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VOICE INTERACTION AND OTHER TECHNOLOGIES

VOICE INTERACTION

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"We do not need magic to change the world, we carry all the power we need inside ourselves already: we have the power to imagine better."

– JK Rowling

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Preface

Inducing a thirst for research among the budding engineering graduates could be the top priority for institutions and teachers who care for the fantastic career of their students. It's not necessary that the research should be so intense at the beginning of their study. But need for research should be elaborated to these students. Firstly, they should be exposed to the futuristic trends in technology, to the need for the modern society with respect to technology, to the user-friendly operations in modern technology and very importantly they should be taught how to collect validated and authentic information from the available resources from the web. Secondly, they should be explained in organising and classifying the gathered information with suitable headings and sub-headings. Thirdly, they need to know about citing the works from where they have collected the resources. Finally, they should also be cautioned about plagiarism. This stable procedure of preparing a literary survey at the initial stage will create positive vibes and will stimulate them to take the lead to the next level of research in the following years.

One such attempt is what you will witness in this book which has followed the above said procedures. A common theme of VOICE ASSISTANTS was chosen and procedures were methodically infused into the minds of the graduates. Skeleton of the paper was shared with the students and the information was gathered, paraphrased in their own language and was inserted to make their papers complete. This maiden attempt has given confidence to the students and has created a real thirst for fundamental research This marks the success of the attempt made by the teachers who not only teach but also motivate and inspire their students.

This book is dedicated to all such wonderful teachers who attempt their best to instill a hunger for research among their students in all feasible manners.

Dr. T. Malathi Gabriel

Dr. S. Horizan Prasanna Kumar

Dr. P. M. Binu

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CHAPTER – 1

VOICE ASSISTANTS – THE FUTURE OF INTERFACE

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1. Introduction

1.1 What is Voice Assistant?

[1]Voice assistants are a type of technology that utilise the user's voice commands to obtain and present certain information or perform a certain task. It uses technologies such as voice recognition, algorithms for language processing as well as voice synthesis to do so.

These commands, usually referred to as intents, are the voice commands of the user. The voice input is processed to listen for certain keywords after reducing the ambient noise from it.

These voice assistants come in various forms. While some are compatible with virtually all digital devices, some are specifically built for specific hardware and physical devices. Some are built for a very specific use case, while some are open-ended and can cater to most situations.

1.2 History of Voice Assistant

[1]Although commonly known voice assistant technologies, such as Apple's Siri, have only been released within the past decade, the core technology pertaining to voice assistants goes back to over a century.

A voice-activated product, known as Radio Rex, is the first product of its kind and was released in the year 1922. It was a simple toy dog that was to function on the user's command of calling its name 'Rex'. The dog would stay inside the house until it recognised a voice exclaiming its name, at which moment it was to jump out of the user's house. It used the technology of electromagnetism. In the toy was present an electromagnet that was tuned in accordance to the frequency of the word Rex's vowel sound.

[2]The origin period, of what we now call modern voice assistants, is believed to have begun with IBM's Shoebox device, which was released in the year 1962. It was able to understand 10 digits (0 to 9) and understand 16 words, [1]which include simple commands such as 'plus' and 'minus'.

[2]In the coming decades, speech recognition research made great progress and these devices were now able to recognise thousands of words, and soon virtual assistants made their way to consumer homes. This marked the era of pre-modern natural language assistants. It produced products such as Dragon Dictate, Dragon NaturallySpeaking and Microsoft's Clippy.

The modern era was marked by the interaction of voice assistants with smartphones. Siri, which was the first to have a great audience, along with Google Now, Microsoft's Cortana and Amazon's Alexa, which gave rise to the evolution of smart speakers, are all products of this era.

Fig 1.1 [2]A Short HIstory of the Voice Evolution

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1.3 Types of Voice Assistant

[3]Rule-Based Bots

These types of assistants are built for a small scope of application in a particular service. The answers to expected user queries are usually scripted manually at the back-end. While building such bots, it becomes extremely important to analyse user queries and behaviour.

Artificial Intelligence Assistants

These do not depend on manually hard-codes at the back-end. Instead, they use Artificial Intelligence (AI) technology in order to analyse user behaviour and create their own set of rules and replies. The AI model is trained on a given data set from which it learns. In order to train the AI model effectively, an enormous amount of data is required.

Grouping Voice Assistants

Here multiple AI assistants are grouped together to increase their credibility and effectiveness of the assistants. Each individual assistant is trained in a specific area of knowledge and hence has a speciality.

1.4. Popular Voice Assistants

Alexa

[4]Alexa is a cloud-based voice assistant service provided and developed by Amazon. It is used to build voice experiences for consumers that feel natural and intuitive, and hence help them interact with the device easily in daily life. [5]It can be invoked or 'woken up' by calling its name. [6]Alexa is powered by two main technologies — automatic speech recognition (ASR) and natural language understanding (NLU). Both these technologies are developed on the concept of deep learning. They work together in order to first convert speech to text, and then recognise the user's requirement by analysing this text using NLU. The overall experience so created is a lifelike conversation that engages the user to interact with the assistant. Alexa can be integrated into various technologies such as Alexa for smart home, Alexa for business, Alexa for hospitality, Alexa gadgets, etc.

Siri

[7]Siri is a voice assistant application present on apple devices such as iPhones and iPads. It can be invoked by the keywords 'Hey Siri'. It can be used to make calls and texts, make everyday tasks more efficient and quick, play music based on prior plays and interests that have been analysed, give accurate answers by using its fact-check mechanism as well as improve your lifestyle and help locate your lost digital devices and files. [8]Siri also works on the two basic principles of ASR and NLU. It is one of the best voice assistants available today. This can be attributed to its sophisticated NLU system. It provides phenomenal results in speech recognition. This can be attributed to the large and varied datasets used to train its aI models as well as the powerful hardware on which the ASR algorithms are run.

Google Assistant

[9]This voice assistant is marketed with the tagline 'Your own personal Google', Google being one of the world's best search engines. It can be present across various devices such as Google Home, smartphones, televisions, cars and speakers. It can be used to help the user get answers to questions that may arise in their daily life, plan the user's day, manage tasks, control smart devices in the user's home as well as discover and enjoy entertainment. [10]It is invoked by speaking the keywords 'OK Google'. Actions On Google allows developers to utilise the technology of Google Assistant by extending its functionality in their applications.

2. Application of Voice Assistant

2.1 Voice Assistant for Business

[11]Voice recognition technology is a step forward in businesses providing better user experiences for their clients. When users speak directly with their digital assistants, it creates an atmosphere of close connection and familiarity. [12]Some of the concrete advantages of implementing voice assistant technology in your business model are listed below.

- Creating a highly engaging and improved interface for users
- Completely remove barriers created by different primary languages

- Offer customer support 24/7 without creating a heavy dependency on resource usage
- Create inclusivity for customers with any visual impairments
- Personalise the user experience by understanding the differing needs of various users

[13]Moreover, by implementing the use of voice assistants in the workplace, business operations can be streamlined. Trivial and repetitive tasks can then be performed by the voice assistants, and hence increase the productivity and resourcefulness of the employees. The AI technology available in voice assistants can be taken advantage of by using them to keep the business infrastructure updated and help in seamless operations of day to day activities.

2.2 Voice Assistant at Home

[14]In homes, voice assistants can be used to create smart homes and operate digital devices running on Internet of Things (IoT) technology. Just by the command of the user's voice, they can get hands-free assistance from their voice assistant in completing their desired task. Some gadgets that can be controlled using voice assistants include air conditioners, lights and other smart switches. [15]A large part of this operation depends on the smart speaker installed in the user's home. Currently, Amazon's Alexa has the market leadership in voice assistants, followed by Google Assistant and Apple's Siri. However, the use of these assistants in controlling smart devices is rather small. Instead, it is greatly used in daily tasks such as checking the news, listening to music, helping in daily tasks such as setting up alarms, reminders and appointments, as well as fact-checking and making information-based queries.

2.3 Voice Assistant for Education

With the advent of technology-rich classrooms, the education industry has come up with various methods to reduce the burden of small tasks on teaching faculty and make classes more innovative and interactive. [16]Similar to a human assistant, voice assistants can take up tasks such as reminding the instructor to perform certain activities, creating calendar notifications and lists, helping assist the instructor

during in-class activities, etc. This can increase the amount of time the instructor has to teach students. [17]They can be used in dictating and story reading exercises as well. They reduce the need for students to break eye contact and hence keep them more engaged in the class. Overall, they help in keeping the class more interactive and enjoyable for students.

3. Pros and Cons of virtual assistant

3.1 Advantages

[19]The use of voice assistants increases safety and accessibility in many ways. They increase users' daily productivity by helping them with trivial tasks and hence reduce the time spent by the user on them. They provide a hands-free method of operation. One need not be physically in contact with the device when controlling them. This increases their convenience of usage by multifold. [18]Smart security devices can help homeowners keep their house and property safe and secure. [19]Apart from these, voice assistants have a virtually unlimited number of skills and uses which make them all the more appealing. They generate conversations that seem natural and personal, which keeps users more engaged and satisfied with the product.

3.2 Disadvantages

[19]One of the great disadvantages of these assistants is that they operate only on voice commands. This requires users to always speak in a moderately clear voice with minimal background, else it might be difficult for the assistant to effectively pick up on the user's commands. [18]Another rising concern regarding voice assistants has to do with privacy and data security. They are essentially like having a microphone always on in your surroundings. There are also concerns regarding the storage of the data collected from the user in order for the voice assistant to be able to function. Installing such technology is not a cheap affair and many times it just so happens that the initial cost of setting up can outweigh the cash and time savings achieved by using the assistant. Although voice recognition and deep learning technology have come a long way over the past decades, it is worth noting that this technology is far from being perfect, and you might find yourself having to repeat yourself in order for the assistant to catch your commands. Relying on voice assistance may result in over-dependence on the technology and avid users to unlearn certain common tasks.

4. Opinion on Voice Assistant

[20]Debates on the potential of voice assistants as well as their vices have been ongoing and increasing. Despite all this, there has been a near-unanimous agreement from consumers regarding the positive contribution of voice-driven software to their lives. This is more than enough proof that the technology is here to stay and evolve. I regularly use Google Assistant on my phone to create alarms and reminders for myself. This assistance has, without a doubt, increased my productivity. With all-new technologies come certain drawbacks, as it is with voice assistance. However, in my opinion, the pros outweigh the cons greatly. The technology provides the convenience of usage and performance of work to an extent that no other technology can provide in comparable measure. With passing time, the technology is bound to become better with increased capabilities. However we, as consumers, must urge the industry to address the various security and behavioural issues that have to do with this technology and, most importantly, use the technology responsibly by keeping a healthy amount of balance and self-awareness.

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CHAPTER – 2

APPROPRIATE ALLOCATION OF SPECIFIED NLP TOOLS FOR THE FOUR LANGUAGE SKILLS

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1.1. Introduction

English is a universal language that has created a global impact and demand for learners at all levels of education. In spite of the prominence the language holds, many ESL learners always regard acquiring the four language skills as a complex and challenging task. Despite the fact that a variety of means have been tried, for various reasons, a large numbers of ESL learners still have much difficulties in expressing themselves fluently. [3]"Mastery of any language does not lie in just knowing the language, but in using the language effectively, meaningfully and appropriately". The more a person uses a language, the more he/she gets accustomed to it. In order to practise a language, a learner needs an interlocutor with effective communication skills to converse or interact with. The usage of any traditional method requires at least 60 to 100 hours of manual effort of the trainers to make learners attain minimum fluency in the target language. But in countries like India, where there is a shortage of trainers, not every learner can be given individual attention.

In order to resolve the problem concerning unavailability of trainer to every student individually, computers were introduced in language learning classrooms and were termed as CALL (Computer Assisted Language Learning). CALL can be a useful supplement when teaching is based solely on direct instructions. It has no interactions with the students. It was created and designed in Language learning classrooms as a medium of instruction, and not interaction. The CALL classrooms were a dumb catalyst which did not undergo any changes during the process of learning. It did not understand what it was tutoring. Therefore, the interaction between the computer and the learner was nil. Many research articles suggested the use of Artificial Intelligence (AI) with NLP (Natural Language Processing) in language learning classrooms in order to resolve the lack of interaction in CALL.

The ability of NLP to understand, analyze and interpret natural language would be of a huge boon to all fields despite variance in disciplinary. Multiple researches have been conducted across fields on tools integrated with NLP. The most researched and downloaded NLP embedded applications such as Amazon Alexa and Google Assistant have tasted their success through the integration of NLP. With the ability to use natural language, it has great potential in the field of education. [4]A research paper has stated that 'Interactive Technology' such as Chatbots and Voice Assistants 'have occupied and invaded the world of online chat'.

[6]Voice Assistants and Chatbots with NLP are appearing in large numbers to fill the requirement of many disciplines in the modern era. These are the two main AI cum NLP based tools that are being incorporated into education by most researchers. Chatbots like Jill, ELIZA, ALICE, Zoe, SmarterChild, NerdyBot and Voice Assistants like Google Assistant, Siri, Amazon Alexa, Bixby, Cortana are being used for numerous reasons such as replying queries, interacting with learners, communicating like a native speaker while language learning, acting as assistants, using for educational purposes, etc. Its integration into various fields is constantly on the raise. Such NLP has been deployed in many language learning classrooms to enhance the four major language skills.

1.2 Statement of problem

Introduction of NLP tools in language learning classrooms might significantly solve various issues of conventional language learning classrooms. However, there is a research gap in identification of specified tools of NLP for the four language skills (Listening, Speaking, Reading, and Writing) individually. Integration of NLP in CALL may not necessarily enhance all the four language skills of the learners significantly without proper methods and appropriate tools.

1.3 Objectives of the paper

- To identify appropriate tools of NLP, a byproduct of AI, for all the four language skills.
- To identify a specified tool for listening and speaking skills altogether.
- To identify a specified tool for reading and writing skills altogether.

1.4 Uniqueness of the paper

Multiple research studies have already been carried out on the usage of Chatbots and Voice Assistants to enhance the four language skills. However, allotting or suggesting specified tools has not yet been done for the four skills individually. The objective of identifying a specified tool for each skill separately would be of immense benefit to language learners for enhancing their language abilities.

2. Review of Literature

2.1 Natural Language Processing

Natural Language Processing (NLP) is a computation that can automatically analyse, understand, and converse in natural human language either in spoken or in written form. It falls out from other conventional computer programs as it, being one of the key components of Interactive type Artificial Intelligence, has the ability to understand unstructured data. [1]In order to understand the unstructured data, multiple layers of data processing is being computed such as Tokenization, Stop word removal, Lemmatization and stemming. Such complicated processing has been created with the intention of enabling computers to understand the unstructured data. The natural language used by humans is mostly data that are unstructured. With the ability of understanding unstructured data, NLP has broken the barrier between humans and machines in communication. If the machines could understand the spoken language of humans, it could act as human assistants or even replace humans at various fields. Similarly, conventional tools that are being used could also be replaced by AI cum NLP tools for its intelligence and interacting ability. Especially in language learning classrooms, the unavailability of a native trainer/ proficient language trainer for a non-native learner has been a grave concern for aeons. This concern can be sorted out through the tools integrated with NLP. The usage of NLP as a tool in language learning classrooms can further motivate and engage the learner to practise the language at his/her convenience.

Advantages of using NLP in language learning

- Students feel relaxed to converse more with machines than with humans.

- Chatbots and Voice Assistants can repeat the same material tirelessly with students.
- NLP provides both text and synthesised speech, allowing students to practise all the four skills.
- Learners talk their minds out to machines which may not be possible, at all times, with human trainers.
- NLP could provide quick expeditious feedback to learners including spelling, grammar and pronunciation.

Fig 1.1

2.2 Chatbots to Reading and Writing skills

Chatbot is a software computer application that acts as a conversational agent. Inculcation of NLP into chatbots could further enable it to understand, interpret and process human conversation. The conventional CALL available in language learning classrooms requires conversational agents to assist the learners in language lessons and exercises to enhance their reading and writing skills. [7]An article suggests the usage of chatbots through CALL for conversations in order to enable learners practise the language by means of adequate practice. The article concludes suggesting that the usage of Chatbots through CALL would benefit the learners. A learner, in order to interact with a chatbot, has to read the text sent by Chatbot and reply in order to have a meaningful conversation. [8]Meanwhile, the learner while having a conversation with Chatbots gets exposed to both reading and writing skills. Wang (2013) argues that there is a connection between ER (Extensive Reading) and writing skills. [9]An article in regard to the relationship between reading and writing skills supports firmly that these two skills are interdependent. At the same time, without adequate and constant practice in writing, one could not achieve fluency in writing. [3]"Success in developing any skill, including language skills, is attributed to constant, meaningful, and

purposeful drills". Thus, with availability at convenience and enough interactions through texts, a chatbot could act as an effective interlocutor to enhance both reading and writing skills.

Advantages of using Chatbots for reading and writing:

- Correct usage of syntax, grammar and spelling of the Chatbot helps the learner identify and get exposed to the proper language.
- The machine uses a wide data set of vocabulary which might benefit the learner in acquisition of vocabulary.
- The learner has the liberty to use natural language inspite of him/her talking to a machine.
- The learner might interact with the Chatbots anywhere, anytime.

2.3 Voice Assistants to Listening and Speaking skills

Voice Assistant (AI) is a digital tool that uses Voice synthesis and Voice recognition with language processing algorithms, especially NLP, to interact with the users. Research on the use of Voice Assistants in language learning is continuously extending. [11]In an experimental study, four university students of Japan participated in an analysis in which the students had a 20 minutes conversation with an IPA (Intelligent Personal Assistant). The study, after evaluation, concluded by stating that 'VA is a potential tool that could be used for language learning'. [10]Another article elaborates on the biggest challenges faced during language learning, one among which is the difficultly of language learners in tracing out opportunities to speak the target language. In such cases, VA could be used, as it has the ability to speak different languages and can be considered an effective tool for enhancing speaking skills. It, when used, could immediately rectify, train and develop users 'pronunciation. A researcher when evaluating the effectiveness of using VA in language learning has made a statement that the learners were able to understand the VA with no or little difficulty. And the same study also found that the communication breakdown between learners and VA is at a low rate of 10%. With the usage of VA, a language learner gets the opportunity to converse or interact with a human-like machine anywhere, anytime. One could enhance his/her speaking skills through constant practice and instant feedback from the VA. Meanwhile, listening skills while interacting will be passively ameliorated.

Advantages of using Voice Assistants for listening and speaking:

- Natural language could be used while interacting with VA.
- The Voice support and NLP of VA uses exact pronunciation, proper grammar and structure, and a wide data set of vocabulary.
- Learners will be able to communicate with VA with basic knowledge in the target language.
- Students feel more relaxed talking to VA than with humans

Conclusion

Review of literature and numerous studies support the benefit of using NLP tools in language learning and teaching classrooms. Besides language learning, NLP also provides data or information required by the learner which keeps him/her engaged and informed. The information provided to the learner through NLP is derived from the internet instantly and so it enables the learner to gather data and to acquire the language as well. NLP provides both text and synthesised speech through Chatbots and Voice Assistants, allowing students to practise and enhance all the four skills. Many researchers have tested and evaluated the effectiveness of VA in speaking and listening skills. However, there are only a few studies conducted on or tested on evaluating the effects of Chatbots on reading and writing skills. There is a research gap in finding out the influence of VA and Chatbot on the four language skills individually. Nevertheless, the specified NLP tool identified through relevant paper suggests the usage of Chatbot for reading and writing skills and the usage of Voice Assistant for listening and speaking skills.

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CHAPTER – 3

VOICE ASSISTANTS - FUTURE OF INTERACTION

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1. Introduction

1.1 What is Voice Assistant?

[1]A voice assistant is a technology that uses voice recognition, language processing algorithms, and voice synthesis to take commands, exchange information and complete various tasks as deemed necessary by the user. The commands they take are known as intent. They usually look for a specific keyword and leave the rest of unrequired noises whilst looking for desired solution.

1.2 History of Voice Assistant

[2]The development of this voice assistant technology has been going on for the last 100 years. The first product that came out was the Radio REX. Then after three decades in 1952 Bell Labs launched Audrey that could recognize 10 numbers. In 1961 IBM launched the IBM Shoebox which recognized 16 words and digits. In 1972 CMU completed the Harpy Program where 1000 words were recognized by the machine. Then in the 90s Microsoft launched Clip. In 1994 IBM launched Simon which was the first smart voice assistant. After Android was released in 2008, Google then decided to spend a lot of money on its own voice assistant which eventually led to the creation of the Google Voice Assistant. In 2011 IBM then launched the IBM Watson which is one of the most intelligent naturally speaking computers. And finally the recent innovations in the field of voice assistant has been that of Microsoft's Siri and Amazon's Alexa where they can be basically classified as voice assistant Search engines.

1.3 Types of Voice Assistant

A) Rule Based Bots
B) Artificial Intelligence Assistants

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C) Grouping Voice Assistants
D) User-Generated VUIs
E) AI-Powered VUI Technologies

1.4. Popular Voice Assistants

Siri

Siri is the voice assistant developed by Apple and can be found in Apple devices. It is the most popular smartphone voice assistant in the world with close to 45% people choosing Siri over any other voice assistants.

Google Assistant

Another great voice assistant based on AI the Google assistant has been found out to be the best voice assistant with most accurate responsiveness on verbal interaction based on commerce, navigation and general information.

Cortana

Microsoft's virtual assistant is particularly useful in obtaining directions. It utilizes Bing to provide answers to user questions.

Bixby

Bixby was developed by Samsung and is one of the most versatile voice assistants. It can solve complex tasks as well like cross checking facts and composing emails.

2. Application of Voice Assistant

2.1 Voice Assistant at Home

[5]The benefits of having Voice assistants can't be emphasized more due to the fact they make our lives so easy. Some of the benefits are-

1. We can set alarm just by speaking.
2. We can listen to songs or hear the news we like.
3. [6]We can also connect our home security along with it.

2.2 Voice Assistant for Business

[7]a) We can just enter our voice and it will send our recorded request over the Internet to its database for providing answers.

b) They help create calendars for appointments, read your emails, add tasks to project management apps, and more.

c) [8]Chat Bots- They are powered and managed by AI by virtue of which there can be consistent engagement with customer. It also helps to easily navigate issues like registration, making payments and delivery issues.

2.3 Voice Assistant for Education

a) [9] A voice assistant can easily play the role of a teacher and make them understand topics with the help of required slides, diagrams and video.

b) It also enables students to focus more as these interactions would one on one unlike in class where ratio is 50 to 1.

c) [10] It also helps in time management as students can get their doubts resolved then and there without waiting for the teacher whom also needs to be an ideal state for solving.

3. Pros and Cons of virtual assistant

3.1 Advantages

1. [11] It helps in improving customer engagement. Voice AI particularly helps brands cater to their consumers better since it is more conversational and can recognize trends. This helps the customer feel more acknowledged and brings in a more personal touch.
2. Voice AI can also take more consumer load and as a result more people would interested.
3. They also help in providing 24/7 customer support and so deliveries can take place in day as well as night.
4. [12] They help in creating a good work environment as deadlines, assignments, meetings and other things won't be missed by the employee.
5. A voice bot can accommodate multiple languages in its portfolio. The multilingual feature ensures that customer interaction is not limited

due to language. This allows businesses to market their products to a larger audience and resolve the issues they face in their native tongue.

3.2 Disadvantages

1. [13] They are not affordable by the general public and only a certain fraction of the society can have them.
2. The technology still has a lot of bugs and the voice match is still not perfected to the max.
3. [14] Companies manufacturing them don't tell us what are the inbuilt things already preinstalled in the device. It has been found out that Amazon's Alexa manipulates the user into using more and more Amazon products.
4. Another disadvantage is that voice assistants as a channel provide less enriching interactions than other platforms. The options are voice content only, which typically involves repurposing existing content, versus visual interactions.

4. Opinion on Voice Assistant

I think Voice Assistants are extremely important for the future where AI and ML will take over the whole working of a society. They can help individual for their personal as well as professional growth. VA's make education extremely interesting for children and thus it will help them to focus more on it. It also has a lot of benefits in offices as seen with scheduling meetings and reminders. It can also suggest in designating work to individuals based on their performance with the help of AI.

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CHAPTER – 4

VOICE ASSISTANTS- VIRTUAL COMPANION

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[1]Voice assistant is a bot directed by artificial intelligence , NPL (Natural Language Processing) and voice recognition to answer our questions and carry our search or chat audibly. The text based terminal require bots to process and analyse texts and give a response. While the voice assistants performs this audibly. So in voice assistants you have to speak out loud to get a response instead of typing your questions.[2]In 1877 Thomas Alwa Edison invented the first dictation machine (Phonograph) before inventing the light bulb, this was the first step towards the voice assistant. Phonograph is a instrument that reproduces sound through the vibration of stylus following the etched grooves on a rotating disc. This works on the principle in response of pressure due to the sound vibration. The earlier devices can only record and play them, but they don't respond to our question. Then in 1880's Alexander Graham bell invented the Graphophone as an upgrade of Phonograph. Graphophone uses wax cylinders instead of foil to record and play it back. This has an upgrade like it allows long recordings and this has a higher playback quality. [3]In 1990's big companies like IBM, Apple started using voice recognitions. Apple started to build speech recognitions into the Macintosh computer in 1993. In April 1997, Dragon introduced Dragon Naturally Speaking , this is the first continuous dictation output which can understand 100 words per minute and it turn it to texts. In 21st century Voice Assistants came into wide use.

3Timeline of Voice Assistants in 21th century

[4]There are various types of voice assistants like Amazon Alexa, Google Assistant, Apple Siri, Microsoft Cortana, Samsung Bixby and so on. All these voice assistants can be used through smartphone and makes our work so easy and saves time.[5]Siri was developed by Apple and Siri allows users to enable our work do audibly like we can make calls, play music , make schedules. This Siri voice activated bot introduced in iPhone through iOS 5 in 2011 .Google assistants were launched by google in 2012. This uses a new feature or software called Google now on Tap and available in latest Android phones. Cortana is a intelligent bot invented by Microsoft and launched in a Windows phone 8.1 in 2014. Blackberry has also developed by RIM or Blackberry Limited to allow different tasks to be done audibly. Hound is a bot which provides fast response and provides a detailed search on weather report, make a call , check the stock market and can also play various games that are interactive. Facebook messenger can be used to plan holidays ,find restaurants, book tickets and many other stuffs in a easier way. This phase is available for only few users and will be allowed by everyone to be used soon. Braina is a digital

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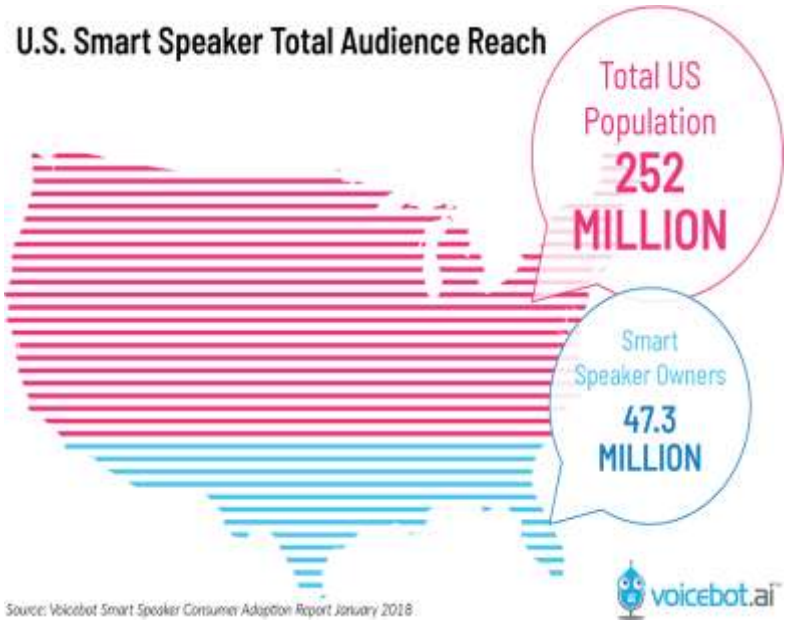
assistant developed in Windows PC OS. This was developed by Brainsoft. It uses a NLI(Natural Language Interface) which enables the users to speak in their own language. Teneo is a bot developed by Artificial Solutions and helps the customers to provide services in enhanced services in their natural language application (NLA).Amazon Alexa is a voice enabled digital speaker developed by Amazon . It helps in setting reminders, provide notifications, answer to our questions and also allow us to place orders in Amazon website . Speaktoit Assistant is a bot developed by Speaktoit . This also perform activities like notifying important events , answer questions , set remainders and customize our services according to our preference.

3Voice Assistants in our home is the rise of the smart speaker .The Voicebot Smart Consumer Adoption Report of 2018 revealed that 20 percent of U.S citizens have a voice assistant in their home. This number in US had its graph go up rapidly .Since Voice Assistant is available in a cheaper smartphone many invests in this and all age group uses voice assistants in their home to make their work easily.



3US stat of voice assistants usage

6Voice assistants also has a technology to integrate home automations , in which we can control our home appliances through our voice. This makes our tasks easy like we need not get up to off fan, light etc.. This helps old aged people to do things easily and allow them to do tasks comfortably or effectively. These automations also make us comfort and look through the security of our home like automatically switching off lights when temperature of wire or the circuit rises. Amazon alexa is more effective and compatible when compared with smart devices like Philips Hue lights and the ringing doorbell camera. Alexa still beats all other voice assistants when we look at the number of options we have for automations in our home. You can also do shopping with voice assistants just by sitting in our home. You will need an amazon prime membership to place your order and you can also cancel and track your order using voice assistant with Alexa .You can also ask Alexa about the new deals offering by the Amazon and place orders easily by just speaking with Alexa from home.[7]Voice Assistants are not only limited for mega companies or corporations. Global banking and Finance network have stated that 88 percent of the global company business leaders use voice assistant bots to grow their business. From consumers side too Google stated that 72% of Google pixel users use AI voice assistant bots to search something .Also it was stated that 52% of consumers say that they wanted to get information through voice assistant AI bots. Artificial intelligence and ML(Machine Learning) have reshaped the consumers behaviour to get things and change their perspective towards trends, which widened the number of opportunities for business. when voice assistants are used in business it completes our work fast and saves more time. This increases the productivity of the employee and work is done more effectively. This technology introduced by companies also attracted people to buy the product and also this further shows the possibility of multitasking. [8]Voice assistants are used as a secretary. Using voice assistants as a virtual secretary benefits business and makes employees work remotely. For example take a case in which businesses use voice bots to stream Zoom meetings. The bots automatically record meetings and the voice assistants transcribe the meetings and helps to find the important things search audibly rather than texting. Doing hand free tasks or automating things in business increase the internal productivity through AI bots. Larger

companies believe that voice assistants are useful in making service request and employees can quickly sort their request and find a solution for them. The AI takes the service requests to workable service ticket. This cuts down the error and allow the employee to respond to these tickets within a time bound and this flow continues in the business.[9] Voice assistants like alexa can also used as a teacher that clears doubt of the students .It has the ability to alter the voice and we can set our liked and comfortable voice so students find easier to follow the instructions and make them easy to engage with the voice assistant bots .In this corona pandemic this voice technology has made the students attend classes online and students were able to clear their doubts and use voice assistants to interact with and clear their doubts. The use of voice assistants has made the students make their doubts clear instantly .Instead of waiting for hours for teachers to respond and provide a solution voice search can be used . Even students can use these bots to practise things that they learn in schools and if they miss any of the class due to certain reason, they can use voice assistants to gain information about the topics that they missed. This voice tech helps the students to learn creative things and make them engaged with unlimited skill. Also these voice assistants are used to make read stories or books to students . These bots have number of audiobooks online. This keeps the students engaged and also make their communicative , listening skill improve from these work. These voice tech can further be utilised to the next stage by making interactive stories. It also makes the students relax through listening music through it and can also make them dance for this music and students can also play games like musical chair through this. Contemporary learnings with the help of podcasts can be enabled. This voice tech engages students to revise exercise that they do in school , test their knowledge in the topic and helps students boosts their confidence on the topic and make them strong with the concepts. Teachers can record their lectures as audio tapes and can be put as a podcasts. These podcasts can be later viewed by the students how much ever time they want to and get cleared with concepts .These podcasts help students to revise and prepare exercise at any time.[10]These bots help students to track their academic performance and their academic progress of every student in an institution. Also help teachers to track their assignments and help them to manage record of

student performances . This also helps students to analyse and plan accordingly to improve their grades .[11]Voice assistant have so many advantages like we can type than typing them on a small screen smartphone. If we are wearing glass or lens and if we look at the phone to read big paragraphs it spoils our eyes so instead we can use voice assistant to read those paragraph. Even when your hands are doing some other work you can operate your phone using your voice assistant. No need to waste time in typing our query and clicking so many websites to get information, we can use voice assistants instead which reads out the answer to us. Even we can ask these voice assistants to say us a joke and we can relax ourselves and also can speak with is about any topic when we feel alone.[12]Improved search facilities, easy customer engagement , converse in any language with no language barrier. Smart working environment to do things fast are the main advantages of voice assistant bots. [13]Not only for the personal requirements we can also use voice assistant bots to build a good enterprise as well. From making customer personalisation, reducing manpower. Marty Weintraub, initiated the Amiclear marketing agency, believed that all voice assistants improve markets by satisfying customers with their personalisation and enhances customers insight. Gartner predicted that digital helpers will help ot recover up 6.2 billion employee hours as a result of using voice assistant in companies. This helps the workers to look at the different part where they plan to satisfy customer needs and improve their productivity and rectify consumers issue and work on it .

These bots help us to have a record of business growth , have a plot of day to day growth which makes the company analyse their growth and plan accordingly. These voice assistant bots can also be used to remind u important dates or events you have to attend , deadline of your work. One of the most important business advantage is streamlined operations, that integrate with digital assistants to enterprise with. This helps them to supervise everything happening in the company and make them to analyse easily. [14]There are many cons in virtual assistant as well like setting up smart home devices with automations are so expensive which cannot be afford by many users, if u have many smart devices with automations they consume more electricity, so it is seen that the electric bill also goes up. Privacy may be mislead by fake websites . If we have a

VUI device, your data may be tracked by the company and can be mislead. There are still many complaints claimed on Google and Amazon Alexa regarding eavesdropping on conversations, this can be noticed like when we speak about something that we want to buy and if we open amazon the product that we want to buy displays first and we get advertisements on google regarding this, so our privacy may be ruined. When you do things in hand and use voice assistant to get some info at the same time u lose concentration on the task in your hand.[15]Even though the voice assistants are accessible everywhere, it needs a good network connectivity to make you utilise things it needs more internet then searching through text. Three out of four customers , that is approximately 75% are using their voice assistants only in home . When they are out they prefer privacy , conversing with the voice assistant makes others nearby also hear about our search and privacy get disturbed . Biggest difficulty is voice assistants do not search the same we say , Error and misinterpretation of our words, if our voice is not that sharp or if our vocabulary is not that good it searches for some other thing that is irrelevant of what we ask , so this is the reason why many cannot use voice assistant bots. Even though the consumers see voice assistants as smarter and easier way to do our daily activities. When it involves money like shopping , booking tickets consumer prefer to do on their own and they do not trust any bots.[16]Most bots are not able to adapt the language of humans this leads people to frustration after trying for several times. These bots cannot be used for every business models ,some business models are so complex and cannot use bots and make people lazy,they don't do any work but get their work completed through these voice assistant bots.

So when we see as a whole voice assistant have both plus and minus on my opinion. It is more useful in some instances and really good for mankind, at the same time it has some privacy relates issues and security issues too. Voice assistant bots make our work do fast, when we have to do a work in small time or listen to a story when we do other work , voice assistants help us in multitasking. Also automations using smart device helps the old age people to on and off their fans and will make their work happen easily and also helps to turn of electrical appliances when the wire or the circuit goes beyond a certain temperature.It helps us from straining our eyes to search information and

read them from a small smartphone and make things easily doable. It can also say as some joke , play music and make us relax when we feel alone or bored. Also for both students , as well as for businesses these virtual assistant help them by reminding their schedule and important events , they also help them to look after the day to day activities and report the stat or plot of their work , which help them to analyse and act accordingly. The disadvantages I see are voice assistants are not suitable for every voice, so wrong interpretation and errors are the main problem with the voice assistant bots, they misinterpret and provide wrong info many times. The set up for automations are really so costly so middle class people cant afford that set up. Privacy can be misused by some voice assistants in which the company eavesdrop what we talk .When we are outdoor everyone see us weird or they feel disturbed or our privacy gets disturbed when we use voice assistants for something. So on the whole Voice Assistant bots have both positives and negatives , so by seeing our need we have to use accordingly and get the benefits through it. This technology is now getting in trend and make our life easy.

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CHAPTER – 5

VOICE ABETMENT- TODAY'S FUTURE

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1. Introducction

1.1 What is voice assistance?

"Okay google play -No time to die". With the simple command we can play music place orders and call people. Life have never been easier for human race aiding it to command technology without using any form of physical attribute.

[1] voice assistance is a digital assistance created by amazon and apple, popularly referred as Alexa and Siri. the program works on recognizing the users' words in statement and converting it to a data recognizable by the computer to process and give the demanded output. The whole process is more complex and intricate using language algorithm, speech recognition audio training.

1.2 History of voice assistance

[2]A six feet tall an analogue box was created to analyse voice and recognize numerical digit in the year 1952.this scientific marvel was named Audrey. Although its small vocabulary it can be considered the big bang in the history of voice assistance. Creators K. H. Davis, R. Biddulph, and S. Balashek of this scientific marvel. Audrey was voice trained using simple telephone and would respond to the speaker by blinking correct light sequence.

[3]The innate stage of voice assistance is pioneered in 1960 by IBM. They created a machine called "shoe box". This revolutionary device recognized 16 spoken words and 0 to 9 digits. It could solve simple arithmetic problems and print the required result. The shoe box was developed by William C. Dersch at IBM Advance System Development laboratory in San Jose. This was a big break through future of the voice assistance that we presently use.

[4]Apple made it possible for the upgrade of the innate stage and combine it with the smart phone. this made it accessibility more to people

and the review was shocking. this was followed by Google, Google now. Google now is a smart speaker connected to android phone more cable in understanding 18 languages, ability to connect people search and connect it to calendar. Microsoft's Cortana also in the line. Although product was available in market, but Amazon's Alexa made into general people demand. thus, making it popular among generation which gave rise to voicebot.ai.

[4]With the increasing competition in the market of voice assistance, each and every software company started to upgrade adding more and more features. Features like calling, messaging, Echo look, camera, speaker etc. Changing the design to make it more attractive. the international approach (UK, Germany, France, Canada, Japan, China, America) of google made it more popular. This competition made the voice assistance slowly and steadily sipping in our daily life. Unknowingly attached itself from daily chore, calling texting, ordering and even playing one's favourite song.

1.3 Types of voice assistance

1. [5] Phones -voice assistance is available in android phones like Apple, Samsung and google assistance. Its connected using cellular network.
2. Smart watch, air pods, fitness band and smart shoe it usually depends on connection with main device like smart phone to operate.
3. Desk top which is stationary and cannot be carried connection used is wifi to use the assistance
4. Laptop and tabs they can be locomoted it also use cellular data as connection.
5. Smart speaker they can be used in home automation

1.4 Popular voice assistance

Alexa

[6]A cloud base voice assistance computed by Amazon, which is available on Amazon products and third-party devices manufacture. Alexa provides more lifelike voice experience to the user giving it an upper hand in communication with technology. The brilliant marketing of the product made it a house old name.

[7]Alexa has over 100,000 skills till date. more than 10.4 million units are shipped world making it one of the most in demand smart speaker. One of the most interesting facts about Alexa is that it has a good sense of humour, known for its jokes and trivia. An interesting skill of Alexa worth mentioning is "away" mode which can be used to scare bunglers away.

Google assistance

[8]Google assistance is avatar of googles first launched Google, which was killed later. now google assistance is used as an extension. The virtual personal assistance is activated by speech recognition of "ok google". The personal assistance knew every detail starting from daily routine and the preferences of the user of the respected software. Assistance is not limited to smart phone but also cars and speaker.

[9]Google assistance has more than 500million user per month. Although its accountable success in smart phone but it lags in smart home application. Amazon is ahead of google in smart home control device using voice home assistance. Google share dropped from 30% to 12 % and amazon share increased 32 % to 37%.

Siri

[10]Apple is working for about a decade to build a handy assistance that will help in every small bit of regular busy life. Siri is available in all apple devices in the present market. Siri is based on machine learning (learns all preferences and advice accordingly), artificial intelligence (giving it more human like thinking system) and on device intelligence. One of the notable features of Siri making popular for confidential usage, all data, fact and document Are stored in end to end encrypt. this feature makes prying of third party impossible and even apple cannot access to the data. Certain aspect of Siri is limited to few countries reducing its global reach. Since its limitation to only apple device user, has put a dent on its popularity reputation.

2. Application of voice assistance

According to Cambridge dictionary the word assistance means to help someone. With the development of artificial intelligence, machine learning and the language algorithm led to evolvement of voice assistance.

Working as personal assistance reminding us of important meeting and event. Suggesting the next purchase according to your personalized taste and many more. The software gives more highly engaging user experience. Thus, decreasing the approach between technology and human through artificial intelligence. It provides all-round support without any extra cost, thus making it economically beneficial.

2.1 Voice assistance at home

[11]Home automation a new trend, which enables a person to access the door, air conditioner, fan and other electrical appliance via smart phone. Automation reduces time and energy, makes it more accessible to people who are senior citizen and differently abled. this feature gives them a feeling of self-reliance. But tends to extent security to people living alone etc. Automation of house old is done using Arduino processor and smart phone. The connection of microprocessor and the Arduino is done by Bluetooth module. The device can only be accessed by authorized person. This can be used as luxury gadget to reduce, to make an efficient home and increase the standard of living. The main purpose of home automation is to provide a smart technical assistance at your hand's reach 24 into 7.

2.2 Voice assistance at Business

[12]Artificial intelligence and machine learning is creating new breakthrough in the new area of vin virtual assistance. VAs is creating new interest in the business and more user are increasing day by day. The voce assistance has proved to take more speedy and correct running voice notes which helps to prevent miscommunication. Time is money, thus saving both simultaneously. Since there is no physical attribute required to activate assistance, multitasking have never been easier. Texting calling no more need typing and handling smart phone, virtual assistance is there to help just at voice command. Voice is efficient enough to handle the tone of text and emotion. Making digital schedule, calendar event and never miss a deadline with virtual assistance. It not only limited to smart phone, but its presence in smart watches and ear phones well organized work where ever and whenever.

2.3 Voice assistance for Education

[13]One of the noble aspects of the virtual assistance is its contribution the education of differently abled people. Leaning disability is no new to our community but getting its due recognition and using technology as aid is true form of advancement .there are different learning disability like dyslexia ,dysgraphia , carpal tunnel syndrome, vision impairment, physical disability and limited English knowledge .People with limited motor access and physical disability can use voice assistance for typing , virtual learning and home automation .Speech recognition tools help students to type faster and gives them a feel of self-reliance . By removing the physical approach to education and teaching is helping lot in advancement technology and computer for differently abled person. The voice assistance gives then feel of confidence which help them tackle problem and writing without falling back of pace. The problem faced by this new methide is the time for the student to get acquainted with the new technology and comfortable in using it on regular basis.

3. Pros and Cons Voice Assistance

[14]Having analytical mind aids a person to decide the advantages and disadvantages in order to make sensible decision. Similarly, through pro and cons we can come to a sensible conclusion which is the main aim of this article.

3.1 Advantages

1. [15] Access through voice- everyday necessity, our smart phone now can be accessed through voice making multitasking easier than ever
2. Natural conversation- they are capable of telling jokes and display a good sense of humour making it more live experience in conversion.
3 Personalization-machine learning help to understand the user choice and inclination just enhance the browsing experience.
4. Breaking language barrier-the voice assistance is accessible in variety of language and it can be effectively use as instant translator, making good travelling companion
5. Home and security -the voice assistance e can be used by senior citizen and differently abled to access home appliance by voice command.

6. Planner – they can work as virtual planner. Access your calendar and plane events, schedule meeting and etc.
7. Availability – it is not only present in smart phone but also in speaker, smart watch and air pod. Increasing its accessibility
8. Reduce the technical barrier for people with learning disability
9. Its available 24X7 without any extra charge.
10. Voice assistance makes less human error and works at very faster pace

3.2 Disadvantages

1. [16] Since voice assistance have replaced the repetitive work load thus increasing unemployment.
2. Data security -since this technology access a lot of data at once the concern of data also comes along. There is no reliability of apps and site it uses.
3. Maximum time they are just reading already existing content, just removing the visual aspect. Thus, missing all the brownie point in engagement with user thus draw back for marketing teams
4. [17] The expense of home automation reduces makes it a luxury device
5. Makes the user lazier and reduces concentration power.
6. It also normalize multitasking thus increasing the work load of an already busy person
7. There were claims of alexa and google eavesdropping our conversation, scaring the user.

4. Opinion on voice assistance

Man's indefinite urge to discover, build and create has led to exponential growth in the field of technology and science. Thus, expanding the probability of the man's development in future. Starting from the nanotechnology to interstellar, knowledge is empowering man kind since the dawn of history. Yes, a knife can be used both ways to kill someone or to save a life, it us who chooses what to use. The of breech of privacy is one of the concerning facts of related to the technology we don't know till want extent out conversation is being recorded. its concerning for security purpose. But it more noble cause in expanding it for education for people shows our true form of advancement in humanitarian aspect. The way it provides self-reliance to senior and

differently abled people gives a good aspect to this technical side. People will do more work in less time thus increasing working efficiency. There are many good scopes of this new technology, which can be used for greater good. But there are always people misusing it for harming and selfish reason. We should always look on brighter side and control the other as much as possible.

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CHAPTER – 6

VOICE ASSISTANTS-TECHNOLOGY SPEAKS UP

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1. Introduction

1.1 What is Voice Assistant?

[1]Voice assistants are technical devices based on programmes that interpret the verbal comments given by the user and respond accordingly using artificial intelligence. [2]They give the significant and desired information by using voice recognition and various algorithms. They could be used in various devices like in cell phones, televisions, computers, etc. Using our voice to give commands to this voice assistant, we can get our desired information without having to physically use our hands to search for this information. It is supposed to make life a little simpler than usual.

1.2 History of Voice Assistants

[3]As time passed by, there was a clear advancement in the making of these devices. Its first form of appearance was seen when the IBM introduced their Shoebox device although it only understood sixteen words and nine digits. During the Pre-Modern era, the 'Clippy' which was Microsoft based came into existence. It wasn't widely used but it gave future creators some guidance about what they should and shouldn't do while building the voice assistants. The Modern Era sees the collaboration of smart phones and voice assistants, and the first product was introduced as Siri created by Apple. Eventually, the crowd saw the appearance of the creation of Google which was Google Now and the google voice assistant and Cortana which was created by Microsoft. In 2014, Amazon then built Alexa as well as Echo. As time passed by, technology has shown more advancements and more features can be seen updated on these devices.

1.3 Types of Voice Assistant

[4]Voice assistants can be categorised into different types based on their functioning and structure. Rule-based bots don't necessarily need to

fulfil extreme requirements and rather assist in finding solutions to small scope of necessities. So, they would not require a complicated algorithm unlike Artificial intelligence Assistants. Artificial Intelligence assistants have their own rules and produce algorithms by taking in instructions from the user. They can respond to more complex queries and are very useful in VUI designing. They even have the ability to imitate a human beings voice. Various large official companies use this type of assistant such as Google, Apple and Amazon. In group assistant voices, various voices are used instead of just one. Although they are rarely used, they come in use when distinct voices would be required for different purposes, where one voice would serve a special purpose and another would serve some other. This would allow the user to keep themselves organised and would find it more convenient during stressful situations. [5]There are also in-app voice assistants that inbuilt in a company's website or their own app. This allows the users of their app or website to have an easier access to it and overall make it a wholesome experience. Stand alone voice assistants do not associate with any other applications and communicate with their users without the support of any app. They work and function as an independent voice assistant. Examples of this type of voice assistants are Suki and Niki.ai.

1.4 Popular Voice Assistants

[6]One of the most popular voice assistants is named as Siri, developed by Apple. Using Siri, one can play music, send messages, place calls, and have other features as well. This voice assistant is built in an iOS device. Cortana, which is developed by Microsoft, is another widely known voice assistant that can be used to find files on the device, set reminders, etc. For android, Google Now and the Google Assistant are the commonly used voice assistants which was launched in the year 2012. Like other voice assistants, they can send texts to other people from your device, find directions to a particular location, etc. The infamous Alexa, created by Amazon, has the ability to almost give an output to any command. All the user has to do is say the word 'Alexa' and give their command along with it. Alexa can play music, place orders for online items from Amazon, provide web information, and perform other various tasks as well. It has the ability to have control over other devices too and

these other devices can be accessed using Alexa. There are many other equally valuable voice assistants as well which also include a few of these features in their own devices.

2. Application of Voice Assistant

2.1 Voice Assistant at Home

[7]Using voice assistants at home have shown great convenience to the users not just at home but even when they are outside. There are times when us humans have our hands occupied and are unable to do a particular task at that instant. This is just one instance where voice assistants become handy at home. These assistants can be accessed any time making them reliable at any moment of the day or night. They also save enormous amount of time as humans can just use their voice instead of having to manually do the required task. [8]They also seem to provide comfort at one's home by playing music or even telling jokes. One can even stream their videos or use these assistants to turn on or turn off their room lights. Simple daily questions can also be answered by these voice assistants. For instance, you can check up on the weather or ask what time it is. One wouldn't have to worry about their spelling or grammatical error while manually typing and searching for the information. Some voice assistants can even amuse the user by saying jokes to them. One way or the other, they tend to make life a little less complicated than usual.

2.2 Voice Assistant for Business

[7]Voice assistants can be used in a workplace too and can actually provide a benefit to the company. It would eventually save money and labour as instead of having actual assistants, voice assistants might be equally useful, maybe even more beneficial. The use of human resources gets reduced and hence money as well as valuable time is saved. Since they are powered by artificial intelligence, they also are more capable of providing more accurate answers and solutions. [9]Voice assistants can go through large pieces of data and pick up specific data from it and present it to the user. All this can be done by just using one's own voice. Instant information can be gathered up using these assistants within a short period of time. This improves efficiency and saves time all together, boosting up the productivity of the company. While working with

international businesses, there could sometimes be a language barrier but with this limitation that exists, voice assistants could have the ability to convert one language into another without having to use human translators. They could also assist in scheduling meetings and work out the clash in times so that a proper time can be fixed when everyone would be available. [10]If we talk about how voice assistants help in uplifting a business, the designer could go on forever, talking about various advantages. They have become widely convenient for everyone and for those technical companies who are looking to be a step ahead, incorporating voice assistants in their technical products would definitely attract their customers. With the wide increase in the use of voice assistants all around the globe, a rise of their presence could be seen in various devices and apps. One can say that they have definitely been a part of the world's current advancements. Their contribution might not be as visible as other technologies but they have a wide role in providing assistance at a work place.

2.3 Voice Assistant for Education

[11]Voice assistants have shown to be a crucial part of children's as well as student's lives. The new generation students have included technology with almost every activity in their lives and therefore using technology while learning also seems like a great way to educate students. There are some voice assistants that have the ability to give flash briefings that would remind the learning student things they would need for school that day. For instance, it would remind them that they have PE that day and so one would prepare themselves for that upcoming class happening later. Even during class, the teacher could also use this device to share a few minutes of useful information so that their students would be able to have the best learning experience. A different method of learning would always attract students and grab their attention. So, this way, the student would be listening to class and taking in information while enjoying the learning. There are also some instances where teachers do not find the need of using these an external tool for teaching in class. According to them, it would be a waste of time and energy and would eventually create a lot of distractions. There would be people who would wonder as to why they could trust a device that uses someone's personal voice. Companies

building these voice assistants, like Amazon and Google, keep on updating their privacy policies ensuring that the user feels safe while using their personal assistant. [12]Another use of these voice assistants in the classroom is that it could help the teachers find an efficient way of keeping up with their work. They could deliver information by using the voice assistant and set themselves a reminder for classes or any other work. This allows them to save quite a lot of time and use that extra time for their students. Teachers nowadays always seem busy and find no time for themselves either. It would reduce the pressure on them and also keep themselves sane at the end of the day. They could also be used in simple tasks like setting a timer in class for small quizzes, or extract a piece of writing from any online book and share it with the class. It could also read out poems or play background study music. All this might allow students to have the best learning experience and keep them engaged during class.

3. Pros and Cons of Virtual Assistants

3.1 Advantages

[13]As one can obviously point out, voice assistants have many beneficial advantages to us. They eradicate the process of typing and save us that extra time. It frees up our hands to simultaneously do more than one task. This efficient advantage allows us to finish our work faster and reduces any of that extra stress that we put on ourselves. Another advantage of a voice assistant is that it is always available at any time of the day and additionally gives instant responses. It supports the user at a 24/7 level and one could even find support from it at times of distress at any point of the day. Using voice assistants also eradicates the language barrier that might occur between two people or between a customer and a seller. It would be able to translate one language to another and this makes it easier to communicate at times of international businesses or while handling with customer service. It can even assist one in their workplace by analysing the work strategies and find solutions to one's problems. It could become very hectic at a workplace sometimes and using these devices may help control with the excess activity that goes on around. When we talk about toddlers who don't yet have the ability to spell out words and type their queries, they could easily speak them out to these devices and independently get an immediate answer. [14]With

further updates on technology, one can use their personal voice assistant at home which control the home smart devices and let the voice assistant know when they leave the house. This would turn the home devices off and save electricity and money too. You could even ask for sales on travel tickets and save money on those too.

3.2 Disadvantages

[14]As much as these voice assistants sound absolutely useful, they do cost a lot and might not be affordable for a lot of people. So, a lot of thought would need to be put into it before investing in them. There could also be security issues that might come up while using these voice assistants. The things that you ask them are stored in clouds and might have the slightest possibility of being hacked into, so one would need to be very secure and also make sure that their Wi-Fi password is strong enough. [15]One would always need strong signal to access them. If you don't have enough signal strength, it might lead to disruptions while using them and cause more irritation. You also must always ensure that your voice is loud and clear enough for the device to detect it, or else it would not give back any response. Sometimes, as this device is fully voice based, there might be limitations caused due to the difference in accents of various people. Also, another limitation is that it would only detect voices and not other signals.

4. Opinion on Voice Assistant

In this world, where things keep on changing every moment of the day, voice assistants seem like a necessary tool in today's modern world. They do seem like they assist in a lot of daily activities but although its convenient, it could end up making one lazy, both physically and mentally. Talking about using them in a workplace, I think it wouldn't be a necessary problem and might actually create an overall positive impact. Even at home, where one could simply set themselves reminders about upcoming events or asking about simple information. This would be very useful when one would be inactive to type the query manually. Investing in smart home devices does indeed sound like a good idea in the long run especially in workplaces and in apps. They are just additional features on apps, and it would depend on the user if they want to make use of that

feature or not, leaving the entire decision up to them. So, in my opinion, voice assistants could be widely accepted by the crowd and can also create huge impacts to society as well. One should definitely not misuse it and eventually become inactive because of them, especially at home. If it makes life simpler and more convenient, then there should be no hesitation in making use of these devices. With the increase in development of technologies, I am sure that in no time, voice assistants would become a part of everyone's daily lives. Although there are quite some drawbacks to it, they could be kept to the side for now, as all good things would definitely come with their own disadvantages as well.

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CHAPTER – 7

VOICE ASSISTANTS – A VITUAL FRIEND

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1. Introduction

1.1 What is Voice Assistant?

The life of an Average person starts with a day full of work which he/she tries to complete before going back to sleep, but one major thing that we all think at least once is that – What if I had a personal assistant who could remind of all the work which is lined up in the entire day. We cannot all afford to keep a real assistant with us who could take our calls, write our mail and sometimes do the basic Household stuff, and then there comes Voice Assistant which can do all of that, just to the physical things but all the work-related things we tell it to do. More like things such as drafting emails, setting reminders and helping us with some hard topic we are stuck at and are not able to get it. all via augmented reality and voice interaction by reshaping the way people engage with the world and transforming digital experiences. Voice control is the next evolution of human-machine interaction, thanks to advances in cloud computing.

1.2 History of Voice Assistant

[1] The 1990s digital speech recognition technology became a feature of the personal computer with IBM, Philips and Lernout and Hauspie fighting for customers. Much later the market launch of the first smartphone IBM Simon in 1994 laid the foundation for smart virtual assistants as we know them today. The History of voice assistant isn't new, it was introduced back in 1961 by IBM, introducing the IBM Shoebox, the first digital speech recognition tool. Due to the lack of technological advances back then it only recognized 16 words and digits. After a Decade of demanding work in 1972 Carnegie Mellon completed their Harpy Program which was a massive thing back then as it was able to understand 1000 words easily. In 1990 The Company Dragon launched Dragon Dictate which was the first ever Speech recognition Product made for Consumer (fact – it was priced for 6000 $ which is about $13,024.45 as on 5th April 2022).

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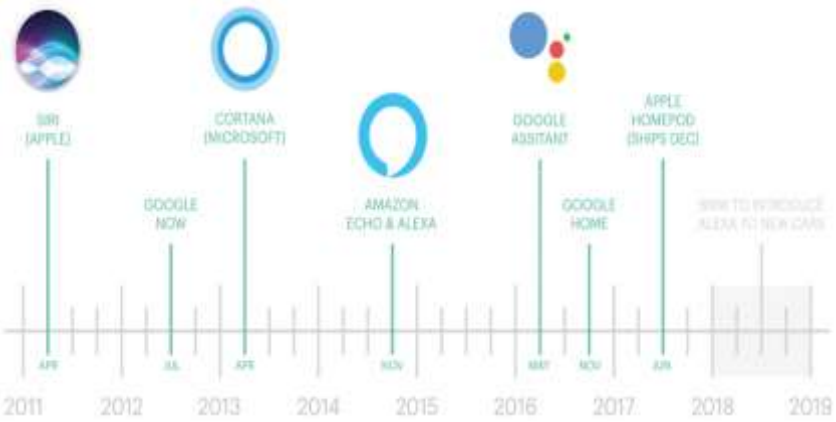
[2] But that all changed on 14th April 2011, when apple announced a voice assistant named Siri which was exclusive to their mac and iPhone lineup. It changed the whole perspective about the virtual voice assistant as it was the first time that a person was able to talk to an unreal person from the palm of his hand and the virtual assistant would reply flawlessly. It came like a revolution in the world and everyone who were looking for a phone started to majorly buy apple iPhone, just because they wanted to be a part of this revolution and they wanted to tell how it is like to have a virtual assistant in the palm of your hands.

Looking at the demands made by consumers, Google also thought the same thing and on 9th July 2012, just one year after apple launched Siri, Google released their own virtual assistant named google now back then but after it was named google assistant on 18th May 2016. Google assistant came and changed the game for apple, because of not everyone had money to buy an iPhone, so most of them went with android operated smartphone and in those smartphones, they got far better polished and friendly virtual assistant as compared to apple. Cause let's be real, apple was the first one to make it possible, that's why it had some flaws which then google corrected and implemented in their own voice assistant.

Apple and Google were the major names in the voice assistant part of Technology in the world back then and will remain the same in future.

But we cannot forget Amazon which launched its Alexa on 6th November 2014, which is the leading voice assistant people fit in their house to turn lights and appliances on/off, set reminders and play music without pressing a single button.

The next is the future we are now experiencing in our daily life as consumers of this generation.



1.3 Types of Voice Assistant

- **Voice assistant in Mobile phones -**

The Voice assistant present in our phones are used to perform the basic tasks like Order a cab, Order Food, set reminders and to get answers to our silliest doubts in the easiest form. Some examples of Voice assistants present on our phone are – Siri and Google Assistant.

- **Voice assistant used as interpreter**

[3] While travelling Abroad, if a person faces an issue in understanding what the individual in front of him is saying in his own native language ex – French, The Traveller can just use voice assistant and ask it to translate what the person Infront of him is trying to tell him, and this helps a lot of Travellers who travel around the world but don't know much about the country's native language, they are travelling to.

- **Voice assistant used in customer support**

Companies add Voice assistant as their customer support, as it let the Costumer to ask the questions, set appointments and perform other business-related things as per their convenience. The experience would be similar to conversing with a live agent at 24X7 customer support. The best example is the call we get from banks when we try to make a big payment or the call from Amazon or Flipkart which tells us that our order is now out of delivery.

- **Voice assistant used in cars for navigation**

If an individual is travelling somewhere locally or interstate and doesn't know the path to reach his destination, he/she can search the

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route via google maps and their voice assistant can guide them the correct path to the destination. Everyday millions of people use google maps to navigate the routes. Not only in google maps but also many car companies include their own voice assistant, which has its own database of map and on a single command can set the direction for the destination we want to reach.

1.4. Popular Voice Assistants

Some of the popular voice Assistants Include

- **Apple Siri -**

[4] Siri is a popular Voice Announced introduced by apple on 14th April 2011, Apple was the first big name which brought a Virtual assistant in the palms of your hands via their iPhone and as an assistant on Mac Devices. Siri was like a revolution by Apple was as everyone forget the first company which made the technology of Voice assistant, was IBM, not apple, Apple just worked on it and made it accessible to the common people like us. Even after launch of google assistant Everyone still chooses Siri over google because of its privacy and security features of a person's life.

- **Amazon Alexa -**

[5] On 6th November 2014, Amazon Alexa was shown to the world in a press conference, it is Amazon's cloud-based voice assistant for its users who buy either Echo Devices or a speaker compatible with Alexa, it can build natural voice experiences that offer its consumers an easier way to interact with the technology they use every day. It plays the song we ask it to, and our Playlist saved on our Amazon Music Account, also can turn ON/OFF lights and Appliances just by saying to it. Amazon offers a collection of tools, software, voice mode and tutorial guides for us to build Alexa as we want it to be. A study Says children are more comfortable with Alexa then with any other Voice assistant which already proofs how interactive and fun Amazon Alexa is.

- **Google Assistant -**

[6] On 9th July 2012, Google assistant was introduced to us from the biggest name in tech industry "Google", it was first named as Google now but later got changed to Google assistant on 18th May 2016. Google assistant was introduced as a Voice assistant for people who use android

phones, which was majority at that time, and just after the release the boom of google assistant was incredible, as it was much more friendly and humanly while replying to the Questions. The main thing Google did was that they added a voice character for each region a person is from and he/she can choose the assistants ascent they are more comfortable with. It allowed users to jump right to their favorite features of an app just by using their voice. Which was really intriguing for a person who didn't have much resources to buy an iPhone.

- **Microsoft Cortana -**

[7] On 2nd April 2014, Microsoft introduced its own voice assistant called Cortana which was exclusively available Windows 10 Computer and Windows 10 Mobile, their approach was to give us a flawless experience between your windows mobile and laptop just as apple was doing with their products. As we clearly see Cortana was in work before Apple's Siri, as it got spotted in 2013, when a developer enabled Microsoft phone was accidentally sold to a customer. But as happy as this story seems, the end of it is sad. Cortana failed in the market miserably due to lack of promotion and support by Microsoft which made the whole thing. And now Cortana is just a feature we skip while going through the startup pages of Windows.

- **Samsung Bixby -**

[8] On 20th March 2017, Samsung Announced its own Assistant called "Bixby", Bixby was not like Google assistant it was a whole new voice assistant made by a team in Samsung and was limited to Samsung Flagship Phones at first, the even added a separate button in Their flagship series S8 and S9 to open Bixby on a click, but later got removed from the upcoming series. Bixby was Samsung attempt to take on the company's assistants like Siri, Google Assistant and Amazon Alexa. But it didn't have the success Samsung Imagined in the battle of smartphone assistants. After trying to revive Bixby for 2 years Samsung removed the sperate button from their flagship series as they were getting criticized due to that, and now Bixby is also just a startup Setup which we all skipped while starting our new Samsung phone. But it's not all done for Bixby, as it is still in their home appliances business, as an assistant who can get your things done on voice recognition, as if you keep food in microwave before going to office and ask Bixby to microwave it, it will the voice and microwave the food, and same goes with Samsung's Dishwashers and Refrigerator.

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2.Application of Voice Assistant

2.1 Voice Assistant at Home

[9] "Ok, Google, what's the weather over the weekend?", "Hey Alexa, where is the closest Punjabi Restaurant?" These questions have been adapted in our daily life. Voice-based virtual assistants are here to play a significant role in our daily life and in our homes. Having a Voice assistant in the house makes us more productive and saves a lot of our time because we do not have to do the physically it can be done just by telling the voice assistant.

Some of the well-known Home-based voice assistants include:

1. Amazon Alexa
2. Google Home

They both do the same work and are both available with a Digital interface (with a display) or just in a form of a normal speaker which listens to our voice, saves the command in cloud storage and send it to our mobile or laptop which have the same account signed in in them, and by this process we get our desired reminder list or shopping list which we told the voice assistant in the morning on our phones.

2.2 Voice Assistant for Business

[10] For giving service to the clients 24X7 companies spends lots of their resources on Costumer Support Branches, in which people workday and night just to reply to the same things a costumer asks them for. If Companies integrate Voice assistants in their business for their customers. It can save lots of resources for the company as now they'll not have to pay for all the employees whose work can be done by a Voice assistant. Voice assistants are not humans, it can give the business 24X7 Costumer Service Capabilities. As it will let Costumer to ask questions, set appointments and perform other business-related things as per their convenience. The experiences would be similar to conversing with a live agent at 24X7 customer support. It will also increase the productivity of a company as the ability to multitask with Voice Assistant Hands-free is productive across all industries.

2.3 Voice Assistant for Education

[11] It will be nice to have an assistant to remind you that it's time to take transition to Calculus from English or read Direction to a primary grade kid while his/her mom is driving the car to the house so that it will be more fun and easier for kid to know where they live. Not only that, if a student gets a doubt in any topic while studying, all he/she has to do is ask the question to the voice assistant and the easiest form of answer will be told, so that he/she can understand it easily. Voice assistants can take on all those tasks and help teachers make their work more efficient. Calendar reminders, list-making, programmed routines and information delivery without having to pause instruction can give teachers a bit more of their resource, which is Time.

3. Pros and Cons of virtual assistant

3.1 Advantages

1. [12] Many Big Brands Like Dominos, Burger King, KFC makes a partnership with Google and Apple So that if a customer wants to eat a pizza, he/she can just tell the toppings and the type of pizza he wants to have, after that the voice assistant just place the order on your address and pizza gets delivered, it clearly shows how voice assistant Improves Customer Engagement
2. In these modern time Companies add Voice assistant as their customer support, as it will let Costumer to ask questions, set appointments and perform other business-related things as per their convenience. The experience would be similar to conversing with a live agent at 24X7 customer support
3. Voice assistant can shoulder responsibilities such as important reminders, and sometimes some small doubts about a topic. So, to make the working space more efficient. For instance, Voice Assistant can be installed at Receptions and on corners to direct visitors to the proper section easily. Additionally, voice assistants can be employed to carry out repetitive tasks or perform secretarial duties.
4. [13] A voice assistant can store multiple languages in its cloud storage. The multilingual feature ensures that customer interaction is not limited due to language. This allows businesses to market their products to a larger scale of customers and resolve the issues they face

in their native language. The boost in customer experience comes with benefits such as increased brand awareness and better consumer belief towards the brand.

5. Regardless of the chosen device Laptop or Mobile Phone, Typing is an incredibly tiring process. Both our eyes and Hands need to be concentrated while typing, making it incredibly difficult to multi-task. A voice assistant easily removes this redundancy. It can pick up verbal cues needed to combine the information and provide exact results in a moment's notice. Moreover, the voice feature frees up your Hands, thereby enabling you to complete tasks simultaneously.

3.2 Disadvantages

1. [14] Smart home devices which are controlled by virtual assistants are expensive, and not everyone can afford them. They also consume a lot of electricity. So, if you have a lot of smart home devices, you can expect to pay a higher electricity bill. When there is no electricity, you cannot use it.
2. Using a virtual assistant with voice recognition can cause you to lose concentration on the tasks at hand. You are giving attention to the virtual assistant when supplying instructions and trying to carry out the task at hand at the same time. When the attention is divided, you are prone to make mistakes. So, before giving instructions to a virtual voice assistant, make sure to stop whatever you are doing and remember the stuff you must do in the day in the back of your mind.
3. [15] If you have a Voice assistant, your verbal as well as behavioral data gets collected by these manufacturers such as Google and Amazon. There have been complaints about this, for example, in 2017 many people started to claim that Google Home and Amazon Alexa are listening to private conversations. This caused people to worry about how their personal data is being used by these manufacturers. Aware of the issue, the manufacturers are now working on offering better privacy controls to the consumers so that they can use the technology in peace.

4. Opinion on Voice Assistant

Today the Technology is changing and getting advance day by day. Earlier there was only a computer on which we could do only some tasks. But after the advancement in Artificial Intelligence, Machine Learning and a few more technologies, computers became so advanced that we can perform all the types of tasks in it, even a task like drafting a research paper. In such a booming era of advancement if a person is still struggling to interact using an input device, then it's not worth it. In this paper, Research about Virtual Voice Assistants is presented. And after looking though the whole Indepth research, my opinion about the topic of voice assistant is on the brighter side. They are like a virtual friend of our who help us when needed and always answer to our silliest Questions. I think voice assistant is the best way to organize and ease up our life, Research on this topic is limited since voice assistants and smart speakers are now gaining popularity. But after looking at virtual Voice Assistant as a whole, I think we should encourage the fact that we made a surreal thing like a whole assistant in the palm of someone's hand possible. For making the virtual assistant more friendly Companies should integrate more things that can be done just by talking to a virtual assistant as it saves our precious time and makes us more productive. Findings presented in this research paper will hopefully inspire other researchers to further explore this vast topic. Smart speakers and voice assistants will be the Centre of interest in coming years as they enter the everyday life of households. Also, with the integration of increased languages in the database of these Voice assistants more are more people can understand what it signifies and are using them in their daily lives. In the upcoming years, the boom for Virtual Assistants will be unbelievable and we all will see them used by more and more individuals. In conclusion I think the advantages of voice assistants outshine its disadvantages and if companies like Apple, Google and Amazon work on it, The Virtual Voice Assistant is the best way to make us as consumers more productive and happier.

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CHAPTER – 8

VOICE ASSISTANTS: THE MODERN ERA SERVANT

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1.INTRODUCTION

1.1 WHAT IS A VOICE ASSISTANT

[1]Since the beginning of the robotics era, we have always had to learn the language of technology, it may be keyboards, binary, coding, or touchscreen but voice assistants have turned this around. Now the technology is learning our language and is operating on verbal commands. The artificial intelligence, voice recognition, voice command and natural language processing (NLP) has made the world of voice assistants' user friendly and optimum.

[2]Basically, the voice assistants take the voice commands as inputs, turn it into texts, break it down into simpler forms, analyse it and then provide the user with an answer in verbal output. Most voice assistants work passively in the background but interact only when they hear their wake-up word. This wake-up word when spoken loud enough initiates the responsive function. Simply put, it is a software that communicates with the user audibly using various inbuilt functions and programs.

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1.2 HISTORY OF VOICE ASSISTANT

[3]It all started in 1922, when a toy dog named Rad1io Rex came into the market. The dog used to come out of its house when his name was called. It worked on voice command, and was the stepping stone towards the voice enabled technology. Audrey the automated digit recognition machine was developed in 1956 by Bell Labs and was used for dialing calls using voice commands.

The IBM shoebox was the first voice activated calculator which recognized 16 words and numeric letters. It came it to prevalence during the Seattle World Trade Fair in1966.Eliza Computer was the first chatbot which worked on NLP and was made to show the conversation with a computer can make you feel like the computer has a human like aura.

The next stepping stone in the path of voice assistants was the Speech Understanding Research Program which aimed to acquire the vocabulary of at least 1000 words similar to that of a child. It was started with support of United States Department of Defense at the Carnegie Mellon University in Pittsburgh, Pennsylvania in the 1970s.

The voice recognised typewriter named Tangora was an upgrade to the IBM shoebox. It had the vocabulary of 20000 words and was named after the fastest typist at that time. It had to be adjusted according the speaker's speech and the pauses between the words.

[4]The voice recognition feature was offered by IBM and Philips in the 1990s but the smart virtual assistant features as we know them now were first introduced in the 1994 in IMB Simon smartphone.

[12]The Dragon's Naturally speaking software introduced by IBM in1997 was the first voice recognition software that could transcribe natural human speech at 100 words min without word pauses. Now fast-forwarding to 2011 when apple introduced the first modern world voice assistant called SIRI int its iPhone 4S. In later years Google,

HP and Amazon joined Apple in the race towards a better voice assistant with their own products line Alexa, ok google, Cortona etc

1.3 TYPES PF VOICE ASSISTANTS

[5]Voice assistants are basically of three types:

General Purpose Voice Assistants:

They are the voice assistants that help you with normal tasks like setting an alarm, calling someone, playing music, or asking for weather etc. They are generally present in the smartphones or smart speakers. They also help to control the other smart devices like watches, lights, AC etc. They are made in such a way that the come handy in day-to-day life and are easier to use for the consumers.

In-App Voice Assistants:

Noticing the rising demand and craze about voice assistants, many big companies have started introducing voice assistants in their app like Flipkart, JIO, Big Basket, YouTube etc. These voice assistants help the user to easily find thing in that particular app and enhance the user experience. The In-App Voice assistants are of two types, one which are owned by the app itself and the other which are owned by big voice assistant companies.

Stand Alone Voice Assistants:

They are not placed inside an app but work as a primary way to communicate at few domains to make the work easier. Suki is one of the stand-alone voice assistants in an app build explicitly foe doctors and medical care staff. They use different transcribes from google or other big brand voice assistants to make their work more efficient and approachable.

1.4 POPULAR VOICE ASSISTANTS

[6]A few famous voice assistants are SIRI, Google Now, Amazon Echo (Alexa), Cortona etc. All of them are available is different devices and have different specifications. We will talk in brief about all four of these:

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- **Siri:** It was developed by APPLE inc. and can be used to make calls, schedule reminders, play music, read texts, and simple searches on web. It was first available in iPhone 4S in IOS 5 update. Later on, it was available in other apple devices like MacBooks, iPads and even iPod. It is a voice activated intelligent voice assistant which was introduced in 2011 and since then has been the most used voice assistant of all.
- **Google Now:** Google's intelligent voice assistant which is now available in almost all the android phones was introduced in 2012. It can do all the google searches and also all the general stuff like calling someone or scheduling an alarm. It can also be used to get the directions to some place.
- **Amazon Echo (Alexa):** It is a smart speaker introduced by Amazon which responds to the name Alexa. It can play any music, tell current affairs, set alarms, tell time etc. It is also used to control the other smart devices in a smart home. It works seamlessly with the amazon website while ordering items or creating a to do list.
- **Cortona:** It is the primary Voice Assistant introduced by Microsoft in 2014. It was first introduced in the windows phone by Microsoft but now is available in laptops too. It can be used to crack jokes, put reminders, finding files on phone and track packages.

2. APPLICATION OF VOICE ASSISTANTS

2.1 VOICE ASSISTANTS AT HOMES

[7]Automation of daily routine has always been difficult but the voice assistants have made it very smooth functioning when it comes to our houses. From the smart devices to making almost everything touch free. The difficult part in automating our homes was to understand all the tech stuff and how to operate them with various remotes and their scary buttons. But the introduction of voice assistants at homes have made it so much easier. We don't have to understand the manual or different modes, just need to speak it out loud enough and everything will be done on our command. From turning on lights, to playing jazz on speakers, from changing the room temperature to pre heating the oven, from listening to the current affairs to adding items to your shopping list, everything now can be done just by saying it.

2.2 VOICE ASSISTANTS AT BUSINESS

[8]Voice assistants are inculcating well in the business world. The ability to get things done on command even when your hands are busy is like magic to a kid for the corporate world. Employees can easily schedule their meetings, update the calendars, note their work progress, and handle the documents and files in a very easy manner. They help increase customer experience, productions, marketing, track projects and boost productivity at workplace by making the logging process easier.

2.3 VOICE ASSISTANTS AT EDUCATION

[9]Teachers face a lot of difficulty to maintain eye contact with the students while reading matter from somewhere but the voice assistants solve this problem by narrating the texts with proper voice modulations and pauses. In the recent covid times getting something done just on your commands without touching any buttons is a blessing in disguise. The voice assistants will minimise the contact chain and hence reduce the health risks. For students the voice assistant is like a teacher 24/7. It can answer all the questions at any time of day. Do smooth web searches about topics, and explain them in brief verbal modules of information.

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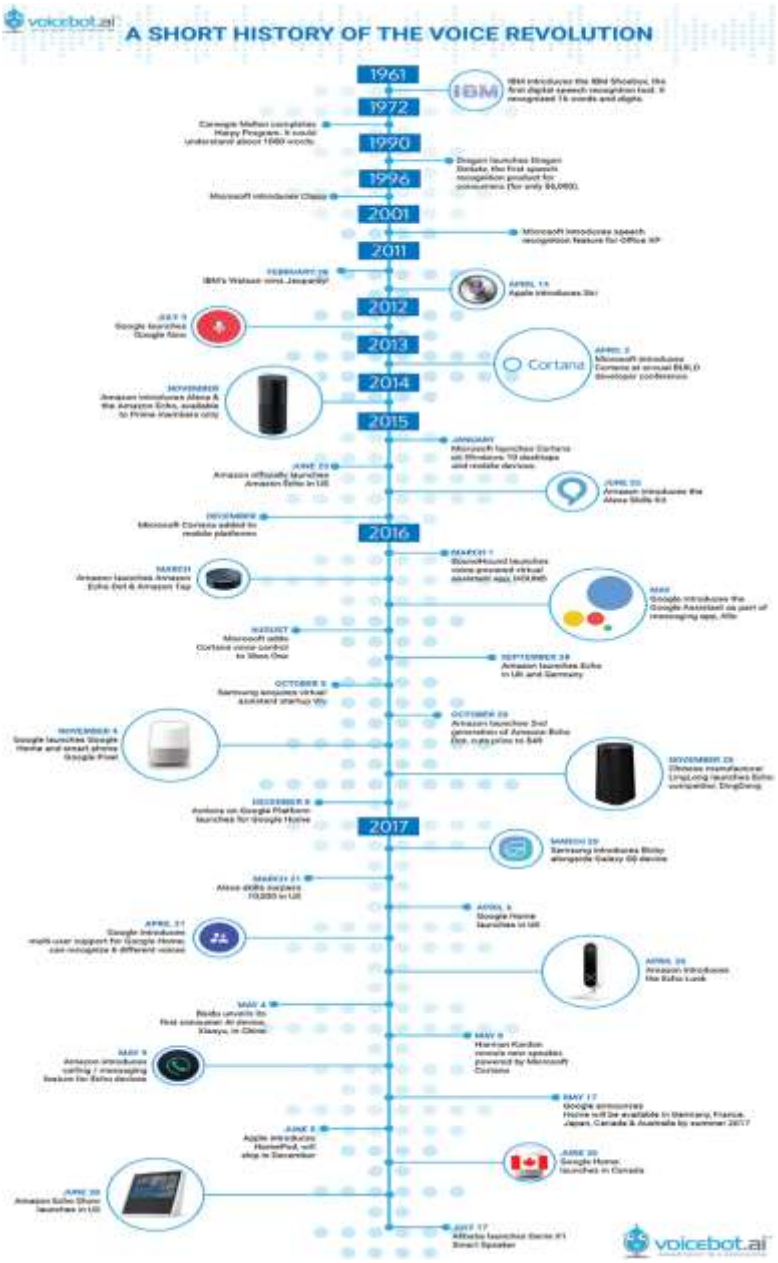

3. PROS AND CONS OF VOICE ASSISTANTS

3.1 ADVANTAGES

[10]Voice Assistants are improving our lives step by step and making the daily chores easier and smoother. There are various advantages of voice assistants, a few of them are as follows:

- **Improving e-commerce Websites:** The voice assistants have made the user experience more influential on e-commerce websites. Not only it makes it easier for users to find and order the things they like but the also get fascinated by the interactive feature of the voice assistants which help them choose the right products.
- **24/7 Customer Support:** A customer can ask for help regarding something at any time of the day but it is the company's duty to provide help. Sometimes it is to provide the help at odd hours whereas in the case of voice assistants, the customer can just fiddle with the speaker and interact with the bot for the simple solutions. It reduces the cost of employment and also makes the work more efficient.
- **Eradicating Language Barriers:** Its difficult to communicate when you go to different countries because of the language barriers and the different accents but voice assistants like google are making it very easy for people to communicate. Google Now has 22 languages and they are adding more of them, so if you need to convey your message to someone the voice assistant can do it seconds.
- **Hand Free Operation and Automation:** Automation of mundane tasks through voice assistants not only saves time and man power but also makes the work more efficient. The hands-free operation helps us to do multitasking and managing work better. From scheduling meetings to finding files with just one command, voice assistants have covered it all.

3.2 DISADVANTAGES

- [11]**Violation of Privacy:** Most of these voice assistants wake up only after listening to wake up words, but there are still many questions that do they hear all the conversation that we have during our day. It might not listen it actively but it is still listening it passively which is a big privacy concern.
- **Data Security Concerns:** As these voice assistants are becoming so prevalent, these companies might sell the personal data that they collect during the interactions with the bot. People might share important notes to keep them safe which might be classified, selling this so-called safe content is dangerous.

- **Lack of Accuracy and Misinterpretation:** Even though the voice assistants have developed a lot but there is still some number of misinterpretations. Like with homonyms, sometimes they make errors to choose if to use "there" or "their". They also face issues when it comes to understanding the acronyms which are nowadays used very commonly.

4. OPINION ON VOICE ASSISTANTS

Voice assistants have changed our world for the better. Not only it has made our lives easier by automating our mundane routine but also it is a big step towards a world of advances robots who function on artificial intelligence. Yes, we need to accept that there are some privacy related issues which need to be worked on but who are we lying to, our world is nevertheless filled gadgets invading our privacy.

Voice assistants have also made the lives of differently abled easier. People who are visually impaired or the people who have hand amputation can easily use voice assistants for their day-to-day life. They have brought us closer to tech life as it has eradicated the language barrier between us and the machines. They have the future of fully automated world one step closer. The changing of lights on our command still feels magical to most of us.

There is still a need to spread the benefits of voice assistants in India as very few people use this wonderful technology. Although most people know about it but don't the various tasks, they can use it for. We need to show people how user friendly the voice assistants are, how everything in the world is just one command away from you and how you can organise all your technology stuff just through one common device,

Voice assistants have made their impact in all three places, it maybe homes, schools, or place of work. They have created a place for themselves which can not be replaced now. Soon these voice assistants will become the new need for everyone. Hopefully voice assistants will develop to such an extent that they could classes, surveys, interviews etc on their own eliminating the margin of error.

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CHAPTER – 9

STRENGTHEN LISTENING SKILLS BY RECTIFYING ASSIMILATION AND ELISION PROBLEMS IN CONNECTED ENGLISH SPEECH WITH MOBILE APPS

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Abstract

This research paper delivers about how sound foundation and mobile gadgets help the students improve their listening comprehension through recorded speech and conversation. Discussion on the challenges listening and the remedial actions taken to those difficulties. The association of phonological assimilation and elision awareness on ESL (English as a Second Language) listening skills is investigated in this research. Variation in word-final consonants is thought to cause ESL learners' difficulty with connected speech word recognition. However, research findings do not definitely demonstrate the ESL listening success, because the spectrum of mechanisms studied was not carefully controlled, among other things. Hereby, the quantitative method of survey helps find out whether the audio-lingual method has been used or not in the L2 classes or mobile tools and imitation techniques help to improve listening accuracy.

Keywords: mobile application, the impact of listening skill, assimilation, elision

Introduction

Technology is a dominant one in English language Teaching because it helps the students in multiple ways. In the area of teaching English (ELT), many theories and methods have been developed to teach the language effectively and in the twenty-first century, for example, Mobile gadgets provide enormous sources and learners can assist the E-sources at any time and anywhere. Since the English language is unforbidden in job sectors, a flexible learning system is a necessary one. If we are supposed to acquire any language properly, we should follow

the LSRW, among them LS is the primary process and for this alphabet and the word' patterns are not required much to do this practice. listening is a mental process and needs attention to be very close to any speech.

A good listener is to understand the content in a single attempt but the beginners face some predicaments such as assimilation and elision of connected speech. Sometimes L2 learners difficult to understand when a sound at the end of a word is transformed based on the beginning sound in the next word, it is called assimilation and when a sound is elided, it is called elision (Assimilation: When Two Sounds Combine, n.d.). so often the students fail to understand the English is spoken in the English classroom it is a needful condition. Though the lack of laboratory practice and lack of interest in L2 learning, the mobile phones make a comfortable environment and create curiosity in listening. Today the smartphone has become popular worldwide with a broad range of users, from all levels of education. The mobile applications provide the content like a daily conversation, through which students listen to the vocabulary and understand the assimilation and elision.

Review of literature

Mobile apps help as an effective tool to practise the skill of listening with various types of audio-video content. The sound such as the paralinguistic features, supports listening comprehension (Katchen, 1996). **Assimilation** is a frequently connected speech process in which the effect of a nearby phoneme causes one phoneme to change to another. For example, after the voiceless /t/, s is pronounced as a voiceless /s/, as in 'cats,' yet after a voiced consonant like /g/, as in 'dogs,' s is pronounced as a voiced /z/(Sahatsathatsana, 2017).

Some examples like

Could you please give me?

"Coujoogimme?"

The /d/ sound in "could" and the /y/ sound joined to form a sound ("Coujoo"). This is due to palatalization, which is a sort of assimilation. This is also true for various noises and sound combinations. (Assimilation: When Two Sounds Combine, n.d.).

With the support of technology-based teaching and audio content, we could sort out this problem in listening.

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Elision is almost always used in less formal discourse. When native English speakers converse, a lot of phonemes or segments are not uttered. As a result, English learners should not expect to hear every segment of the spoken language (Roach, 2010).

Challenges that student face today

The status of communication skills in rural area colleges is maximum below the average because of the reason. teaching listening comprehension is one of the most important and difficult duties for any foreign language teacher. Mobile apps and sound with subtitles help students improve their listening comprehension and how they feel about this instructional tool(Safranj, 2015).

- Lack of awareness about fundamental sound of the language.
- No choice to listen authentic the english word pronunciation and accent.
- Lack of training to practise the skills.
- Peer group activity not to be conducted.
- Students have minimal time to listen to the second language.
- They don't have another optional apart from the classroom in the rural area.
- English vocabulary utterly varied from subject to subject, for example, history subject english vocabulary utterly differs from the science subject.

so, with the help of the teacher's guidance and mobile app students can listen and learn the various types the accent, pronunciation of the language, but sometimes the tragedy that is not happening inside the class rooms. These are things that should change in the field of second language learning.

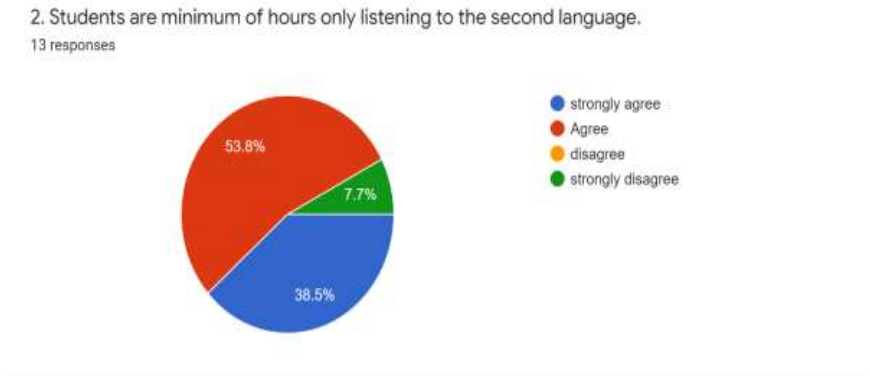

Figure.1 Status of L2 listening in classroom

With help of the google form a simple survey study has conducted above the tertiary level student to know about the ESL classroom experience. The image shows that there was minimal time only students listen the English language which obviously transparent through strongly agree 38.5% and agree 53.8%, so they get lower chance to get the exposure of the assimilation and elision.

Discussion & suggested mobile applications

When students listen to the conversation of audio book, it avoids the hesitation to repeat again and again to decode the sound because mobile phones be an individual personal teacher, there are lakes and lakes of content available and help to escape from inadequate of learning time, these kinds of practices reinforce their listening skill.

Mobile phones provide multiple advancements to improve language skill, students can improve their listening skill and words pronunciation. Apps affords audio material for depending upon learners' level like the beginner, pre-intermediate, intermediate, upper-intermediate, advanced. It helps learn all the aspects and elements of the language and also objective type test and voice recording option to support the evaluation by learner itself.

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s.no	Name of the app	language aspects	chosen skill & level of exercise	Kind of Learning	Mode of activity
1	IELTS (International English Language Testing System)	Listening	Listening: Basic -34 lessons	• 100 Most Common Phrases • 1500 Most Common Words. •Vocabulary. • English Useful Expressions • Irregular verbs. • British Slang. • English Pronunciation. • Common Phrasal Verbs. • English Tenses.	Audio and viewable syntax clips.
2	TOEFL Listening	Listening, reading	Listening: Listening to conversations and lectures.	1000 Most Common Phrases. • 1500 Most Common Words. • Irregular verbs. • American Slang. • English idioms by categories. • English Phrasal Verbs. • English Pronunciation. • English Tenses	Audio and viewable syntax

Figure 2. suggested apps to practise

The figure 2 shows that different type of audio mode conversation, transcription, language aspects, varied level of exercise and different kinds of learning and speedy access.

Conclusions

Since India is a multilingual country so the English language is mandatory to pay special attention to teaching and testing the it. Mobile Technology serves for the learners effectively and reinforces the different areas of language skills, specifically in the area of listening skill, it creates the good environment and kindles the interest in listening to the components of the language and it affords a self-learning and evaluation option with the help of a master device.

Though mobile assisted language learning method is recommended for college students.

Apps are would rectify the listener difficulties from the assimilation and elision comprehensiveness. The prior preference to the listening skill is improve the language. Here ample mobile learning devices are available and which affords numerous opportunities to reinforce their listening skill.

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CHAPTER – 10

VOICE ASSISTANTS- THE PINNACLE OF TECHNOLOGY

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1. Introduction

1.1 What is Voice Assistant?

[1]It is a device that takes the speech of the user as the input, analyses and recognizes words from it to perform the task specified by the user. The software looks for particular keywords in the speech input and filters out any background noise.

1.2 History of Voice Assistant

- [2] 'Audrey' was developed by the Bell Labs (US) in 1952. It could recognize digits.
- Then in 1962, IBM invented 'Shoebox Machine' which was capable of recognizing digits and about 16 words. It could also carry out simple arithmetic calculations.
- [3] 'Harpy' was launched in 1976, built by Carnegie Mellon University and funded by DARPA. It could recognize phrases and had a vocabulary of 1011 words.
- The year 1986 saw the coming of 'Tangora', which was linked to a typewriter. The software proved to be very useful as it could recognize about 20000 words. However, these devices did not adapt to individual speakers.
- 'NaturallySpeaking' was built by Dragon in the year 1997 which could process natural speech which means that the users did not have to pause between words. The key feature of it was that it could be purchased at a very affordable price.
- IBM and Google's collaborative project, 'Watson' was a major leap for the voice assistance technology when it bet Jeopardy champion Ken Jennings in a trivia quiz.
- [4] The later years saw the advent of modern day speech recognition devices such Apple's Siri in 2011, Google Now in 2012, Microsoft's Cortona in 2013, Amazon Echo in 2015 and after that there was no turning back.

[5]**Audrey**

[6]**Shoebox Machine**

[7]**Harpy**

[8]**Naturallly Speaking**

[9]**Watson**

1.3 Types of Voice Assistant

- [10]**General Purpose**: These are available in smartphones, smart watches, smart speakers etc. These are used to set alarms, online browsing, making calls, sending messages etc. Some examples of the software falling under this category are: Google Assistant, Bixby, Siri etc.
- **In-App**: Most of the apps available today, provide a 'voice search' feature to enable quick and easy search for its users. Examples of apps and services which use in-app voice search are YouTube, Amazon, Domino's, Flipkart etc.
- **Stand Alone**: These are not embedded in apps but are themselves stand-alone apps. They have limited uses. Some examples would be Niki.ai and Suki. Suki is a stand-alone voice assistant build for use by doctors.

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1.4. Popular Voice Assistants

Some of the voice assistants, popular in today's electronics market for their compatibility, user-friendly features and affordability are enlisted here:

- [11]Amazon Alexa
- Google Assistant
- Apple Siri
- Microsoft Cortana
- Samsung Bixby

[12] Amazon Alexa

[13] Google Assistant

[14]Apple Siri

[15] Microsoft Cortona

[16]Samsung Bixby

2.Application of Voice Assistant

Voice Assistants have diverse applications in the modern world. They make our lives easier and enhance our productivity in various ways. Their applications in various environments are listed below.

2.1 Voice Assistant at Home

[17]At homes, voice assistants can be used to:

- Play music
- Set alarms and reminders
- Create shopping lists
- Play short games and quizzes
- Get weather and traffic update

2.2 Voice Assistant for Business

Businesses and enterprises make use of voice-assistance technology as follows:

- [18]Chatbots: In-application chatbots that interact with the customers through voice recognition, enable one-on-one customer-business interaction. For example, several ecommerce platforms like Amazon provide voice-enabled chatbots in their mobile apps.
- Voice Payments: A bank in Turkey, called Garanti, has built a Mobile Interactive Assistant which can interact with its customers, making mobile banking easy.
- Within the organization: Voice assistants can increase the productivity within the organization. For examples, HR managers have been using voice assistants to analyze recruitment data and add a conversational medium between the applicant. Another Assistant, Darwin, can evaluate attendance and salary records, team performances etc.
- Feedback and Visibility: In-app voice assistants collect huge amount of consumer feedback which would not have been possible otherwise. This valuable feedback can help companies improve their performance. Also, many people now-a-days prefer voice-shopping and companies like L'Oréal are tying up with Amazon to make their product information accessible on Amazon Echo and others.
- Advertising: Voice assistance technology has added to the existing forms of digital advertising, very popular these days as people spend more time on their mobile phones. The voice assistants provide personalized recommendations to the users based on their input.

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2.3 Voice Assistant for Education

[19]In classrooms, it can aid the teacher in many ways:

- Alexa, with its human like voice features, can make learning more personalized and interesting.
- Voice assistants can read out texts to the class.
- They make it easy to store and access huge amount of data such as student attendance, performance record etc.

They can also help students in homework as they provide facts and information from reliable sources with just a voice command.

3. Pros and Cons of virtual assistant

The pros and cons of voice assistance are listed below.

3.1 Advantages

- [20]Information can be accessed hands free
- Saves time
- Helps users that suffer from physical disabilities

3.2 Disadvantages

- They are expensive
- May hamper privacy
- It is not error free

4. Opinion on Voice Assistant

Technology is a boon till it is used consciously. Voice assistance has clearly made our lives easier as it gets things done just by saying. It is of great help to households, education institutions and business firms. It has helped create the concept of smart homes and offices. It is getting improved every year as more and more features are getting embedded into it. In the coming years, we can expect ourselves to be heavily dependent on voice recognition technology. This is indeed a boon for humanity and with the advancement in technology, some of its limitations will also get eliminated. As this field gets explored more, the now expensive voice gadgets would certainly be made available at lower prices. With further developments, background noise cancellation would get improved and these assistants could become more versatile in recognizing different

languages and voices with different accents. This field is the need of the future and an ever growing one. Hence, it can be rightly termed as 'the pinnacle of technology!'

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CHAPTER – 11

THE IMPACT OF VOICE ASSISTANTS

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1. Introdution

[1]The rapid evolution of AI and machine learning made possible the development of voice recognition technology, which is how actively penetrating every area of our lives. And there's nothing to wonder about: for such social-dependent creatures as humans, speaking is a lot more natural activity than writing or, of course, typing. An average human can type about 40 words in one minute, but pronounce 150. This contrast, alongside with many other benefits we're discussing below, vividly demonstrates why voice Assistants should be taken seriously by not only IT giants and fans of smart homes, but every business owner out there.

1.1 What is Voice Assistant?

[2]In simple words, We can say that as per the request of the user digital assistant that using the voice recognition, language processing algorithms, and voice synthesis to listen to specific voice commands and also return relevant information or perform specific functions. Filtering out the ambient noise and its completely software based and also able to integrate into most devices, some assistants are designed specifically for single device applications, such as the Amazon Alexa Wall Clock. Because of their wide array of integrations voice assistants are integrated into many of the devices we use on a daily basis without that our life is bit tough according to me such as cell phones, computers, and smart speakers.

1.2 History of Voice Assistant

[3]Voice assistants have an incredibly expanded history that genuinely returns to 100 years, which could appear, apparently, to be confusing as applications, for example, Siri have as of late been passed inside the on beyond 10 years. While many feel like voice innovation is a more current advancement. Nonetheless the review, advancement, and execution of voice and discourse acknowledgment innovations has been happening throughout the previous 70 years.Before Thomas Edison

authorized his light, he envisioned one of the earliest working correspondence machines. The principal phonograph, which he worked in 1877, contained a pointer that scratched grooves into a turning, tinfoil-covered chamber in light of the strain conveyed by sound vibration. The decorated record could then be used in reverse to vibrate the pointer and change those advancements back into detectable sound. These early contraptions could record talk and play it back, yet they couldn't deal with words and take any action- and the phonograph's delicate tinfoil made befuddled accounts, most ideal situation.

Alexander Graham Bell created a redesign on Edison's phonograph, whuch hi volta Graphophone Company safeguarded in 1886.The graphophone used wax instead of foil, which thougth about longer records and more astounding playback. Edison also encouraged a wax transformation of the phonograph and the two contraption were used essentially for dictating letters and other documents, and then gradually this kind of inventions upgraded to Audery which was the first true speech recognition device in 1952 then to Shoebox which was introduced by an IBM Engineer at 1962 worlds fear in seattle.Then to tangore which was the next version of Shoebox invented on 1986 then the next level invention was done on 2000 by Apple and on 2010 by Google and these will be still devolvind.

1.3 Types of Voice Assistant

[4]Google Assistant, Siri, Cortana, Facebook M, Blackberry Assistant, Braina, Teneo, Speaktoit Assistant, Hound And Amazon Echo (Alexa).[5]Which are available on android,iphone's etc.(2)Application activities, a function of Google Assistant, may be used to activate actions inside certain apps utilizing deep. Connections. Amazon (Alexa) is just introduced the same thing for Alexa on applications.These are the examples of the Voice Assistants which can be found in the smartphones, smart speakers and other smart devices. All the Voice Assistants are used for the set the alarm, organizing events, making phone calls, opening apps etc.

1.4 Popular Voice Assistants

[5]There are many popular voice assistance but on the peaks is Siri, Google assistant, Bixby and Alexa. Siri, presently lacks such a capability

and performs poorly when compared to Alexa and Google Assistant.Google Assistant and Alexa are increasingly concentrating on executing activities inside applications, infringing on the space previously occupied by in-app Voice Assistants. [5]Alexa can handle common queries and execute things like presenting a press conference or setting a diary alert. Alexa has received a Follow-up Mode, which enables you to deliver repeated orders to the voice assistant. Once you've given your initial order, Alexa will answer without needing to be roused up or awakened. More significantly, Alexa's conversational talents demonstrate that she is staying up with the fast-paced field of voice assistant innovation.

2. Application of Voice Assistant

2.1 Voice Assistant at Home

[6]According to me voice assistants have been part of life since Apple introduced Siri on the iPhone. From there, Amazon gave us Amazon Echo and Alexa smart speakers followed by Google Assistant. There is also Samsung Bixby and Microsoft Cortana.

Voice assistants give marketers access to multiple users in a single household. These consumers all make unique purchase decisions because they have their own brand preferences, product interests, and music playlists.

[6]There are disadvantages to, that voice assistants as a channel provide less enriching interactions than other platforms. The options are voice content only, which typically involves repurposing existing content, versus visual interactions. This may diminish some of the more meaningful engagements that marketers can have elsewhere. [13]The Nest Audio, which belongs to the Google family of gadgets, is quite comparable to the Echo in terms of pricing. The connectivity with other Google products is a huge plus.

2.2 Voice Assistant for Business

•Use a voice assistant as a secretary

[7]When the voice assistant act as a virtual secretary can benefit for businesses.

For example, businesses have begun using voice AI to streamline Zoom meetings. Every meeting is automatically recorded, and the voice assistant transcribes the meeting and its also helpful for many students in

corona period. [14]Voice assistants are known by a number of names depending on the specific application they are used for. Intelligent personal assistants, automated personal assistants, smart assistants, virtual digital assistants, chatbots, and voice assistants are only a few examples.

•Let a voice assistant boost internal productivity

[7]Nowadays voice assistant technology is increasing internal productivity. Larger companies find that voice assistants are helpful for making service requests.

Employees can quickly and easily create a service request by voice, and the AI transforms the request into a workable service ticket.

Give a voice assistant customer service tasks

Voice assistants should be a part of our customer service strategy too. It frees our staff to handle more complex problem and work more productively Consumers prefer the ease of communicating with a chatbot or voice assistant for simple requests like tracking packages or basic troubleshooting.

Because voice assistants are not human, It also 24/7 customer service capabilities. This lets customers ask questions, set appointments and perform other business-related tasks at their convenience.

2.3 Voice Assistant for Education

Do you know what is double-edged sword in classroom?

[8]Its Using a voice-assisted device into the classroom . It may compromise not only the identity, but the safety of minors.

In generation students will work collaboratively . The workplace like Siris and Alexa , makes sense to acclimate them to the practice today. However, the voice assistant device concern about student privacy. Google Home is better left at home. If voice assistants is used in classrooms educators and parent have to tackle together.

[15]Monitoring each pupil's information, both in vocational and academic data, is a time-consuming operation. While technology such as the Learning System makes this process simple, voice assistants go one further by assisting school officials with their day-to-day work

3. Pros and Cons of virtual assistant

3.1 Advantages

•Be your own boss:

[9]I want to be a boss the own boss so who doesn't want to become their boss? Nothing without a freedom and freedom is everything. attractions to working as a virtual assistant is that you can be your own boss

•Do life the way you want

[9]As the boss, you can live your life the way you want without worrying about taking time off or taking sick days and upsetting co-workers or employers. You can choose to take a client or not. You can choose how your job intertwines with your family life and make it work best for you

•You can choose the benefits you want:

[9]We do no have to wait for a year or more to receive vacation time.you can take leave however long and also whenever want.

[10]You can utilise Alexa Skills and Google Actions to help your clients complete certain tasks. Artificial intelligence assistant technology aids your company's everyday activities, which are constantly monitored. Specific voice commands may be used to recall crucial dates, targets, schedule a meeting, The use of a voice-activated personal assistant to automate repetitive chores liberates human time and effort.[11] Technology for individual voice assistance is here to stay. Simply speaking to a gadget to complete duties is an enticing invention that opens up a slew of possibilities, particularly for enterprises. Voice-to-text innovation is primed to definitely influence behavior of customers, and organisations must be prepared to accommodate customer expectations if necessary.

3.2 Disadvantages

[9]Working from home as a virtual assistant has its downsides as well. Although the pros outweigh, these three cons are definitely worth considering:

• Be my own boss

[9]Being your own boss can be great, but it can also be a burden since you have full responsibility for the entire business. You have to take care of all the little details that a business requires as well as perform the tasks you have been hired for. It can be a little daunting.

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- **Chores**

[9]Sometimes working from home can be a huge distraction. Life happens, and it happens a lot at home. Children get sick or do not take their naps. Appliances break or pipes leak, and you still have household chores to do on top of the work you are doing for your business.

- **No company paid benefits**

[9]The company paid benefits are a nice thing to have, but when you work from home as a virtual assistant, you do not have those luxuries like 401k plans, paid leave, paid insurance, retirement and more. You are responsible for all those benefits rather than a company paying for them.

More: Why You Have to Stop Checking Your Email Over the Weekend

When you consider becoming a virtual assistant, be sure to really take the time to think about this freelance job and weigh the pros and the cons as you make a decision. Make your own list of pros and cons too and see how it would work for you and your family.

[12]Device voice instructions are frequently "physical" demands... Unlock the door or activate an appliance. In contrast to privacy concerns, this poses a major threat to protection and wellbeing. While the hazards connected with residence use are restricted to that home, they are part of a larger set of concerns linked with the Internet of Things.[13]While voice activated companions have their drawbacks, they do add to the comfortability of a smart home. The future of smart things is in better hands, with further enhancements planned for voice assistants.

4. Opinion on Voice Assistant

People like Voice Assistant, the voice technology that is the part of so many people in their every day life can fell all but useless.Telling Alexa to play songs or asking siri for directions can be almost impossible whenever prolonged("Aaaaaaaa-lexa") or chopped ("Hey….Si….ri!") sounds cause the devices to misunderstand my commands or stop listening altogether.Voice Assistants could radically improve our lives. Their inaccessibility could even be dangerous for those with mobile disabilities, who could rely on voice assistants to call for help. Instead, they often fail to understand us.

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CHAPTER – 12

VOICE ASSISTANTS – BEGINNING OF AN AEON

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1. Introduction

1.1 What is Voice Assistant?

Advancement of Technology in this time of Digital Revolution has come up with various advancements in the field of science and one such promising practical example could be taken of Voice Assistant.[1]Voice Assistant enables user to input command using one's voice and get the relevant output result from the same by using modern algorithms integrated with AI using voice synthesis to get the commands. Voice Assistant has such algorithms which could filter out specific types of keywords and search them over internet to give precise piece of information. Voice Assistant make work handy and furthermore reduce the processing time of hand typing the input/query. Voice Assistants AI and algorithm comes with flexibility to integrate with wide variety of devices such as computer, cell phone, smartwatch, speaker, home theatre's etc. Hardware integrations like Echo and Alexa Screen increases its usage exponentially in daily life making it more user-friendly. AI algorithm keeps on rebuilding itself to improve by each search to meet the user demand and dominate the market.

1.2 History of Voice Assistant

Most of us believe that the era of Voice Assistant began from Apple Siri back in 2011 [2]however this technology was introduced and implemented a 100 years ago in a toy named "Radio Rex" where in Rex a dog would jump out of the house using vocal input in which an electromagnet was tuned to the frequency of the word Rex which then generated the subsequent output of making the dog jump out.

[1]Futher Advancement in technology helped the enhancement of Voice Assistant like the Automatic Digit Recognizer by Bell Labs in 1952, IBM Shoebox by IBM in 1962, Darpa's Speech Understanding Research (SUR) in 1971. However, the 90's saw a sudden progress in field of research and development and Voice Assistant products started to make the way to the homes of consumers.

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Dragon Dictate shook the market in 1990 by making the worlds first user oriented speech recognition program which could take input of one word at a time with a time interval between each at a price of $9000. IBM bought the first smart Voice Assistant in 1994 named Simon and soon around 2010 the world-renowned companies like Google, Apple and Google Powered Alexa entered the game which completely changed its course and made it a revolutionary boon to the world and set a steppingstone to the Tech Oriented World.

1.3 Types of Voice Assistant

[3]Now a days many kinds of Voice Assistant are available in the market to cater the demands of the consumer. The back end functioning of AI algorithm associated with the Voice Assistant keeps on changing. It's user-friendly nature which makes integration with various other devices and applications even more easier making it a dominating Tech in the field of AI applications. Commonly used kinds of Voice Assistant are:

1. Rule Based Bots-

Small scope requirements are met by Rule Based Bots which are predefined to perform a particular segment of working originally from the backend itself. These generally do not require any complex algorithm. Proper analysis is very important when we build such bots because we need to add FAQ's, Debugging and Error Management. It comes with several follow up question to generate a valid output and depends less on AI generated direct output by following a tree like structure flow. Predefined set of Human developed code runs again and again each time and algorithm could not extend its boundaries set by the developer.

2.AI Assistant-

As Artificial intelligence Assistants are made to replicate human intelligence, so AI based Voice Assistant are capable of analysing the user demand and then use complex algorithm to generate the closest output using the keywords in the vocal input and then surfing them over the internet to give us the closest result. Unlike the rule-based bots which run on hard coded rules set up in the back end are limited to a particular function with limited variety of valid inputs, AI based assistant come up with self-learning algorithm in which it modifies and betters its result after each search which is impossible to be attained by using set-based bots which use old school back-end coding. AI Assistant needs a lot of data

input to develop better and give better results. AI Assistant based machines are capable of solving complex queries and are capable of imitating human voices too. Data Management also becomes more important to support such kind of technology like as we grow old our face changes and some characteristics of face might change over a decade or so however the face recognition in the mobile phone keeps on updating the slightest change every day when we access it in our mobile phones even when they aren't visible to naked eyes. Major dominating companies in market have switched to AI Assistant based services to user as they are more user friendly, give better result and more reliable on long term basis. However small companies and start-ups still tend to rely on scripted bots because their low cost. Tech companies like Google, Amazon and Apple spend billions every year to develop better solutions using AI Assistants using voice and pictorial inputs

3. Group Voice Assistant

Modern implementation of AI based voice assistant include integration of multiple AI algorithm to have multiple voice assistant in a single application defined each for a particular task like a debate on a news channel where each one speaks for its organization, he/she is associated with. However, this technology is not used much but still it has a wide application and bright future ahead where the world is turning towards online metaverse this tech could bring a great impact to it.

1.4 Popular Voice Assistants

1. **Siri**-[4]One of the most popular Voice Assistant developed by SRI Inc. in 2010(further purchased by Apple) is key feature of iOS powered devices which is known to create a premium ecosystem which consolidates all apps and devices for a better output. Siri lets you stay connected without even lifting our finger making everyday work effortless and time efficient from a simple alarm to solving complex mathematical problem all by a single command of "Hey Siri".
2. **Google Assistant**-[5]Google Assistant came as an extension of web browsing in 2016 where voice commands along with advance recommendation system was bought which used the self-learning AI algorithm bettering its feature card after each result. Today it's the most used Voice Assistant throughout the globe featuring its use in Android powered devices. It came along with various other integration with

application like google maps and you tube which widened its usage and made it more user friendly.

3. **Alexa**-[6]Alexa is cloud-based Voice Assistant, which was developed by Amazon in 2014, its name was taken from the library of Alexandria. Alexa came as Amazon echo which came in as a much handy and affordable product which focused on home automation along with the basic features of Voice Assistant. It came into use for smart homes wherein even switching on tube light to an air conditioner everything could be controlled by voice commands. It became a famous product in no time due to its unbeaten features and cheap pricing making Amazon 2nd in terms of brand value in the world. Followed by the success of Echo, Amazon Echo show came in market which integrated screen along with voice assistant making it a one stop device for multimedia entertainment and smart home automation.
4. **Cortana**-[7]Cortana is developed by Microsoft in 2009 and its yet another AI based Voice Assistant. It was initially integrated along with Windows and X Box consoles which helped it gain popularity and have a sudden increase in users in 2018 due to its high flexibility in usage along with Microsoft 365 and Office.
5. **Alan**-[8]It provide with backed AI services to add features like the Voice Assistant into the apps making it more user friendly, and its easy integrable algorithm come in handy enabling the conversion of old school web sites to modernized AI application increasing the scope and market for this technology.

2. Application of Voice Assistant

2.1 Voice Assistant at Home

[9]AI based Voice Assistants like Google Echo, Apple Siri, Amazon Alexa etc. have wide application when it comes to automation and making house a smart home. Various applications of Voice Assistant at home are:

Playing Music-Voice Assistants like Alexa are widely used in playing music at home wherein Alexa is connected to the power source along with an active internet connection and one could play any song be it any language by activating it saying, "Hey Alexa!" followed by "Play (song of your choice)" and Alexa would play it. Even control like volume could be controlled by voice command which makes. AV entertainment could be done anytime just by a verbal command.

Making Reminder-Voice Assistant come in handy in maintaining alarms and reminders. Sometimes it happens that you remember something, and you may forget it after a while and a paper might not come in handy so there Voice Assistant comes into play where you could set reminder (like buying groceries) so that you might not regret it later. Hence making life more efficient.

Smart Home- Automation is now very easier and pocket friendly. Usage of smart plug, bulbs, fans along with a voice assisting machine is a common sight today. One could set up routines for appliances to work. Even one could start their air conditioner before they could even reach home. It elevates the standard of living and help bring technology to its best use.

Manage time and Productivity- We could set up alarms and timers. We could even set up timings and restriction each appliance so that the voice assistant warns up as soon its usage exceed the time limit. It reduces the hustle and make the day more organized ensuring maximum output and come up with a balanced plan which does not focus only on a single activity.

Entertainment- One could listen to songs, facts, news and many more. Even a 2-year-old could say "Hey Siri" or "Ok Google" to play a nursery rhyme. We could also use modern Voice Assistant like Amazon Echo Screen for AV Infotainment which could play YouTube, Netflix, Amazon Prime or any other OTT platform anywhere in the home with or without a proper TV setup.

Misc.- We could play games, order food online, book a cab and many more using voice assistant that is quite amusing.

2.2 Voice Assistant for Business

[10]Voice Assistance in Business makes implementation better and help the organization/company to earn more profits. The key advantages are:

1. **Speed**- Text could be dictated rather than typing which would reduce the work time and could help company aim for greater profits.
2. **Hands-free-** Another advantage of voice assistant is that as both hands are free multitasking becomes a easy job. One could save the time wasted in stopping a workflow to message or call someone by directly instructing the voice assistant to do so.

3. **Ease of Use**- We learn speaking even before writing skills so giving input in the voice assistant become a much easier task. In cooperative sector where private companies seek to maximize the profits saving time by voice assistant could be a game changer.
4. **Embedded Voice Assistant with Chatbots**-Text based chatbots seem to be a bit old school nowadays which restrict the usage limited and hence hinders the overall growth. AI integrated Voice Assistant could use features like Microsoft Azure to bring voice assistance to the existing apps giving it a modern touch.
5. **Data Management and better Profits**-Companies could gain much more data using AI base Artificial Assistance which could help them develop better strategies to cope up the demands and remain one step ahead of the other competing companies. Voice Assistance technology could be used in product design and marketing and could help develop better connect with the people increasing the word of mouth.
6. **Accessibility**- App management becomes easier which increases the scope of development and saves time.
7. **Marketing**- Post pandemic time has seen a sudden surge in eMarketing wherein a complete online mode of targeting the customer was adapted focusing on the exponential increase in internet users. Where companies could target Voice Assistant companies to prioritize their result and give online advertisement. This would increase the sales and ultimately help earn greater profits.

2.3 Voice Assistant for Education

[11]Voice Assistance is a boon to education as it ensure effectiveness and reduce study time. A Student could ask query as soon as he gets it without touching the device just through the voice command which reduces the chances of diversion to social media application and help ensure maximum retention. One could set a routine timetable which cover everything from studying to both mental and physical fitness making the maximum out of the day without wasting much time. One could learn a new language just by sitting on the chair without even moving a bit. Teachers could customize the quiz and test as per the Data set received and could help in better development of the child like the Amazon Echo's Skill Blueprint tool without developing prior coding skills. Children could listen to Stories and Poems without a mobile or

laptop which reduces the screen time and is better for their eyesight too. In recent years Podcast had gained attention wherein many school have come up with their own Podcast in various scholastic and co-scholastic fields which increases knowledge and keep the student up to date. It could even act as teacher's assistance helping him/her to multitask to get the best of the allotted time ensuring better quality of education and making the class even more interactive and fun. It makes education more personal and engaging which ensures better development of student and ultimately a better human.

3. Pros and Cons of virtual assistant

3.1 Advantages

[12]Automation has become common, one could do time consuming activities just be a sentence or two. Gaining knowledge is not anymore, a tiresome work. Voice€ Assistant have broken the physical barriers and have come in handy for people especially visually impaired people. Virtual Assistants come with such AI algorithm which provide conversational experience and sort of develops a connect between the user and machine, ensuring better experience and customer retentivity. It helps people out of solace as they always have someone to talk to. Many find reading text boring and a waste of time so here voice assistants play a massive role in countering this section of society with audio information be it songs, weather, news or any other kind of thing.

It helps in multitasking and makes data management much simpler. AI algorithm keeps on developing itself and becomes better and better increasing its processing speed making it more user friendly and time efficient ultimately helping the company to earn greater profits. Education sector has also been revolutionized by Virtual Assistants ensuring better retentivity and maximum output from the children by modern algorithm which keeps on changing as per child's performance with a proper report which help in eradicating the barriers and difficulties children face from their root cause. It helps in time management and help in developing better skills.

3.2 Disadvantages

[13]Despite of AI algorithm which help them to self-learn with each search still 100% accuracy still can't be achieved. Sometimes the

interpreter could not get the accent or there might be too much background noise. Spending much time within Virtual Assistance may lead to Digital Divide further leading to weakening of social relations.

[14]Privacy concerns may arise as the device is always capable to listening you which may be used for wrong terms. Virtual Assistant leads to automation and automation leads to leads to less physical work due to which health issues may arise and one might remain unhealthy. Virtual Assistant gives the exact output while one when search a book might get to know more facts. Distraction is easy which may result too time waste and poor time management.

[15]Complex Integrated Algorithm requires a lot of data for smooth functioning wherein cloud system are used however one cloud break into the cloud and retrieve sensitive data. When language is interpreted from another foreign language data might change which may create disruption in data management making the job more tiresome.

4. Opinion on Voice Assistant

According to my opinion everything in the world comes up with both positive and negative aspects but as far as positive aspects have the strength to make an impact in people day to day life and the technology comes up with a solution, the technology must be encouraged. Voice Assistant come up with AI algorithm which makes daily life work easy and handy and eliminates the physical workload. It helps in multitasking at the same time which increases the output significantly and eradicates the problem of shortage of time to fulfil a designated task. It helps in developing an automated environment where everything could be done without even lifting a finger. In modern world people keep on running for their dreams and do not have time to waste so multitasking becomes important. Every field be it Education, Technology, Business or any other sector could be made better by integrating voice assistant and it could help in bridging the gap between the society. Most of all it also ensures equal opportunities of growth to both physically and visually impaired people. Along with moderation we could make better use of technology and set a better foundation for the future ahead and progress for the better sake of Humanity.

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CHAPTER – 13

VOICE ASSISTANTS – FUTURE OF INTERACTION

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1. Introduction

1.1 What is Voice Assistant?

[1]Voice assistance is a technology in which a device in built software which uses artificial intelligence to receive an recognize human command and responds accordingly. [2]In simpler way you can give command or ask something to voice assistance without having to touch your electronic device.

1.2 History of Voice Assistant

[3]Unlike as it sounds as a new technology which seems to be existing for only a decade the voice assistance actually has a very long history which goes back 70 years to 1952 when 'Audrey' system was introduced by Bell Labs which was a Automatic Digit Recognizer not a simple small device but stands more than 185cm tall to contain all the software just to read 10 numbers.

In 1961 IBM introduced the IBM Shoebox in Washington, Seattle. The first digital speech recognition tool. It recognized 16 words and digits from 0-9 and 6 simple commands such as 'plus', 'minus' so that it can be used to do simple calculations. Just like its name its size was around a size of an shoebox.

In 1990 Dragon launched Dragon Dictate the first speech recognition product designed for pc's which people can buy for a price of $9000. The user can tell it a sentence pausing after each word waiting for it to process it. After 7 years in 1997 Dragon released Dragon NaturallySpeaking which was more advance as it was able to interpret a maximum of 100 words per minute and can be bought for only $695.

In 2001 Microsoft introduces speech recognition feature for Microsoft Office XP.

[4]In 2007 Google launched GOOG412 a phone index services that asphalt the way for their other voice assistance products.

[3]From 2010 this technology started to take new shape when at 14th April, 2011 Apple introduced Siri which was not eventually created by apple, it was created by SRI International with speech recognition provided by Nuance Communications. The app was acquired by apple two months after this app was released on IOS App Store and was finally released inbuilt with the launch of iPhone 4s making it the official apple voice assistance.

In 2011 IBM Watson was released which was first announced in 2006 to beat humans in a game of Jeopardy but now it is one of the most intelligent naturally speaking computer system.

In 2015 Amazon Alexa was introduced and with the launch of Echo which used Alexa as voice assistance enabled the use of this technology to go beyond phones or laptops. Echo links all the smart devices from fridge to air condition to television to be controlled by your voice command and can be bought at an affordable price of Rs5000.

1.3 Types of Voice Assistant

Artificial Intelligence voice assistance

[5]Google assistant for android , Siri for apple , Bixby for Samsung are some examples for artificial intelligence. You can perform basic tasks such as make a call , sending a message , setting alarm , marking bookmark , saving a event in calendar or using search engine. Google assistant and Amazon Alexa can also perform some in app tasks which is powered by a technology named deep learning which is a subset of machine learning. Siri and Bixby on the other hand cannot perform these in app tasks and compared to their competitors are not as advanced as Google assistant and Alexa.

Google assistant and Alexa are making an investment on focusing more on in app voice command functions by using the help of in app voice assistants present in that particular app.

In App Voice Assistants

Noticing the popularity of voice assistants big companies such as Udaan , Flipkart , Youtube , Amazon , JioMart and so on have introduced their own in app voice assistants. These voice assistants are present to enhance and elevate the user experience. These are used for searching on google , searching or help desk or viewing rating and reviews on Flipkart

and Amazon , tells the location, trains details , arrival and departure time on Trainman , to search your favourite music on Gaana or Spotify. Google assistant and Amazon Alexa are trying to develop more voice in app task functions by using these in app voice assistants.

Many small business have started to use service provided voice assistance such as Slang Labs which provide voice assistance for domains of ecommerce, travel and network.

This solution makes it easy for small business as this saves both time and money and also has no maintenance bills.

Custom Voice Assistance

Celebrities

[6]Celebrities who became famous from Youtube, Instagram, Facebook, Twitter, Films can give their voice to VUIs custom voice assistants. John Legend a famous American singer was the first one to do so. He lent his voice for Google assistant in 2018.

In 2019 when John Legend left Google Assistant a famous Youtube star Issa Rae lent her voice to Google Assistant.

User Generated

VUI platforms can provide users to integrate their own voice to create a voice assistance of their own voice. Some famous voice assistance for example Medium is user generated.

1.4. Popular Voice Assistants

[7]Siri developed by apple is a voice assistance used to do basic task such a s calling , messaging, playing music which was developed in 2011 and launched in iPhone through IOS 5.

[8]Google Assistant developed by google in 2016 can do all basic assistant tasks. Google Nest containing google assistant is a smart device to control different smart gadget .

[7]Amazon Alexa developed by Amazon in 2014 is a voice enabled speaker which respond to command starting as 'Hey Alexa' and can be used to do nearly all function that Siri , Google assistant and Google Nest could do.

Cortana developed by Microsoft and launched with Windows phone 8.1 in 2014 can be used to track delivery packages , find files in phone and set alarm.

Facebook M is on its early stage and is not yet fully available for all the users. It will be put in messenger and is currently available to only few messenger users. You can book hotels , air ticket , find places once its operational.

2. Application of Voice Assistant

2.1 Voice Assistant at Home

[9]Having a voice assistant at home these days can not only help to make things easy but also take care of security and health. It is import to not have multiple assistant for different things but to make a ecosystem of one type of voice assistant. To choose the best voice assistant we have to look for a number of things such as compatible with number of brands, security, number of things it can control such as temperature, switching light on and off , it should have a phone app and the user interface should be smooth and easy to use. It is import to avoid 3rd party products as they have a danger of privacy and security. 2 famous options voice assistant for home options are Amazon Alexa and Google Assistant with Alexa being compatible with 7500+ brands, on the other hand Google Assistant is only compatible with only 1000+ brands. Research also showed that in 2018 Google Assistance has a market hold of 36.7% of smart voice assistant platform whereas Amazon Alexa having 28% of market. With these products affordable price it has become extremely east to buy and setup these products for home.

2.2 Voice Assistant for Business

[10]Having a voice assistant for business can vastly increase the productivity and workflow.

The very first thing will be email management as this pandemic has made maximum shopping, food ordering completely online, the standard way of marketing on billboards became less effective during this pandemic the new method which the online ventures are opting is to reach their target consumers through email. This is where Alexa's Astrobot come handy. It helps manage your email you can prioritize, reply, read, compose, delete and many other things which helps a lot to remove unnecessary emails.

Alexa's FreeBusy Scheduling Assistant helps to schedule day. You can ask Alexa to schedule appointments for a day you can get when someone else on your contact list is free but they should also be using this software to schedule their day.[11]Software developers can optimize voice assistant by building their own module according to their need which can be helpful as the business sees fit. Some voice assistant which support this optimization technique is Alexa, Hey Athena, Silvia.

2.3 Voice Assistant for Education

[12]Voice assistant for education will help save a lot of time for example when a teacher will be teaching the software will automatically write what teacher is saying saving time and giving more time for teacher to make students understand the topic. Due to low funding schools need a budget voice assistant which can look and analyse each student individually so that each student can be developed equally.

3. Pros and Cons of virtual assistant

3.1 Advantages

Improved Customer Experience

[13]Efforts are reduced for example you want to find restaurant near you, you can just speak with your smart voice assistant platform and it will do the rest for you. As we are advancing we are loosing patience for this Chatbots will reply way quicker to your query and you don't have to wait a long time on phone to get your query resolved. Customer care is one of the most important aspect for a business management, making a customer feel valuable is important.

Language Barrier

People who have problem in speaking languages other than their native language can easily talk to these chatbots as they support multiple linguistics, this feature helps the business to market their product to a larger audience base the boost in the user experience helps the brand free advertisement from people and better consumer service.

Smart Work Environment

In a office when the work is operated at full pace, the office starts to look like a war zone and things are not at place voice assistant AI can

be used to make the environment effective for example a voice AI places at reception can guide people where to go for what and to carry out small task which are generally done by secretaries.

3.2 Disadvantages

Data Privacy Concern

[14]Although people are using these voice assistant there is still a big con of data collecting. Not providing a complete transparency of what is done of these data is one of the reason people find hard to trust these voice assistant products. There have been past incidents of data stolen from some very renowned companies.

Price of Development

Though voice assistant seems to be a very helpful tool for a business its not easy to create one. Small business cannot afford to create there own voice assistant as it requires a lot of money and time. Plus maintaining the assistant and keeping it up with the latest technology which some other big companies are using. Consumers will start repulsing if they don't get a good user interaction with the service.

Lost Concentration

[15]If you are doing a task with your hand such as writing and you give a voice command to the voice assistant there is a high probability that you will loose concentration or make a mistake as all your focus will move to voice assist. So make sure to stop what you are doing before giving voice command.

4.Opinion on Voice Assistant

Voice assistant with no doubt has a shining future. As we are progressing everyone want to be more comfortable to be more efficient which is exactly this technology is trying to do.

Mobile will be fully voice assisted Google and Amazon are spending a lot to make this technology. A lot of time we don't know the exact product name because of that we are unable to find that thing but with this technology being implemented our phones will be so smart that they will tell in which app to find this product.

Everyone in this pandemic saw the importance of voice. If some is extremely ill and cannot even gather the energy to move he/she can call ambulance. These chatbots provided to an extremely helpful tool as they connect hospitals to the patience. Apple's Siri now takes a CDC COVID-19 assessment questions and then recommend telehealth apps. It is sure that voice assistant will play a huge role in healthcare in future. Voice assistance will be able to predict different users by his/her voice and using the previous data stored for that person will show things according to the interest of that person.

With Mark Zuckerberg announcing web 3.0 people will use voice assistant only to do most of their tasks.

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CHAPTER – 14

VIRTUAL ASSISTANTS – AN ANALYSIS

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1 Introduction

1.1 What is Voice Assistant?

[1]A digital assistant software that utilizes voice recognition (including settings to adjust to different accents), advanced language processing algorithms (delivered through pattern recognition procedures to decipher spoken words), and voice synthesis (to enhance the user experience by allowing responses through synthesized voices to answer user queries) technologies to receive inputs in the form of specific voice commands and return relevant information or perform specific functions as requested by the user is referred to as a voice assistant. [2]Users can ask their voice assistants questions in addition to controlling home automation devices and media playback via voice, and manage other basic tasks such as email, to-do lists, and calendars with verbal commands.

1.2 History Of Voice Assistants

[3]Historically, radio rex (a toy housed in a wooden box responsive to certain electromagnetic frequencies, that would emerge on its name being called) is the earliest example of a voice activated released created in 1922.[4] Subsequent efforts by Bell Labs, with its 1952 release Audrey (the Automatic Digit Recognition machine) could recognize fundamental phonemes of speech but high-power requirements and maintenance coupled with limited ability to understand speech (restricted to only numbers spoken slowly by users with recognized accents) meant its operation for instant telephone dialling was less efficient than manual dialling itself. [5] IBM's shoebox, a voice activated calculator released in the 1962 Seattle World Fair after initial launch in 1961 could recognize up to 16 words and the digits 0 to 9 capable of performing rudimentary calculations commanded by voice. The Shoebox's upgrade called the Tangora, a voice recognizing typewriter had a 20,000-word vocabulary and basic prediction algorithms (based on the Hidden Markov Model of analysis) to predict what would be said based on previous user

communication. Still each user required to train their typewriter to recognize their voice and pauses between words were needed for effective processing. [6] In the intervening time, through his invention of the first computer chatbot program ELIZA, MIT professor Joseph Weizenbaum demonstrated that interactions with such software are inherently superficial due to the chatbot's reliance on pattern recognition and not true understanding to provide requisite responses to the user. Yet the ability of the user to continue to interact with the software under the belief of true understanding on the chatbot's part despite evidence to the contrary did not diminish and led to what is termed as the ELIZA effect which gave evidence to effectiveness of such software should the technology behind it improve.

[5] The next milestone came in the form of Harpy, a voice recognition software developed by researchers at Carnegie Mellon University in the 1970s, that possessed the vocabulary equivalent to a 3-year-old's, could understand basic sentences and could thus process speech via pre-programmed vocabulary, pronunciation, and grammar structures to determine which sequences of words made sense together, and thus reducing speech recognition errors. All these early developments together allowed for the development of a host of different voice recognition technologies including Dragon's Naturally Speaking software in 1997 (which could understand upto a 100 words without any pauses in between), Colloquis' SmarterChild an entirely text based chatbox launched on MSN and AIM messaging platforms in 2001 and eventually modern Voice Assistants like Apple's Siri in 2011, Amazon's Alex in 2014 and so on.

1.3 Types Of Voice Assistants

[7] Classification of voice assistants can be done based on their mode of response into the two broad categories of VUI (voice user interface) software that respond using synthesized voices to user requests and GUI(graphical user interface) software that respond to spoken user requests through means of either text or images. Additionally, they can also be classified based on the functions they perform (and their capabilities) as follows:-

a. **Rule based bots**:- These bots are targeted towards solving problems for the user using Voice User interface (VUI) that do not require

complex algorithms to do so and are relatively straightforward, including tasks like password retrieval etc. On a given application there can be many different specialised bots due to their limited scope. For instance, the bot that handles checkout related procedures on e-commerce sites if often different from the ones that function while the user is browsing through items. Nonetheless, they can be used throughout the entire application

b. **Artificial Intelligence assistants**:- These bots function mainly to analyse the users themselves, fulfil complex requirements and predict the user's overall behaviour through use of rules devised by the assistants based on its "learnings" from vast amounts of data fed into its system (an aspect of Machine Learning). They can therefore perform a greater variety of tasks more effectively such as answering complex questions and imitating voices to very accurate levels at which distinction between artificial and real voices becomes difficult and so on.

c. **Grouping Voice assistants**:- Applications using multiple Voice assistant applications in tandem either to deal separately with different tasks within the overall application or to provide detailed coverage on different topics of user queries (analogous to the idea of different specialists providing insight on various topics like weather, current affairs etc. on news channels).

d. **Custom voices**:- Voice assistant applications often use synthesized versions (based on data collected from multiple words spoken and stored in databases) of specific people's voices to enhance user experience during their usage. These can be based on celebrity voices (such as in the case of famous musician John Legend lending his voice to the response system of Google's Google Assistant VUI) or alternatively based on synthesizing responses or entire applications for the user in their own voices (something that the industry is currently working keenly towards achieving).

1.4 Popular Voice Assistants

The developments in the voice user interface sphere of technology have led to the development of various voice assistant applications in modern times. Some of the more popular ones include Amazon's Alexa and Echo, Apple's Siri, Microsoft's Cortana, Google's

Google Assistant, Facebook M (a software slowly being integrated over the Facebook messenger platform), Samsung's Bixby and so on.[5] Virtual assistants may be integrated into many types of platforms or, like Amazon's Alexa, across several of them.[8] In case of certain voice assistants however such as Apple's Siri and Google Assistant, the software often comes in-built within smart devices produced by the respective companies be they smartphones, watches, etc. Additionally, it is possible to install various 'skills' for voice assistant applications (in-built or downloaded) to perform specifically, for instance Amazon's Alexa has dedicated applications (i.e. 'skills') that it functions on doing various tasks such as for facilitating gameplay of popular games like jeopardy, movie trivia contests etc. Their functionalities can also extend to managing a host of home-based appliances remotely, like temperature settings on Air conditioners at home, advanced smoke detection, visitor notifications and so on, something already present as a part of existing skills or platforms for various assistants most popularly the Amazon home assistant platform for its Alexa VUI.

2. Applications of Voice Assistants

2.1 Voice Assistant at Home

The scope of voice assistant software extends to the goal of implementing it in every facet of day-to -day life, to enhance our standard and quality of living. To this end their applications at our homes to enhance the efficiency of our domestic lives is a foundational step the industry has taken towards integrating technology to all parts of life and thereby streamlining the mundanities of life. [9]An example of this comes in the form of the Google Home platform, which interconnects the google assistant VUI present within the user's phone or computer to a system of speakers designed specifically for the platform in addition to the direct IoT (Internet of Things) based connections with other smart devices within the home environment (from speakers to television sets with either built in or installed Chromecast connections) to perform a wide range of tasks using voice commands to the google assistant software on the user's mobile or laptop device including ;

a) playing stored music from the mobile or computer device via Bluetooth on connected speakers.
b) listening to audiobooks on the Google Play Books software.

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c) streaming video-based content to any Television that has a Chromecast connection,
d) grouping any combination of speakers and displays with Chromecast audio built-in together for synchronous music throughout the home
e) turning the TV on or off remotely
f) getting traffic data before travelling
g) receiving status updates on user's flight related data (such as times, dates, seat details, arrival times etc.)
h) Controlling supported smart home devices like thermostats, plugs lights etc.
i) Maintaining productivity through the setting of reminders, creating, and updating to-do lists etc.

and so on. These features are common to other voice assistant-based technologies as and their platforms as well (such as the Amazon Echo platform working with the Alexa VUI and so on). [10] Additionally, the previously discussed feature of skills (applications designed specific to voice assistants to perform specialised tasks) can also be incorporated within these home systems to perform tasks such as providing entertainment (through playing games like Earplay or Akinator), ordering food, placing calls, locating other smart devices and so on all through the means of the specific voice assistant software used.

2.2 Voice Assistant for Business

Apart from personal applications of this technology, voice assistants can also see extensive use in various aspects of running and maintaining businesses. For instance, employee productivity can be maintained with the amount of time spent on other tasks by maintaining data on important dates, deadlines, scheduling appointments and keeping all relevant data up-to date a process that occurs continuously without stops due to the inherent deep learning software that allow voice assistants to work without stopping. They can access reports, analyze data and keep crucial systems updated maintain a seamless flow in business operations. They can also reduce time employees spend on repetitive tasks by automating them and thus increase time employees can spend on more relevant and tasking matters. Voice assistance can aid in the Human Resources division of a company by automating more mundane tasks for HR employees such as shortlisting potential candidates based on certain

criteria to attend interviews, scheduling interviews effectively and even conducting preliminary interviews of said candidates using AI technology and machine learning. They can be ideal components to e-commerce businesses and their operations in terms of chatbots facilitating a better user experience or in terms of VUI based voice assistants facilitating easier transactions for visually or otherwise disabled customers. Also consent based acquisition of customer details including order history will provide opportunities for expanding the business' consumer base and lead to better customer retention through better recommendations for further purchases (again using automation through Voice Assistant technology's artificial intelligence systems). Additionally, Increasing the language database of a voice assistant, potential linguistic barriers (and even cultural ones) can be avoided during corporate and customer interactions. Customer service can also be bolstered (upon proper design of the assistant's machine learning algorithms) given the seamless ability of voice assistants to function non-stop. Overall voice assistants can be used to personalize customer interaction, boost employee talent, and optimize overall business productivity, which will give any company that employs them efficiently and intelligently the crucial edge over the rest of the competition.

2.3 Voice Assistant for Education

Augmenting education (especially for children in school and other professional environs of learning) with technological tools to enhance the process and make learning easier, engaging and effective is the primary goal of what is now referred to as ed-tech (educational technology). [11] While this initially started of as basic multimedia aid like videos or presentations for instructors to enhance the learning process, through the introduction of voice assistance and additional technologies in creative solutions over the past 5 years, the field has seen rapid growth and has brought an entire re-evaluation of effective methods to dispense education to the masses (ranging from school going children to retired professionals seeking to pick-up a new skill). Specifically, the personalization that voice assistance can bring to the learning process (given how voice synthesis can achieve this goal by personalizing sounds based on individual student preferences), in addition to aiding the instructors (either in reciting out text while the instructor explains or by

automating tasks like doubt clarification in big classrooms) and streamlining the evaluation process, in recent times especially due to the pandemic, they have proven to be almost a necessity to facilitate the process of distance learning. The most important role that voice assistance delivers on however is the transmission of information that instructors or students would be required to read from books or computers otherwise during lectures, so that eye contact (a very important aspect towards maintaining the flow of a lecture and every student's attention) is maintained is without doubt a great unspoken advantage this technology can be used for to enhance in the instructor's ability to deliver lectures in person. [12] In addition, the quickness with which voice assistants can provide answers to doubts, their ability to facilitate communal learning well (especially in classrooms where all students are exposed to the same information), to enhance the productivity of students by converting speech to text (instead of getting students to type down or write down their notes) and their utilitarian nature (given only a single device/dedicated speaker with access to the voice assistant software is required) proves just how much of a boon voice assistance is becoming to educators all across the world.

3. Pros and Cons of Virtual Assistants

3.1 Advantages

Virtual assistants whether they be of the VUI (voice user interface) or the GUI (graphical or text-based user interface such as chatbots) have great potential in terms of being able to change the nature of our day-to-day lives from our homes to the workplace to even influencing the way we learn and process new information. Broadly, some of the advantages of voice assistants are as follows:

1. [14]**Automation**: Voice assistants aid in automating a wide variety of tasks at both the workplace and home (by performing simple tasks ranging from maintaining reminders and deadlines to deal with customer service and regulating the Air conditioner's settings). This allows for greater free time on the part of the user to perform other more demanding tasks
2. [15] **Scale**: Voice assistance can also be used as an effective implement to reach out to a wider consumer base through the means of employing them in e-commerce sites or in marketing campaigns.

3. **Analysis:** Additionally, through data collection based on their customer interactions (consensually) they also aid in customer behavioural analysis which ensures the end goal of greater customer retention
4. [14]**Security:** Voice assistant technology bring a new facet to home security. Through connections with burglar alarm systems, CCTV cameras and microphone triggered entry systems installed within residential properties, via use of their voice recognition software and Machine learning algorithms, these assistants can provide instant notifications to homeowners whatever their location regarding visitors or potential intruders. Additionally, through connections via apps installed on smartphones, they can also be used to make direct calls to the authorities in the event a potential home invasion situation is detected
5. [1] **Entertainment:** Voice assistants also provide a host of avenues to remotely stream video content like movies or TV shows on connected TVs or home theatre systems and play music on connected speaker systems. Additionally through the use of skills, voice assistants can also be used to play various video games as well through the use of voice commands.
6. [15] **Personalization:** The technology in recent times has allowed for great personalization of various aspects of business and education facilitating easier conversations especially during client and consumer interactions for marketers on one side and better learning processes through outfitting voice assistants to the needs of students individually based on detailed student reports analysis (allowing for personalized tests, revision cycles and pace setting for new concepts).
7. [13] **Savings:** Voice assistants through mediating certain tasks such as booking flight tickets or cabs can, through the use of their machine learning algorithms, adopt the user's preferences and sort through options and decide upon the most cost effective alternative that fits all the user's criteria by executing search algorithms. Additionally by affixing details regarding in and out time from the user's home it is also possible for the virtual assistants to regulate usage of power consuming devices by optimising some and powering down others to effectively conserve energy and reduce electricity bill costs.

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3.2 Disadvantages

Despite numerous advantages there are some shortcomings that require redressal to make this developing technology truly effective. These include:

a) [13] Security can be an issue as far as virtual home assistants are concerned. Given the amount of data that is collected by the software and is uploaded to the cloud as a part of the deep learning algorithms implemented within the assistant's software it is still possible for misuse of this data to occur either through corporate mismanagement or through interception of the data in transit or from the cloud farms by infiltrators.

b) Initial costs of these products could outweigh the overall savings made through their implementation. Due to the technology behind these assistants still staggering forward in the developmental stage, the costs of production demand higher retail prices for the product making them unaffordable to the vast majority and regular maintaince requests in cases of damages resulting in a drastic reduction in product efficiency.

c) As mentioned, due to the technology still being in its developmental stage, voice recognition on virtual assistants isn't fool proof. Often difficulties emerge during user interactions due to the AI's inability to comprehend the user's accent or words regardless of the speed of their delivery, resulting in the requirement of repetition more times than ideal.

d) Regardless of the benefits general justifiable paranoia on the part of the users often can manifest at the thought purchasing such products due to it entailing the permanent presence of a microphone at their home (with very little present knowledge on the user's part regarding the extent of corporate interference - either logical or not – into the operation of the software). While this fear can be eluded by turning of the system the additional security risks manifest greater panic in user's minds as a compromise of such security leading to the loss of entire logs of data regarding user-assistant interactions and the scope regarding potential implications due to this data's misuse is currently a great impediment to its widespread adoption.

e) [16] Voice assistant software can also be ineffective in its use as far education for younger children is concerned, due to the limitations of voice recognition software melding with the different and erratic

speech patterns of children (ranging from their over enunciation of certain words, elongation of certain syllables, omission of necessary words entirely in their sentences) than that of an adult's (whose speech patterns are normally used to train voice assistants) which can result in misunderstanding of requests on the assistant's part which will derail formative education needed for basic development of the child's mind.

f) [17] Recent studies showing reinforcement in gender biases being developed against women due to the submissive behaviour displayed by voice assistants that are programmed with primarily female voices in response to vulgar and abusive language being directed at them in addition to the general trend of corporate entities utilising female voices alone for developing their assistant software is a key issue to the further development of virtual assistants that needs to be overcome before further progress can be made.

4. Opinion on Voice Assistants

Overall voice assistant software while providing great aid in various fields ranging from education to business to our daily lives in its current state, still possesses flaws and has room for further development keeping all the hurdles (to adapting it on a massive scale in its current state) in mind. Additionally the importance of deep learning and artificial intelligence in terms of developing the necessary 'intelligence' required to make voice assistants function up-to user expectations and fields like the Internet of Things to create an interconnected web of devices with virtual assistant software for its effective implementation in managing systems via automation mean greater research into voice assistance software or any of these other fields work symbiotically to not only improve the quality of our lives but to also bolster our understanding of computing as a whole. However, increased reliance on these assistants in the future can prove to be detrimental in several aspects towards the quality of our lives, with increased automation of daily tasks leading to dependence on the user's part which might have implications on personal development and overall personality in the long run stemming out of increased abstinence in the performance of certain basic tasks (such as keeping track of appointments, deadlines and schedules to constantly motivate oneself to better organize and utilize time, maintenance of one's home to help build appreciation for hard work etc.) which would otherwise aid in the process

of maturing and help inculcate responsibility and good values. Additionally, the ease with which information can be extracted using such software affects the impetus to truly explore and ask good questions to discover information for oneself through inquiry. Mitigating voice assistant technology usage to enhance the benefits while preventing complete reliance on it personally therefore should be the approach taken towards its implementation to ensure the best possible results.

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CHAPTER – 15

CYBER SECURITY AND ARTIFICIAL INTELLIGENCE FOR CLOUD-BASED INTERNET OF TRANSPORTATION SYSTEMS

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OBJECTIVE

The Internet of Things (IoT) has major implications in the transportation industry. Autonomous Vehicles (AVs) aim at improving day-to-day activities such as delivering packages, improving traffic, and the transportations of goods. AVs are not limited to ground vehicles but also include aerial and sea vehicles with a wide range of applications. The IoT systems consisting of a collection of AVs have come to be known as the Internet of Transportation systems. While such IoT systems manage large quantities of sensor data, much of the data is also sent to a cloud for offline analysis. While there is great potential in AVs and the improvements it can make to the transportation industry, security and privacy concerns pose new challenges that need to be addressed as we move forward. In addition, Artificial Intelligence techniques are also becoming crucial for such IoT systems to be able to intelligently manage the AVs. This paper discusses AI and security for cloud-based Internet of Transportation Systems.

PROBLEM STATEMENT

In the previous development IOT is been used to store the data which will be transferred to autonomous vehicle. But this system has some drawbacks regarding security during data transfer.

SOLUTION

In proposed system we are implementing Cyber Security (CS) based data transfer to Autonomous vehicle to overcome the existing problems. Here a cloud is the mediator that which transfers sender files to autonomous vehicle with more security we are using CS based

algorithm (Advanced Encryption Standard) which is used to hide the transferred data into cipher text. The cipher text can be decrypted by the private key generated by sender to the particular AV.

INTEGRATION OF CYBER SECURITY AND AI

There are three aspects to integrating cyber security and AI. One is to apply AI for cyber security, the second is to apply cyber security for AI and the third is to detect privacy attacks due to AI. Research began on applying AI for cyber security around the mid-1990s. The idea is to apply ML techniques for detecting unauthorized intrusions. This research was expanded in the 2000s to include malware analysis and insider threat detection. Massive amounts of attack data are being collected. This data has to be analyzed so that malicious attacks can be detected. Furthermore, we also need to predict how the malware could mutate so that the attacks can be prevented. In addition, streaming data are being analyzed to detect malicious insiders. The second area is securing the AI techniques. This area, now come to be known as adversarial machine learning, has become quite prominent over the past decade. We are increasingly depending on ML techniques for every aspect of our lives from healthcare to AVs. These ML techniques could be attacked and could result in catastrophic situations. Therefore, we need to examine the types of attacks and adapt the ML techniques. For example, in our work, we have examined support vector machines (SVM) and adapted the SVM techniques to detect some of the attacks. The adversary will learn about our models and adapt its behavior. Our adversarial support vector machine technique is able to learn what the adversary is doing and adapt itself so that it can detect the attacks. Over time it becomes game playing between the adversary and us. The thirst aspect is the privacy violations that could occur to do the ML techniques.

For example, it is now possible to integrate massive amounts of data and analyze the data and obtain various properties of individuals. This could result in the privacy of the individuals being compromised. Many privacyaware machine learning (data mining) techniques have been developed. The challenge is to enforce appropriate policies so that we can carry out policy aware data collection, storage, integration, analysis and sharing.

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SECURE CLOUD-BASED IOT

As stated earlier, we envision that much of the data collected from the AVs will be sent to a cloud for further processing including carrying out analytics. That is, the massive amounts of data including attack data may be analyzed in the cloud using various ML techniques. Therefore, it is important that the cloud itself be secure especially if it has to carry out security critical operations. We have designed and developed a layered architecture for a secure cloud [9]. At the lowest layer is the VNM (Virtual Network Monitor). Then we have the VMM layer (Virtual Machine Monitor) that carries out virtual machine introspection. Above that is the cloud storage layer based on technologies such as Hadoop/MapReduce. The data may be encrypted which means querying and analytics will have to be carried out on the encrypted data. Above this layer is the query layer for querying the cloud data. Finally, we have the application layer and in our example the applications are those that support the Internet of Transportation Systems.

SECURITY AND PRIVACY OF THE IOT SYTSEM

One of the approaches to the security and privacy of the Internet of Transportation Systems is to build a reference monitor using a Physics-Based Anomaly Detection (PBAD) algorithm for ground and aerial AV's. The algorithm will consist of three parts:

(i) Building a model offline of the AV's physical invariants,

(ii) Implementing an online tool to monitor expected and observed behavior to detect anomalies, and

(iii) Raising an alarm if significant residual difference exists between executions. The techniques have been applied both for ground and Ariella AVs. Below we provide more details of the steps.

(i) Offline pre-processing:

The AV's invariants are calculated using a well-known non-linear model for aerial and ground vehicles. Accelerometer, gyroscope and magnetometer sensor data on the x, y, and z axis is used for the aerial vehicle. Vehicle position and steering angle is used for the ground vehicle.

(ii) Online stage: An Extended Kalman Filter (EKF) is used to predict AV's physical behavior by estimating unknown parameters from noisy sensor input. The algorithm is divided into two sections that predicts and corrects the estimation before it is compared against the sensor data.

(iii) Anomaly detection: A CUSUM algorithm is then used to detect persistent attacks. An alarm is raised if the residual difference is larger than a predefined threshold.

Beyond the security of individual vehicles, the transportation sector could greatly benefit from a supporting infrastructure that allows communication between vehicles, motion sensors on lamp posts, and surveillance cameras (to name a few) to help identify traffic jams, re-route vehicles and increase vehicle safety. From the user's perspective, privacy concerns arise from all the information needed by such system that could lead to private information being exposed such as vehicle identification and driving patterns. Legislators, engineers and scientists should keep privacy concerns in mind as advances in IoT become more prominent in day-to-day activities. This will aid in improving the public perception, reduce hesitation from consumers and increase the adoption rate of new technologies.

INTEGRATING AI AND SECURITY FOR CLOUD-BASED INTERNET OF TRANSPORTATION SYSTEMS

Data Science/ML techniques are being applied to analyze the data and a challenge is to apply the stream analytics/learning techniques for transportation data. The main question is to understand the nature of the complex transportation data and adapt the stream analytics techniques and apply them on the massive amounts of heterogeneous sensor data being collected. Such data will often emanate as data streams. Therefore, many of the techniques for stream-based machine learning need to be examined. In addition, deep-learning based techniques developed for IoT systems need to be examined. The Internet of Transportation Systems will depend heavily on Data Science/AI/ML techniques for various applications including optimum directions, driving without a human in the loop and many more. The adversary will be learning the models used by the vehicles as well as learn about the data used in the training of the models. The adversary will attempt to thwart the vehicle's learning process. Therefore, the learning algorithms have to adapt to thwart the adversary's actions. Eventually it becomes game playing between the

adversary and the vehicle's machine learning algorithms. While massive amounts of data are collected by the Internet of Transportation systems, the privacy of the individuals have to be protected. As more and more sensor data are collected, the storage on the AVs will not be sufficient to store all of the data. We envision an encrypted cloud storage component where older data and/or less frequently accessed data are pushed to the cloud. Based on the access control policies, local applications running on the AVs will be given access to some of the collected data. When needed, these AVs will be allowed to access some of the encrypted data stored in the cloud via a simple query interface. We envision that much of the data sharing and analytics will be carried out using the services running in the cloud. Another direction for enhancing security and at the same time ensure high performance computing is trustworthy analytics. Computations over big data may require massive computational resources and, organizations (e.g., automobile companies) may use a third-party service to outsource some computations to be cost-effective. When a third-party server is used for computation, data inherently becomes available in untrusted environments, i.e., either observed by a man-in-the middle during data transmission, or insider threat from adversaries at the third-party location where computation is performed. In these cases, data owners may need to protect their data and require cryptographic guaranties about data security and integrity of computational output from these third-party services. We are conducting research in Secure Encrypted Stream Data Processing and Trustworthy Analytics using advancements in embedded hardware technology (e.g., Intel SGX) to support trusted execution environment (TEE). We need to explore the applications of TEEs to Internet of Transportation and Infrastructures.

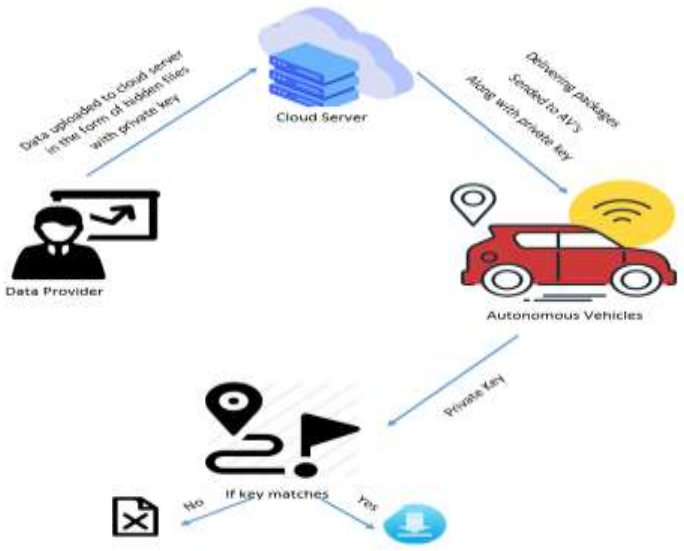

Fig 1:Block diagram of proposed method

ADVANTAGES

- More Security
- Accurate data transfer
- Less cyber attacks

CONCLUSION

This paper has discussed the characteristics of the Internet of Transportation Systems with respect to AVs as well as the security and privacy concerns of such systems. Next, we discuss how AI and Security may be integrated. Cloud-based Internet of Transportation Systems were also discussed. Finally, we discussed how AI, Security and the Cloud may be integrated with the Internet of Transportation Systems. We have only scratched the surface with respect to securing the Internet of Transportation Systems.

We have to understand the various types of tracks and develop ML techniques to detect and prevent the attacks. We also have to examine how to handle the attacks on the ML techniques that are needed for the development of Intelligent Internet of Transportation Systems. Finally, we need to determine the types of data to send to the secure cloud for carrying out analytics.

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CHAPTER – 16

VOICE ASSISTANT-THE INNOVATION OF FUTURE

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What is voice assistant?

[1.] The voice assistants are based on natural language speech recognition which uses voice recognition, language processing, algorithms, and voice synthesis to work hand-free. A voice assistant works as follows- firstly we need to ask or say what we want then the voice assistant searches for relevant information which would be helpful for us and display the result.

History of Voice Assistant?

[3.] The first voice recognition device was invented in 1961 by William C. Dersch. This device will recognize up to 16 words with inclusive digits(zero, one, two, three…., nine). This device was also used to perform some basic mathematical operations. (addition,subtraction ,multiplication, division)

[4.] Later on in1971-1976, this was developed by Carnegie Mellon So that it is able to understand 1000 words inclusive of digits which was a remarkable difference, and was named as harpy program

[5.] The first recognition product was invented in 1990 by Dr. James Baker for a general-purpose of a large vocabulary speech-to-text dictation system. which was a revolutionary product for a dragon. This product had a problem that was sorted out in 1997 so that the user can speak without a pause. this product was available to the customers for $6000 only.

[6] As we all know the famous phrase "Hey Siri" which is a remarkable AI in the history of voice assistants was invented in 1993 by Adam Cheyer and is used in Apple products. Siri was created to interact with all the information in the world with the help of technology. As soon as Siri was developed completely, the team was invented by Steve Jobs for interaction was rejected

Because they wanted to show the world themselves but later on after two months steve convinced them to join apple and they accepted the request. This collab bought great fame to Apple.

[7] Cortana is a virtual assistant which was developed by the Microsoft company. Cortana runs based on the bing search engine.it was launched in April 2014 .now days these Cortana became a key ingredient for Microsoft products. the name Cortana is given by the Microsoft halo video game franchise. Bungie folklore and Jen Taylor are actresses who were dubbed for Cortana's US-specific version. The idea of making Cortana is in 2009 .team leader for this project is general manager zig Scrafin and chief scientist larry heck. This Cortana has special features like a notebook. availability of Cortana started with the windows 10 operating system and some other mobile phones.

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Types of Voice Assistant?

There are various types of voice assistants. these voice assistants are classified into many types Now let us discuss some of them-

- [9.] **Rule-based bot** - These rule-based bots will work based on simple algorithms and mechanisms for example how can I recover my google password. this type of question won't require complex algorithms, but the design was complex work that involves a lot of analysis. And these are scripted in the back-end process. These rule-based bots are mainly used by small companies.
- [10.] **Text-based bots -** These bots are often used for limited parts. for example, when you visit an e-commerce website it pops up a bot during selecting items these items are called text-based bots, but during the checkout process, other bots will pop up, these are different from text-based bots. This is because these bots have a limited role on websites. Whereas complex bots are used in the entire application, these bots are easily made when compared to fule-based bots and complex bots like artificial intelligent bots.
- [11.] **Artificial intelligent assistants -** These artificial intelligent assistants are made to answer any type of complex question. Artificial intelligent assistants can also predict user behavior easily, artificial intelligent assistants can produce their own rules, This artificial intelligence system works based on given instructions and a group of training data, As a result, this artificial intelligence can even imitate the human voice and easily book an appointment in restaurants, hotels, and hospitals, these bots even can recognize our facials and voice even if we grow older. leading companies like Google, Samsung, Amazon, and Apple invest huge amounts in artificial intelligence assistants, whereas small companies hire rule-based bots.
- [12.] **Grouping voice assistants -** Grouping voice assistants are voice assistants which consist of two or more bots .for example when we visit an e-commerce website it pops up and screens one bot during the selection of an item. Grouping voice assistants bots are called text-based bots used for a limited time. whereas another bot comes during the time of checkout these bots are called rule-based bots. In this way mix of more than two bots is called the grouping of voice assistants.

- [13.] **Podcasts voice user interfaces(VUI's) -** Podcasts are collections of audio files recorded by the individual or individuals. individual share their conversation or stories or new tips and tricks to the audience. An individual who hosts the podcasts is called a podcaster. Initially, podcasts are named as audio blogs. these podcasts are started in late 2004. podcasts got fame on youtube and Facebook.Twitter. Spotify, Instagram. etc all around the world. celebrities who host podcasts have a great reach in audience. The first celebrity podcast is hosted by john legend. John who worked for dubbing for google assistant. After john left google youtube fame Issa Rae got available for dubbing google's custom voice assistant.
- [14.] **User-generated voice user interfaces (VUI's)** - These are a collection of reviews from users or audience who rates the product that is stored in invoice user interfaces. This is called user-generated voice user interfaces. For example, if you visit amazon and then select the product you want under the product description you will find customer reviews or feedback. From that, you can see how users rated the product and how many users rated it. Similarly, when you visit the play store select the app you want under the app description you will find ratings of the app. to get the website or app successful these user-generated voice user interfaces play a key role in it.
- [15.] **Companies Providing AI-Powered Technologies voice user Interface -** Usually in western countries companies develop their voice user interfaces by getting assistants from Google -Assistant, Amazon -Alexa, Apple -Siri, and Microsoft -Cortana. By looking at the development of their companies Facebook is now trying to develop its own artificial intelligence for voice recognition.

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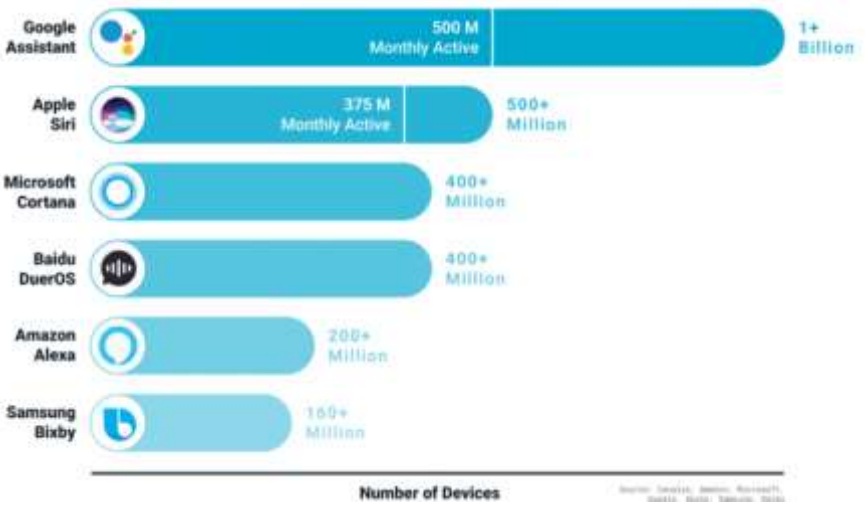
Popular Voice Assistants?

[17.] These are the most popular voice assistants around the world amazon Alexa, Apple Siri, Google assistants, Microsoft Cortana, and Samsung Bixby. Among this amazon, Alexa has the best device compatibility, Google assistance has the best accurate responses and Siri is best for apple users



Voice Assistant at Home?

[19.] We can use voice assistants to play musicVoice assistants can be used to turn off/turn on lights. Voice assistants can be used to book hotels, restaurants, hospitals, etc. If you are planning a trip it will show distance, time, direction, trains, and flight from the selected location to the destination. you are bored it will narrate some stories. You can control the tv hand free.

We can fix remainders. We can make calls using a voice assistant. We can do mathematical operations. It will tell us jokes, news, and podcasts. It gives detailed information regarding weather reports.

Voice Assistant for Business?

[21.] According to finance review and global banking, it was reported by 88% of business leaders across the globe that voice assistant was very helpful for the growth of their business. As we all know google one of the leading companies in the world has a famous smartphone series named google pixel and in a survey it was concluded that 72% of google pixel users' work is been done by a voice assistant throughout the day through customer review process 52% of consumers requested that it would be helpful to them

If they could do many more tasks using voice assistants. The main reasons for the business investing are they could complete their work in a fast process, it is hands-free to use, it is easy to use. voice assistants are actually designed with an accurate volume, tone, intonation, and rate of speech in our mind which convey many emotions. This voice assistant is now accessible in smartwatches and smart speakers because the voice is the only way for perfect interaction.

[22.]

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Voice Assistant for Education?

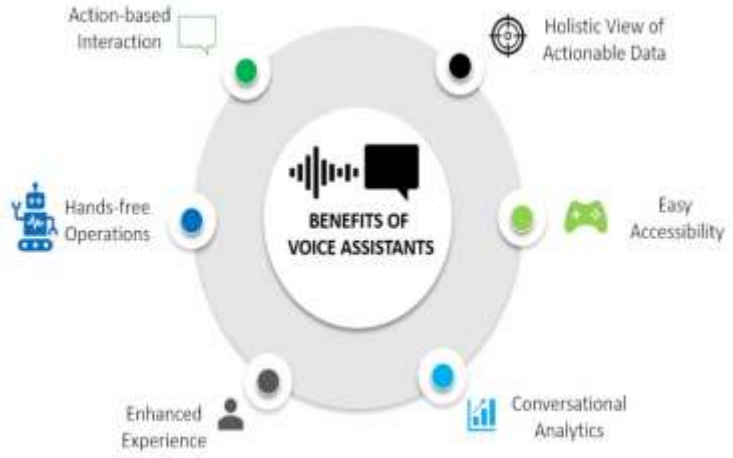
[23.] Voice assistants are not only used for business and household purpose, it is also used for educational purpose in mays as follows. Voice assistance for teachers will be more helpful because they can keep an eye on students. Voice assistants reduce touchpoints and help to prevent the spread of the coronavirus. Voice assistants will help to collect data, for example, student attendance, presentations, and event participation. Voice assistants will ask questions after class to know what students understand. Voice assistance will help students to learn in a funny way.it is also used by teachers to customize quizzes and tests. It will tell us topic-related stories and also gives inspirational stories. It helps teachers to work fast on stress freeway.

Advantages?

[25.] Voice assistants can be used at any period of time (24*7). It will enhance smart working. there is no language barrier. It is also used to complete heavy loads of work in an easy way. Voice assistants are eye free so that strain is caused by the screen. Voice assistants give you very fast responses so that you can save time. For old age people, it would be very beneficial because they can do their work by sitting idle in a place. If you are planning a trip it will show distance, time, direction, trains, and flight from the selected location to the destination. We can use voice assistants to play musicVoice assistants can be used to turn off/turn on lights. You can control the tv hand free. We can do mathematical operations. We can fix remainders. It gives detailed information regarding weather reports. We can make calls using a voice assistant. The main reasons for the business investing are they could complete their work in a fast process.

This voice assistant is now accessible in smartwatches and smart speakers because the voice is the only way for perfect interaction. Voice assistance for teachers will be more helpful because they can keep an eye on students. Voice assistance for teachers will be more helpful because they can keep an eye on students.

26.



Disadvantages?

27. As we discussed before voice assistants are used in smart devices. They cannot be affordable to afford as they are very expensive and also they consume a very huge amount of electricity is required. If there is no electricity, you cant be able to use them. while using voice recognition some times it may not detect the exact words you pronounce. It may sometimes lead to lots of problems and loss their task from their hand. Sometimes it may take a lot of time while work with a voice assistant. we need to be very careful and cautious while instructing and providing details of the task to the voice assistant. For suppose if a user uses an unverified voice assistant the data may be traced out by the manufacturer .there are many cases and complaints regarding this problem. many hackers trying to jam the google and amazon servers to grab the private conversations. This caused the people to miss trust the original manufacturer. if any problems are noticed anything different occurs on their phone they must report a problem. if the signal strength is low voice assistant won't work properly.

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Opinion on Voice Assistant?

As we have gone through a lot of stuff regarding the voice assistant we know that it is a part of our daily activity. there is something negative in every positive thing in the same way voice assistant also has some disadvantages but without looking into them if we straightly look at the advantages it has that would be a lot better usage to us. the voice assistant is not just a thing that helps us work faster it also entertains people in its own way. if we try to look at the advantages and use it properly it is useful to us in many ways. the voice assistant is one of the most productive tools for professionals and also can be used by others. as this can be used hands-free we can complete our work in a faster way. for a secure and private life we can use the most trusted voice assistants like google-Alexa apple-Siri Microsoft-Cortona we can expect the ultimate security from these. these voice assistants will always be helpful to us they can also do the tasks which other humans cannot perform but it is created by a human, now the ai is in such a way that the technology is crossing the human limit. we humans must use the technology in our hands in a proper manner so that it would be helpful to other living beings.it also provides ultimate information to us free of cost so and it is accessible at any part of the time as it is non-living it doesn't have any feelings so it responds the same way at any time and nth time always remember that your phone is always watching and listening to you through the camera and the ai used in the voice assistant so be careful and try to avoid any work which may lead to problems for you or your family. Make sure to use the technology in your hands properly!

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CHAPTER – 17

VOICE ASSISTANT – FUTURE OF IMPROVED PRODUCTIVITY

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1. Introduction

1.1 What is Voice Assistant?

[1]Voice Assistant, also known as a smart personal assistant or connected speaker, are new types of products sold by Apple, Amazon and Google and are based on native language recognition. They allow searches to be performed using a voice command installed by the user, as well as retrieval of information by voice compilation.

[2]Voice Assistant is a digital assistant that uses voice recognition, language processing algorithms, and voice integration to listen to specific voice commands and retrieve relevant information or perform specific tasks as requested by the user. Based on specific commands, sometimes called targets, spoken by the user, voice assistants can retrieve relevant information by listening to specific keywords and filtering ambient sounds. While voice assistants may be fully based software and can be integrated across multiple devices, some assistants are specifically designed for single-device applications, such as the Amazon Alexa Wall Clock. Today, voice assistants are integrated into many of the devices we use every day, such as cell phones, computers, and smart speakers. Due to the wide range of integration, there are a few voice assistants that offer a unique feature set, while others prefer the opening to assist in almost any situation.

1.2 History of Voice Assistant

[3]In 1961, IBM introduced IBM shoe box, the first digital speech recognition tool. Recognized 16 words and digits. In 1972, Carnegie Mellon completes the Harpy program. Can understand about 100 words. In 1990, Dragon introduced Dragon Dictate, the first consumer recognition product (for only $ 6,000) and Microsoft introduced Clippy. In 2001, Microsoft introduced the speech recognition feature of the XP office. On 18th February 2011, IBM's Watson won the Jeopardy. After

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April 14th, Apple launched Siri. On July 9, 2012, Google launched Google Now. On April 2, 2013, Microsoft introduced Cortana at the annual BUILD developers conference. In November 2014, Amazon introduced the Alexa and Amazon Echo, which are only available to key members. In January 2015, Microsoft launched Cortana on Windows 10 desktops and mobile devices, June 23 Amazon officially launched the Amazon Echo in the US, June 25 Amazon launches the Alexa Skills kit, December, Microsoft Cortana has been added to mobile platforms. On March 1, 2016, Sound Hound launches powerful voice assistant app, Hound and Amazon launch Amazon Echo Dot and Amazon Tap, In May, Google launched Google Assistant as part of the messaging app, Allo, In August, Microsoft added voice control for Cortana. on Xbox one, 28th September, Amazon launches Echo in UK and Germany, 5th October, Samsung gets Viv first assistant, On 20th October, Amazon launches second-generation Amazon Echo Dot, lowers price to $ 49, On November 4th, Google launches Google Home Page with smart phone Google Pixel, On November 28, Chinese manufacturer Ling Long introduces Echo rival, Dingdong, On December 8 Actions on the Google platform launches Google Home. On March 20, 2017, Samsung unveiled Bixby next to the Galaxy S8 device. On March 21, more than 10,000 Alexa skills in the US, on April 6, Google Home launched in the UK, on April 21, Google launched the multi-user support Google Home could see 6 different. words, April 26th, Amazon launches Echo Look, May 4, Baidu unveils its first Al device, Xiaoyu in China, 8 May, Harman Kardon unveils a new speaker, powered by Microsoft Cortana. On May 9, Amazon launched a call. / Echo messaging feature, May 17, Google announces Home will be available in Germany, France, Japan, Canada and Australia in the summer of 2017, June 5, Apple launches home pad, will be released December, June 26, Google Home launches in Canada, June 28, Amazon Echo show launches for us, On July 17, Alibaba launches a smart Genie X1 speaker.

1.3 Types of Voice Assistant

There are many types of voice assistants

Rule Based – Bots

[4]Text-based bots, on the other hand, are often used for specific parts of the application in terms of their limited space. For example, a bot

when a user browses items on an e-commerce site may be different than a bot that appears during the exit process. This is because the scope of these bots is limited and related to certain parts of the service. However, complex law-based bots can be used throughout the application. If you are building and using legal bots, analysis is especially important. As a VUI designer, you will need to prioritize users' questions by finding out which questions are most frequently asked, which confuse the user, or prevent the user from completing the task.

Artificial Intelligence Assistants

[4]These assistants can analyse the user, complete complex questions, and predict user behaviour. Instead of using rules with strong rules, artificial intelligence is about producing their own rules through learning. To produce these algorithms, the Artificial Intelligence (AI) system is provided with instructions and a set of training data as a result, AI-enabled assistants can complete tasks that are not possible using custom-written algorithms. To upgrade AI-powered assistant, data is required, and much more.

Grouping Voice Assistants

[4]A single voice assistant can be used to create a voice user experience. This type of knowledge consists of having multiple practical assistants, which can increase credibility and engagement. For example, gathering voice assistants together when each of them has a special task. Think of a news program, in which a different person introduces himself and discusses a different subject, such as the weather, sports, politics, and so on.

1.4 Popular Voice Assistants

Siri

[5]Developed by Apple, Inc., Siri is an intelligent digital assistant that allows users to send messages, schedule, make calls, play music and videos, etc. It is a smart voice-enabled accessory that was first installed on the iPhone using iOS 5 released in 2011, which was gradually available on a few different platforms.

Google Now

[5]A smart Google Assistant, Google Now is installed on all Android devices. Launched for the first time in 2012, Google Now is used to schedule appointments, send text messages, search directions, etc. With

the latest versions of Android, a new feature called Google now on Tap is also available on the latest Android handsets.

Cortana

[5]This is a great digital assistant developed by Microsoft and launched with the release of Windows Phone 8.1 in 2014. In addition to humour and the ability to tell jokes, Cortana can be used to set reminders, to find files. on the phone, track package delivery, etc.

Hound

[5]Hound is a very smart and helpful digital assistant that provides fast and detailed weather search results, text messaging, phone calls, finding you the right hotel, navigation help, stock market exploration, etc. It can also be used to play music and play various social media games.

Amazon Echo (Alexa)

[5]Developed by Amazon, this is a digital speaker that responds to the name Alexa. The device allows the user to communicate by voice, play music, set alarms, create playlists, distribute podcasts, provide weather information, and order items on the Amazon website. It can also be used to control other smart devices with the help of automation hub.

Facebook M

[5]This Facebook-enhanced digital assistant is gradually being added to Facebook Messenger, category by category. Currently only available to a few users, this service will be extended to the entire Facebook community soon. Once operational, it can be used to plan holidays, find restaurants, book tickets, and shop online in a quite effortless way.

Braina

[5]This is a virtual digital assistant that has been developed for use on Windows PC operating systems. Developed by Braina soft, this assistant assist user to perform voice-based functions. It focuses heavily on voice recognition and uses the visual interface of the native language.

2. Application of Voice Assistant

2.1 Voice Assistant at Home

[6]It has never been easier to make your daily routine easier. Everything from movies and TV to music uses streaming resources that can be shared across devices, and smart home technology makes it easy to control your electronic devices from your phone or computer. And

there are several devices that allow you to combine all these functions into one place. But only voice assistants allow you to do everything without tracking the remote or standing up. If the idea of improving your home so that everything is controlled by your voice sounds appealing to you, it is time to buy a voice assistant. The top three players in the voice assistant space are Amazon, Google, and Apple. Amazon pioneered the field with its famous Alexa technology, and currently produces several Echo products using Alexa. The Google Nest series is a natural competitor to Amazon, and their products are in line with the Amazon line. Apple has also stepped in with their Home Pod, powered by Siri. The full size of the Home Pod has just been discontinued, but the more compact Home Pod Mini seems to be a big part of their product line going forward.

2.2 Voice Assistant for business

[7]This innovation is appropriate not only for personal needs but also for the needs of a successful business. One of the best business benefits of voice assistants is the automated process that introduces them to business setup. Such assistants never stop working with new AI technologies and in-depth learning. Processing information, updating data, and keeping important processes up-to-date are some of the tasks this voice technology can offer. Voice assistants are responsible for identifying important end times, schedules, and coordinating events and meetings. They can make any business model flexible and automated.

2.3 Voice Assistant for Education

[8]The nature of voice technology allows for seamless interaction and provides students with the familiar life skills needed in the areas of questioning and focused listening. The number of services using voice technology is growing rapidly and steadily. Powered by Artificial Intelligence (AI), voice-controlled digital assistants such as Amazon Alexa and Google Assistant have accessed millions of living rooms over the past few years but are now being used in some classes. A digital facilitator can transform the classroom with real-time responses and built-in skills. Although each voice controller has its own unique features, many devices do the same and can send and receive information, answer basic questions, set timers and alarms, and interact with other devices connected to the Internet. Recent advances in natural language processing have allowed voice assistants to better understand and interact with students.

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3. Pros and Cons of Virtual Assistant

3.1 Advantages

[9]Visible senior assistants can contribute to the management of repetitive tasks and help you and your business stay organized and efficient. The great advantage of working with a virtual assistant is that it frees up your time so you can focus on the most important things of your business. Visual Assistants can take repetitive tasks such as newsletter management, tracking emails, calendar management and travel plans so you do not have to.

[9]Another advantage is that you have a low overhead. You do not need to keep someone else in the office. If they have knowledge of remote working tools and tools and programs that are set up for remote communication and supported by their supervisors, it should be easy to manage. If systems and technologies are already in place to support visual support, you can try and hire visual assistants who have worked with your business tools to make that process easier. This way they can hit the ground running. Alternatively, you can hire a person who specializes in learning new software and systems and will be fully operational in a few days.

[9]others may choose to work with a visually savvy assistant on social media who can manage posting and engagement schedules to help grow followers on important media channels. Or some may choose to work with a visual assistant who can help with blogging and content alongside other responsibilities to grow marketing content. Experienced visual assistants can bring in best practices from previous employers and help you set up new software or applications that can improve productivity, collaborative work, or project management.

3.2 Disadvantages

[10]You need to get busy to get clients. The hardest part about starting a business is getting the first paying customers. This is true of working as a visual assistant, like many other tasks. Homework Brings Many Challenges. Working from home is a dream come true for many, but some find it difficult. Working as a Physical Assistant Can Be Lonely. If you are accustomed to meeting and working in the office and having colleagues, you may find things that are difficult to get used to when you start working as a visual assistant. It can be difficult to separate work from

home. There is more to be said about closing the deadline and leaving work behind. There are many moving parts for starting a business. As a self-employed virtual assistant, you will become a trusted business owner. This means that you will need to take care of things like paying taxes, invoicing clients, and other common bookkeeping activities. No Benefits. If you run your business as a freelancer, you do not receive benefits such as company-paid health insurance and the 401k plan. If you want these things, you will have to pay extra for yourself in your pocket.

4. Opinion on Voice Assistant

I have tried to use Apple's Siri or its text-to-speech function, to fail to understand my stuttering. For people like me, voice technology that is a part of everyday life may feel trivial. Telling Alexa to play a song or requesting directions to Siri is almost impossible whenever it is extended ("Aaaaaaaaa-lexa") or recorded ("Hey… Si… ri!") Sounds cause devices to misunderstand my commands or stop listening completely. Voice helpers can improve our lives. Their inaccessibility can be dangerous even for those with a mobile disability, who can rely on voice assistants for help. On the contrary, they often do not understand.

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CHAPTER – 18

VOICE ASSISTANTS – A TECHNOLOGICAL BOON

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1. Introduction

1.1 What is Voice Assistant?

[1]Voice assistance is a software that permits hands free operation of a device. It's a unidirectional communication between the person and the computer. It's an assistive technology that provides aid to users using natural language processing and speech synthesis. [2]Voice assistance is a task-oriented programming application which recognizes human speech with the help of AI and stores its performance on cloud storage with millions of words and phrases in it. Internet is not required for the functioning of voice assistance. Voice assistance is now built in every operating system.

[3]The plan behind voice assistance is that the user makes a request through the microphone of the voice activated device and then the voice request gets streamed to the cloud and then it gets converted to text from. This text then goes to the backend system and gets processed and then the backend replies with a text response. This response goes through the cloud and gets transformed to voice which is then fed back to the user.
Voice assistance can perform several tasks such as:

- Answer the questions asked by the user
- Set timers or alarms
- Make purchases online
- Play music from major streaming services
- It can be used to control other smart devices too

1.2 History of Voice Assistance

[4]Its quite fascinating that voice assistance has been in development since 1770s and it has come a long way since then in terms of technology development. Telephone inventor, Alexander Graham Bell has also done important work on voice recognition by making way for the "Dictaphone", a machine used to record dictation of notes and letters.

[4,5]The first breakthrough was the invention of "Audrey". It was built by Bell Labs in 1952. It could recognize digits from 0 to 9. It was an enormous machine which occupied a six-foot-high relay rack, consumed substantial power, and had lengthy cables. This created it unsuitable to be used.

[5,6]The next invention was the IBM "Shoebox". It was made in 1962. This device recognized 16 spoken words and ten digits from 0 to 9. It remodeled recognized sounds into electrical impulses and gave directions to another machine to calculate and print the results for problems given by the user's voice. But both Audrey and Shoebox had a drawback, they lacked backwards text to speech method.

[4,5]Then in 1976 a major leap was made with the help of "Harpy" made by a team of researchers from Carnegie Mellon University. Harpy could recognize 1011 words and even understand sentences, pronunciation, and grammar structures.

[5,7]The first consumer voice recognition software was released in 1997 called "Dragon NaturallySpeaking" developed by Nuance Corporation for Windows computers. It allowed the user to convert voice into text without giving any pauses and it displayed the words on the screen.

Since Dragon NaturallySpeaking the technology has massively improved. IBM developed Watson which won the TV show "Jeopardy!" in 2011. [4]Google with its trick of using cloud computing to process the data received by its app took the market by storm and added voice search to its Chrome browser in 2011. Apple came up with its own version of voice recognition, Siri and Microsoft called its software Cortana.

1.3 Types of Voice Assistants

There are different types of voice assistants fulfilling different needs but, in the end, they are all used to solve the user's problems.

[8]Rule-based bots: These are used to solve small problems faced by the user like "How can I retrieve my password?". These types of problems do not need complex algorithm to give an answer and the answer is straight forward.

[8,9]Artificial Intelligence Assistants: An AI virtual assistant is an application program that understands its user's voice commands, can analyze the user, and predict their behavior. They give a more advanced and personalized experience. AI can also be used to develop Voice User Interface (VUI) design.

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[10]User generated VUI: A VUI allows the user to interact with the computer through voice. The main features of VUI is that it allows the user to interact with the product hands free and eyes free while they are paying attention to something else.

1.4 Popular Voice Assistants

There are many voice assistants out there but the most popular and feature rich ones are made by Google, Apple, Amazon, and Microsoft. These are Google Assistant, Siri, Alexa, and Cortana respectively.

Google Assistant: [11]It was released on May 18th, 2016. It is Google's voice assistant AI for Android devices. It can perform various tasks given by the user through natural language speech interface. It uses machine learning and voice recognition to provide a personalized and interactive experience by adding two-way conversation ability.

Google Assistant Logo

Alexa: [12]Alexa was released on 6 November 2014. Alexa can perform many functions from playing music to solving mathematical questions. The creators of Alexa took inspiration from conversational computer onboard Star Trek's starship "Enterprise".

Alexa Logo

Siri: [13]It is Apple's voice controlled personal assistant founded in 2011. Siri is also designed to give an interactive experience. Siri is very clever and has unique features. It can read the last mail in the inbox, can text other people in case you are not able to and so on.

Siri Logo

Cortana: It is Microsoft's voice recognition software founded in 2014. The name is taken from the video game series called "Halo" also developed by Microsoft. Cortana is also an AI powered virtual assistant.

Cortana Logo

2. Application of Voice Assistant

2.1 Voice Assistant at Home

Smart house is a concept that has been around for a while now and voice assistance can be used to control many parts in a house. [14] Any ordinary home can be transformed into a smart home by purchasing smart lighting, fans, and air conditioners. One just needs a voice assistant on a phone or smart speaker to control many devices and appliances in the house. Routines can be set using voice commands; for example, "I'm leaving the house" can be set and the smart home will turn off all the

lights, fans ad any other electrical appliance and lock the doors. There are many smart speakers like Amazon Echo, Google Home and so on.
These speakers can be used at home to play music, maintain a shopping list, keep a track of the tasks that need to be completed and entertain the people in the house.

2.2 Voice Assistant for Business

Voice assistant have so many applications, even in workplaces. They could bring real improvement in workplace efficiency. There are many advantages of using voice assistants in businesses.

Communication: It is a known fact that communication is a crucial factor for an efficient and productive business. [15,16]Voice assistants can not only speed up conversations but also can convey greater range of emotions which can help overcome the problem of ambiguity and miscommunication because of text messages. It also helps multilingual teams communicate properly.

Analytics: [15] Data analysis is another crucial responsibility for any firm. Voice assistants like Cortana and Siri are helpful in these matters. Analyzing many aspects of data using just voice would be a massive boost in productivity of the workplace. Analysts can just talk, and the visualization of the data would be presented.

Management of time and tasks: [15]Voice assistants can be of great use in setting meetings and searching for any scheduling conflicts and give the best schedule possible to the user. Even joining meetings can be made easier with the help of voice assistants as the user will not need to look at the screen or use his/her keyboard and mouse. Setting reminders for an important event can also be set using voice assistants.

Chatbots: [16]To improve consumer experience many businesses have introduced chatbots to their applications. This software brings voice assistant capabilities at a fraction of cost to the users to solve and answer their simple problems.

2.3 Voice Assistant for Education

Voice assistance also has a wide use in education in schools and colleges. [3]AI assisted voice assistants can be used to assist students in their learning process by making information available to them in an efficient and faster way. They can also be used to check solutions and spelling with

just a voice command. There are many voice assistants which can be used by teachers to teach. ProblemPal proposed by Trivedi uses Amazon's Alexa Skill that helps teachers to auto generate practice papers for students with voice commands. This skill can create practice problems about any subject and topic from many educational websites like Khan Academy, Wolfram Alpha.

[18]There are AI tutors like Edwin, which prepares students for English certification exams, Robot Ani which teaches business English, it uses chat bot style interactions to engage with students and examine their progress.

[17]Dragon NaturallySpeaking which was made in 1997 is also used today by students who need help with typing papers, writing exams, or completing any written work. It is especially helpful for students who are differently abled, who have dyslexia or any kind of learning disability. These students can just use voice recognition to transfer their ideas onto paper.

Voice assistance hence can prove extremely helpful in education.

3. Pros and Cons of voice assistant

3.1 Advantages

There are numerous advantages of voice assistants as seen above. [19] Saying a few words rather than typing or writing them is easier. One other selling feature of voice assistance is not requiring looking at screen. A person can be doing any other task while giving commands to the computer and get response quick. For example, a person driving a car need not look at the phone screen for directions but can just communicate with Google Maps for it and it will help the person out.

This is also beneficial for people who are blind voice assistance can be a life saver for them in the world dominated by computational devices. They can get directions to a place by just asking and the software would reply, even hearing-impaired people can take advantage of this as voice assistants can convert audiobooks or voice messages into texts for them to read.

[15]As seen in business voice assistants, chat bots can be beneficial to gather data from the consumers and help provide a satisfactory experience to them. Also, the language barrier falls in workplaces with the help of voice assistants which makes communication easier.

[3,14]In education it can be seen how voice assistance can help students jot down points quickly or how they can ask a doubt and get a response quickly. It can also prove helpful for differently abled students.

[20]Smart speakers and smart home appliances can be utilized to save electricity for example, they could be programed to turn off the lights, when you are leaving the house, with just a voice command.

At the end of the day voice assistants make life easier and can help many people with day-to-day tasks and controlling multiple smart home products.

3.2 Disadvantages

There are cons to voice assistants too. [21, 22]The initial cost to buy a smart speaker may not come under everyone's budget but voice assistants are available on most mobile phones nowadays.

[21,22]Voice recognition isn't perfect and is prone to either not understanding the or misunderstanding the user which can cause problems. The AI is still evolving and t hey learn and adapt to user.

Security and privacy issues. [22]This is a major disadvantage of today's voice assistants. Principal security researcher at Kaspersky Lab David Emm has said 'Even if Amazon doesn't do anything questionable with your Echo interactions, it does store them in the cloud, which isn't totally hacker-proof'. [23]Voice assistants have access to so much data about the user including passwords of email accounts and social media. Most devices have a certain level of security but often they are used to control other cheap smart devices which make them vulnerable to cyber-attacks.

[23]Voice assistants always must be active that is they are listening and recording at every moment to the user to work efficiently there is a high potential that the conversations might get leaked. This could lead to a lot of problem for anyone at home or at workplace. There have been cases where voice recordings have been leaked, [23,24]Apple had hired third party companies to have a look at the contents of Siri's recordings. [23,25]Even Amazon had accidentally sent 1700 voice files which contained personal information to a customer in Germany in 2018.

4. Opinion On Voice Assistant

This technology is fascinating and is gaining a lot of popularity and it might soon change and update certain workplaces and education

system. Voice assistants integrated with AI and augmented reality can provide learning experiences that have never been seen before. At workplaces people will be trained to make use of this technology to be more productive and efficient.

I think that voice assistants can be considered as a helpful tool to help counter day to day situations, but one must not be highly dependent on these software and devices as the focus gets diverted and the user might make a mistake while doing whatever task he/she is doing. Security is another concern relating to voice assistant but as technology advances this issue can be overcome if not it can be reduced a lot. Currently voice assistants do not speak a lot of languages but once that is solved, they can be used by many more people. Overall, this technology can prove itself and has potential to grow and develop a lot more now that the studies are being conducted in this field.

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CHAPTER – 19

UNDERSTANDING VOICE ASSISTANTS

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Introduction

Looking back 10-20 years, I bet most would have never imagined a world where you could look at a screen and it will pop open or look things up just using your voice. Book a movie ticket, order some food on the go, check the weather to know if carrying an umbrella is a necessity or just play a song by humming the tunes – all of this is now achievable through the use of 'Voice Assistants,' a revolutionary technology often taken for granted.

Voice Assistants are your personal assistants built right into your electronic devices including your Television, PC, Laptops, and most commonly, your mobile devices. They are ready to assist you with the most basic things to the most tiresome of tasks, all through the clever use of Artificial Intelligence, Machine Learning, and the good old microphones.

Let us look at Voice Assistants in further detail:

1.1What is Voice Assistant?

[4.] A voice assistant is a digital assistant which uses voice recognition to perform various tasks and functions depending on the request of the user. It uses various language processing algorithms and voice synthesis to listen to and detect the command given by the user and performs them accordingly. They use specific commands called 'Intents' and by listening to certain specific keywords, they can filter out the ambient noises. This allows them to get a clear idea of the commands being given by the user.

Voice assistants can very well be the answer to traditional desktop limitations (The need to have a physical connection with the system) and target the next generation of smartphone interfaces. The propagation of affordable and exceptional quality hardware in recent years has created a large market for voice assistants in end-user's homes and offices.

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[2]**Vector Depiction of a Voice Assistant**

1.2 History of Voice Assistant

[1]The Experimental Era (1920s-1980s)

Exactly 100 years ago, we had the release of a toy with what I believe can be called a vision, a farfetched vision but a vision regardless. It was called Radio Rex, a toy shaped like a dog whose head came out if you would call its name. We can very well say that this was the first commercial voice assistant, it marked the beginning of what will come to be one of the biggest technological endeavors of all time.

[5]In 1952, the well renowned Bell Labs presented the world with "Audrey", the Automatic Digit Recognition Machine. Ignoring its myriad of problems including maintenance and power consumption, the world saw glimpses of something extraordinary. It had the ability to recognize phonemes, the fundamental units of speech.

[6.]Another amazing feat in the history of voice assistants was the IBM Shoebox, a voice-assisted calculator that recognized 16 spoken words and all the digits between 0 and 9. These words included simple commands such as plus, minus, etc. A fun trivia on its name, it was named shoebox because of its size, which was about the size of, you guessed it, a Shoebox.

The next important development in the field of Voice Assistants came in the form of "Harpy." A machine was developed by Carnegie

Mellon University in Pittsburgh in the 1970s. The program was funded by DARPA and the United States Department of Defense. Harpy had the vocabulary of a 3-year-old human and it was able to understand sentences, a feat unseen before.

The Birth of Assistants

In the early to mid-1990s, speech recognition technology became an integral part and a selling point for the early PC's made by IBM, Phillips, and Lernout & Hauspie who were all fighting for customers. Later in 1994, IBM launched a smartphone with voice recognition capabilities called "Simon".

Colloquis publicly launched SmarterChild on platforms like MSN Messenger and AIM. It allowed users to look up facts and converse with the product to an extent.

The first digital virtual assistant was Siri, which was a prime feature of the iPhone 4S on 4 October 2011.

Alexa launched its own voice assistant Alexa alongside Echo in November of 2014.

Trivia: Alexa was inspired by the great Library of Alexandria.

[6.] **1.3 Types of Voice Assistants**

There is a diverse range of voice assistants, who use different technology and workflow. Some of these include:

(i) Rule-Based Bots

These types of voice assistants are usually used when the need is direct and simple. Their scope of operation is small in requirements. An example is "How can I book tickets?." An issue of this scope usually has no need for complex algorithms and is usually scripted in the back-end.

[7.] **(ii) Artificial Intelligence Assistants**

This variety of Voice Assistants is quite sophisticated in the sense that they can analyze the user's behavior, performing complex tasks and to an extent predicting the behavior of the user. It is based on Artificial Intelligence rather than hard-coded rules which allow it to make its own decisions.

A great demonstration of the power of AI was seen when the CEO of Google and Alphabet, Mr. Sundar Pichai demonstrated Google Duplex, a voice assistant that allows someone to carry out tasks such as booking a movie ticket using natural language conversation.

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(iii) Grouping Voice Assistants

A rare yet visionary user experience is created with the use of more than 1 voice assistant to perform the tasks. This creates credibility for the user and can help to increase engagement.

[7.] **1.4 Popular Voice Assistants**

Most popular Voice Assistants in recent years include:

(a) Google Assistant
(b) Siri
(c) Amazon Alexa
(d) Microsoft Cortana

2. Application of Voice Assistants

Voice Assistants are powerful tools that can do amazing things and gain new abilities every week. But we cannot use them to the best of our abilities, mainly because we do not know what we can do with them.

One in three U.S. homes has a smart speaker and almost 80% of smartphones have a google assistant, Siri, or Alexa. This goes on to show how much Voice Assistants have been integrated with our lives.

2.1 Voice Assistants at Home

[16.] The uses of voice assistants at home are varied and the silent impact they have in our lives is amazing. They provide us with an assistant which many saw in movies, a Jarvis to our Tony Stark. Their applications include:

(a) Booking a movie
(b) Tuning in to radio
(c) Keeping a shopping list
(d) Managing our time and being productive

[10.] **2.2 Voice Assistants in Business**

Their uses in the Business sector are niche and unexplored, their uses can vary from confirming payments from buyers who pay using UPI to maintaining and making sure employees work in companies using constant pings or reminders.

The self-driving Tesla's are an amazing use to voice assistants to control the car to a certain extent by using a combination of AI and ML, cameras, and microphone.

[8,9,]2.3 Voice Assistants in Education

The use of Voice Assistants in Education is not just limited to automating tasks and saving time, it extends further beyond modernizing the interaction between the student and the teacher.

Voice assistants are the closest thing to a human, and a teacher can use Alexa to make learning feel personal for their fellow students.

Voice assistants have an interesting feature of eliminating the need to break eye contact. For example, in certain situations, while teaching, the teacher needs to refer to the material which can result in the breaking of eye contact. Using a voice assistant to read out the material while retaining eye contact can help increase the trust and understanding between student and teacher.

Some great ways to use a voice assistant in the field of education include:

(a) Seamless exchange of questions and answers
(b) Reading stories and books to students
(c) A good control of the environment for the class
(d) A personal assistant for the teachers

3.0 Pros and Cons of Voice Assistant

As with many other novel ideas and great technologies, voice assistants have their fair share of pros as well as cons. The pros and cons often have different impacts on the lives of the end-users, and companies sometimes use obscure and out-of-the-box methods to solve these cons while amplifying the pros.

[12]3.1 Pros of Voice Assistant

(a) Helps users to save time by offering services, you can communicate with google maps and ask it for directions to your destination.
(b) Assist in phone operations such as call routing or replying to texts without typing.
(c) They can help you in distress as there is some software that allows them to be therapeutic. This can help you relax using meditation techniques and allow you to relax with a single command.
(d) They control your smart home devices which can save electricity as they will ensure the most optimized use of power.

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[13,]**3.2 Cons of Voice Assistant**

(a) **Expensive:** Most voice assistants which offer smart home setup are quite expensive and can cost a fortune to get the most out of them.

(b) [17]**Network Dependent:** Voice Assistants are heavily dependent on a good internet connection to function at their best as they need a reliable and fast connection to fetch you the requested data and perform their functions optimally.

(c) [14] **Voice Errors:** Voice recognition is far from perfect and still has trouble detecting the various dialects and speech patterns, this can lead to some errors.

(d) [15] **Privacy:** The idea of having a microphone in your house listening in to your every conversation can seem a little concerning to some. The privacy concerns regarding voice assistants are growing and gaining traction as the concerns of data leaks grow. This leads to people getting paranoid about the technology. Many are concerned about hacks into the cloud server used to store the information regarding users and the user profile, the hack while impossible.

[3]**Depiction of microphones in Voice Assistant**

4. Opinion on Voice Assistants

Whilst voice assistants are an impressive technology, it has too many flaws as of the writing of this article to be of any efficient use. Voice recognition technology is new and fails to catch the accents in different languages around the world. Another major flaw is the time it takes to process the voice data and give the required results is slower than manually searching for the query. Pair it up with the recent rise in privacy concerns with microphones, the public opinion on voice assistants is looking grim.

Voice assistants have not matured yet as technology and need time to develop, this can be seen in a good light as the more time it gets, the better the technology will become. I can see Voice Assistants becoming an integral part of our lifestyle, but it still needs some time to achieve its full potential. It is at the stage of Scooby, and we need to reach the level of Jarvis.

Even though my current opinion on voice assistants is negative, I have full faith in their potential.

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CHAPTER – 20

VOICE ASSISTANT - THE AID OF DIGITAL ERA

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1. Introduction

1.1 What is Voice Assistant ?

[1]We know that Artificial Intelligence (AI) is bringing a vast amount of changes in our day to day life, even voice assistants use the same technologies combined with some other algorithms like language processing algorithms and voice synthesis algorithms which plays a major role in voice assistants to respond to a user's task given to it. These algorithms are designed in such a way that it can break down the command into several meaningful parts spoken by human, assess it, and return an appropriate result to the user.

Voice assistants can be of two types based on our usage, they can be used to manage general day to day life tasks that are digitally necessary and also, they are used as chat bots in several companies to guide the user according to his/her needs.

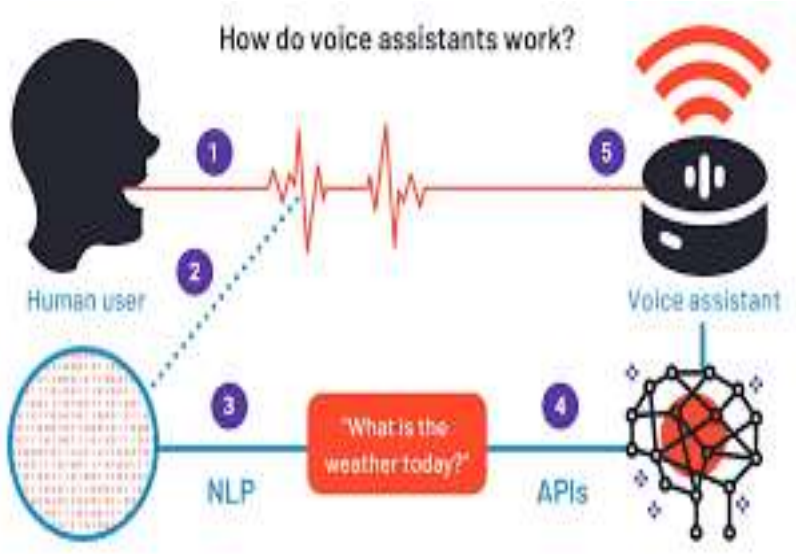

Figure-1. Representing how voice assistants work.

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1.2 History of Voice Assistant

[2]Voice technologies have emerged in the period of 1950's - 1960's. Voice technologies started to develop according to various needs of human beings at that time, but the Voice Assistants was 1st time introduced to the world by Apple in 2011.

Apple introduced 'Siri' in the mobile phones as a voice assistant feature which was a game changer in the digital and AI industry which amazed many people with its abilities. Then onwards the voice assistant feature was being introduced by many MNC's like Google, Microsoft, Amazon etc. Google launched its own voice assistant feature names as 'Google Now' in 2012, then Microsoft introduced 'Cortana' in 2013, at last even Amazon launched its own voice assistant feature named 'Alexa' and 'Amazon Echo'.

These 4 years was the period where voice assistance became a booming technology by attracting more and more people to use the feature which made a huge amount of profits to the MNC's. Then slowly the technologies got even better which got some major changes by implementing more featured into them.

[3]Again in 2016 Google launched 'Google Home' which is used to operate google nest and also to control the connected devices through this feature and 'Google Assistant' which is a cool feature which is present in every android smartphones available now, which became a part of everyone's day to day life as it is widely used by 24% of the world population to navigate through their phones and make their work easy by giving a voice command.

Figure-2. History of mainstream voice assistants

1.3 Types of Voice Assistants

[4]Voice assistants can be classified into 4 categories.

(i) General Purpose Voice Assistants :- Siri, Bixby, Google Assistant, Alexa are some of the examples of General Purpose Voice Assistants which are used to perform general day to day digital tasks like setting an alarm, setting a remainder etc. Usually these general purpose Voice Assistants can be found in our smart phones or any other smart devices.

(ii) In - App Voice Assistants :- To ease the customer experience, some brands have enabled the voice assistant feature in their respective apps where users can give voice commands for search results. By enabling this feature, the process becomes more easier for a user to navigate or search anything within the app. 'Udaan' , 'MyJio' , ' Amazon' , 'You Tube' , 'Gaana' are some of the apps that have enabled this feature which made customer experience easier to operate.

(iii) Owned Voice Assistants :- Some brands have their own voice assistant feature and have their own name for the voice assistant. For example, 'Erica' is the brand named voice assistant in Bank of America app.These in-app personalised voice assistants are built by some of the AI service providers like 'Nuance' and Google cloud.

(iv) Managed and White labelled :- [5]Most of the companies depend on some AI platform service providers to enable a voice assistant in their portals. Usually these are developed by third party AI Service providers. Developing an own voice assistants is not an easy task, so to fill this gap, these 'white label solutions' entered the market to provide voice assistants which are totally under the control of them.

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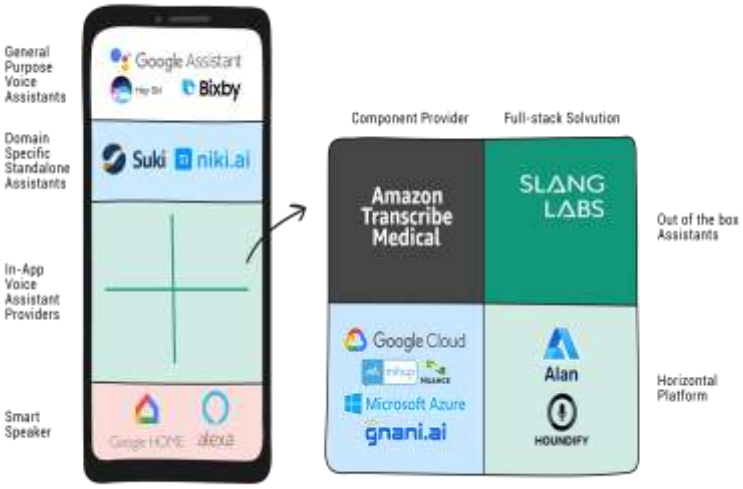

Figure-3. Representing the type of Voice Assistants.

1.4 Popular Voice Assistants

[6]There are some popular voice assistants that are used throughout the world by many people.

These became popular as they are helping us in many ways in helping us to do some basic tasks and make our work easier. Due to the best algorithms and the technologies that are used, they have gained more popularity throughout the world.

Here are the popular Voice Assistants :

(i) Amazon Alexa :- Alexa is more popular because it is built in such a way that it can answer any type of general questions. They are mainly specialised in operating smart home devices like lights, fans, watches, TV, etc…, Amazon's voice assistance helps the user search or shop the items that the user want to buy. It has made the user experience more comfortable by making the process of buying things in an easier hassle free way.

(ii) [7]Google Assistant :- Google is capable of showing the search results very quickly. Google is a leading company which crossed Apple and Amazon because of its best algorithms that are used to show the

accurate results in a very less time. Google Assistants help in easy pairing and we can operate any 3rd party smart devices after pairing with Google Assistant. We can consider Google as the most user-friendly product and also it has a very good name in showing the most appropriate results as google is the best search engines in the world.

(iii) Apple Siri :- Siri can be used in Apple products like iPhone, iPad , MacBook..etc., Siri is most widely used in western countries as the apple products are the majority products bought there. Siri is capable of understanding 20 languages and it is more than any other voice assistants available, apple Siri can be easily paired when there is an Apple ecosystem.

Figure-4. Representing the popular Voice Assistants.

2. Application of Voice Assistant

2.1 Voice Assistant at Home

[8]Using voice assistants at home is none other than making our home smart which is called 'Smart Home' and it is purely based on IOT(Internet of Things) and Artificial Intelligence. We can use smart hubs connected to the google home to make our home a smart home. So by this we can give commands by voice to the voice assistant so that it can fulfil our need. We can switch on/off the lights, fans, TV's etc…, we can also ask the voice assistant to play some music to chill or turn on the AC by just sitting on a sofa.

Using Voice assistant has made lives easier as most of the electric appliances can be operated just by giving a voice command to the voice assistant.

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Figure-5. Representing a Voice Assistant using at a home.

2.2 Voice Assistant for Business

[9]To increase the user experience most of the companies are adding the feature of voice assistance in their existing portal which made easier because speaking is more easier than typing a doubt. Nowadays the emerging technologies have also made voice enabled payments and this contributed a huge development in finance industries. A bank in Turkey has proved that even mobile banking can be done with the help of voice assistant named MIA.

Research says that, using Voice Assistants have improved productivity within the organisation and reduced the count of human labour. Most of the company gained a good amount of profit through Voice Assistants by offering personalised recommendations. With the help of VA's companies can collect the customers interests where it is not possible with the human power so that the users get the similar products getting displayed so that they can buy the product.

There are many ways that these businesses have boomed with the help of VA's.

2.3 Voice Assistant for Education

[10]Voice assistants can play a major role in education field and it completely depends on the type of usage of Voice Assistants in a classroom. Teachers have many responsibilities in a school like taking attendance, taking feedback, explaining sessions in a new way, explains

the doubts and many other tasks, so generally teachers often forget some tasks and here comes the role of VA's where the AI technology is used to mark the attendance, record the sessions and the presentations given by students. Learning through podcasts is also an effective way to learn in this digital era, giving a single voice command to play an appropriate session according to the command lessens the burden of wasting time in searching for the sessions and also doubts are easily clarified through VA's.

Nowadays many textbooks are also available through voice lectures where you can listen to the lectures easily with spending less time. In every school the faculty conducts tests and quizzes to know the knowledge of the students, so with the help of VA's teachers can conduct customisable tests by knowing the weaker section in each session.

Figure-6. Students using a Voice Assistant in a library.

3. Pros and Cons of Virtual Assistant

3.1 Advantages

[11]Virtual Assistants can help in reducing the work load which we have in our day to day life. Virtual assistants play an important role in marketing for brands which bring a lot of profits and traffic to their sites. Those companies which enabled virtual assistance have a amazing feature of 24/7 customer support where any user from any part of the world can enquire anything and also it doesn't need any human support for that. Though a wide variety of languages are speaker around the globe, Voice

assistants have the capability of understanding different languages which is an important feature in this technology.

With the help of Voice Assistant we can save much time and become more productive by getting things and work get done faster than usual. Without any operation we can operate the appliances just by giving a voice command which saves a lot of time here also. Without any work to the hands we can get our work done just by sitting in one place.

[12]Voice assistant also strengthened a lot in building customer engagement and improving user experience as it became very easy for most of the people to operate or navigate in a portal and also this made the payment method more hassle free just with a voice command. This technology has made some other industries like fashion, e-commerce, education, finance, service providers improve a lot.

[13]Voice Assistants have proved that they are very helpful in kitchens, usually mothers have a lot of work to do inside a kitchen so they may miss some of the ingredients to add into the food, so as the technology is developing, even VA's are being used in kitchens, just by giving a voice command like "hey! Google tell me the recipe of making Biryani", VA's give u exactly the most appropriate recipe in the form of steps, so the cooking is done more interactively with the help of VA.

Nowadays even children are using voice assistants for their homework or to complete school projects. As they are incapable of searching for an appropriate website in the browser, VA helps them in finding the best website for the topic. As we discussed VA plays a major role in Education field.

Figure-7. Benefits of Voice Assistants

3.2 Disadvantages

[14]We all know that we can access Voice Assistants only when there is a proper internet connection in our area, many people live in rural areas where there is no proper connectivity so, they can't use VA's. This is one of the major disadvantages as internet is the core thing that is necessary to access Voice Assistant.

Though Voice Assistants can manage most of the tasks can't guarantee that it makes us relaxed when we are using it, as the technology is even upgrading, there are a lot of changes that need to be implemented in this concept to make even work more easier as VA's cannot access every thing in our home. We know that Voice Assistants can be operated with the help of voice, sometimes our voice will be changed due to weather conditions or something else or sometimes we may be little far so that Voice assistant can't hear us, so it is a must to be clear and audible to access Virtual

Assistants. We must also ensure that there is no disturbance in our surroundings so that we are audible to the Voice Assistant.

[15]As we discussed above that some of the companies or organisations use third party AI service providers for their customisable voice assistants, here comes a major fear that the third party platforms may extract the user data unknowingly and misuse it. As it can be accessed with voice, anyone with the voice can access the Voice Assistant at your home or office and breach all your personal data and information through that which is a very harmful threat. Research says that the Voice assistants are also probe to cyber hack which are done to breach all our personal data. As the voice assistants are always connected to the internet, it is capable f hearing everything that we talk at the home or office so there comes the fear that the Voice Assistants may hear or record our personal data when hacked. Reattach suggests that these VA's must be improved a lot regarding security features.

4. Opinion on Voice Assistant

As we discussed the advantages, the opportunities we may unlock with the help of Virtual Assistant, I think it is absolutely necessary to used by everyone as it helps in saving a lot of time through out the day making our work even more easier and helping everyone in every field of work is the best feature in this. In my opinion everyone must use this to improve

https://doi.org/10.26524/royal.110

productivity and save their valuable time. Especially every student must use this to make their learning more happier and easier, and also I believe that this can play a major role in company offices or businesses to make work more easier.

One must make use of Voice Assistants upto its potential. Even companies are using voice assistants to improve a lot in their businesses and I believe it is even helpful for individuals in their day to day life without mattering age of a person. Voice assistants are helpful for everyone. As the technologies are booming, I believe that, even we must be updated to the society to enjoy the new emerging technologies like VA's. I am sure that this technology even develops a lot in further years aiming to make every house a smart home.

Figure-8. Representing Google Assistant

Figure-9. Representing Google Nest

Figure-10. Representing Amazon Alexa

Figure-11. Representing Siri VA

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CHAPTER – 21

VOICE ASSISTANT-THE UPCOMING FUTURE

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1. Introduction

1.1 What is Voice Assistant

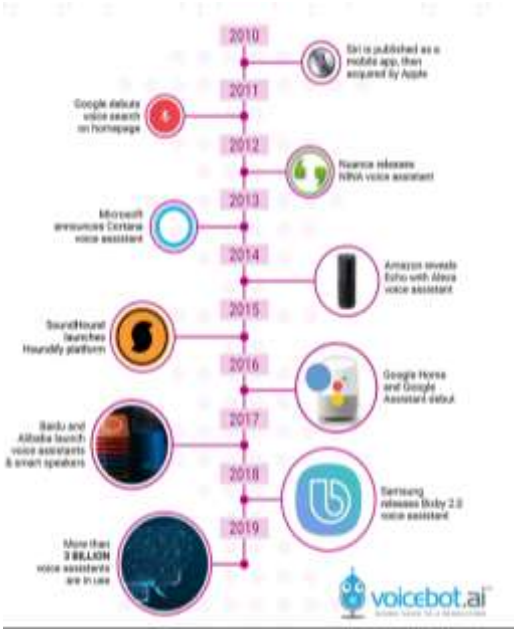
[1]A voice assistant is a virtual assistant that listens to particular vocal commands and returns relevant information or executes specified actions as desired by the user, using speech recognition, language processing techniques, algorithms and voice synthesis.

Voice assistants can return necessary information based on particular commands, sometimes referred to as intentions, voiced by the user by listening for certain terms and filtering out extraneous noise. As of 2017, chatbots abilities and usage are fast developing, with new solutions hitting the market and a significant focus on email and speech user interfaces. Apple and Google each have a sizable smartphone user base. Microsoft's Windows-based pc's, cell phones, and smart speakers have a big installed base. Amazon has a big number of smart speaker users.

1.2 History of Voice Assistant

[2]In 1922, Radio Rex was the very first voice-activated toy. Its name was called, a wooden toy in the shape of animal(dog) would come out of its dwelling. Then in 1952 Automatic Digit Recognition system, "Audrey," was introduced by Bell Labs. System took up a six-foot-high relay rack, used a lot of power, had a lot of cables, and had all of the maintenance issues that come with complex vacuum-tube electronics. The system was able to distinguish phonemes, which are the fundamental elements of speech. It was restricted to accurate digit identification by approved talkers. It could thus be used for voice dialling, but in most circumstances, rather than reciting the successive digits, push-button dialling was cheaper and quicker. The IBM Shoebox voice-activated calculator, which was introduced to the general public during the 1962

Seattle World's Fair after its original market introduction in 1961, was another early gadget that could perform digital speech recognition. This early computer, which was developed nearly 20 years before the first IBM Personal Computer was introduced in 1981, could detect 16 spoken phrases and the numerals 0 to 9. MIT scientist Joseph Weizenbaum created its first natural language processing computer software, or chatbot, ELIZA, in the 1960s. It was meant to "show that man-machine connection was only superficial". To imitate conversation, ELIZA used sequence matching and replacement methods in programmed responses, giving the impression of understanding on side of the audience. The ELIZA effect, also known as anthropomorphisation, is a phenomenon that occurs in human interactions with voice assistants. It is the tendency to automatically assume computer activities are equivalent to human behaviours. The next major breakthrough in voice recognition technology occurred in the 1970s at Carnegie Mellon University in Pittsburgh, Pennsylvania, where the US Department of Defence and its DARPA agency funded a five-year Voice Understanding Research(Analysis) programme with the goal of achieving a vocabulary of one thousand words. IBM, Carnegie Mellon University (CMU), and Stanford Research Institute were among the companies and universities that participated in the programme. After this study/Research programme result was "Harpy," which knew around 1000 words, had a three-year-vocabulary, old's and could understand phrases. It could analyse speech using pre-programmed vocabulary, pronunciation, and grammatical structure to identify which word sequences made sense together, decreasing speech recognition errors. Tangora, a voice-recognition typewriter, was released in 1986 as an improvement to the Shoebox. It contained a vocabulary of twenty thousand words and used prediction to determine the most likely outcome based on what had been stated previously. It was named just after world's fastest typewriter at the time. IBM used a hidden Markov model, which incorporates statistics into digital signal processing techniques. The approach allows for the prediction of the most probable phonemes to follow a given word.



[3]**The decade of Voice Assistant Revolution (2010-2019)**

2. Types of Voice Assistants

2.1 [4]**Rule Based Bots:** These bots are typically employed to complete tasks that have a limited scope of needs. However, when there is a lot of analysis and creating dialogue flows, the design phase can be quite difficult.

2.2 Artificial intelligence Assistants: Such assistants are capable of analysing the user, answering complicated inquiries, and anticipating the user's actions. Rather of following pre-programmed rules, artificial intelligence learns to create its own rules. The (AI) system is given commands and set of data in order to create these algorithms. As a result, AI-assisted assistants can perform jobs that would be hard to accomplish with standard scripted algorithms. Data, and a lot of it, is required to improve the Intelligence (AI powered) assistant.

2.3 Grouping Voice Assistants: Multiple voice assistants can be employed to provide a speech user experience, albeit this is uncommon. Multiple virtual assistants are used in this type of encounter, which may boost credibility and participation.

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3. Popular Voice Assistant

3.1 [5]The number of things a virtual assistant can control determines its worth. It should be able to access apps and do simple operations on your phone. It should be able to perform household tasks at home, such as turning on lights and turning off the thermostat.

Broadly compatible voice assistants provide you seamless management over diverse technology and, by extension, your apartment's comfort and security. To construct a genuinely useful voice assistant, you'll need a big platform with a wide range of compatibilities. Other, lesser-known alternatives exist, but they can't compete in terms of managing devices or replying to enquiries.

Some popular Voice Assistant are:

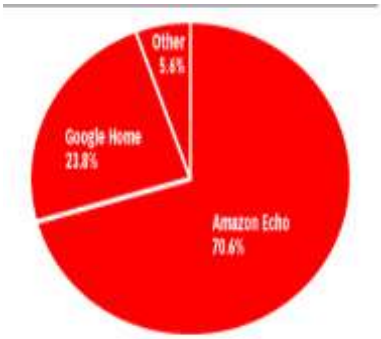
- Amazon Alexa
- Google Assistant
- Apple Siri
- Microsoft Cortana
- Samsung Bixby

[6]Some Popular Voice Assistants

[7]Timeline of main stream voice assistants.

4. Application of Voice Assistants

4.1 [8]Voice Assistants at Business: Text-based chatbots are becoming increasingly popular, particularly in retail, eCommerce, and financial applications. Many firms want to add speech recognition abilities to their existing apps since increasing customer experience is a primary goal. Voice-enabled devices have been used in the banking industry to reduce time and improve customer service, both of which are important in growing business. In addition to improving the customer experience, AI-based virtual assistant technology has the potential to boost a company's efficiency. According to the findings of a survey, digital assistants can substitute for up to 6.2 billion labour hours.

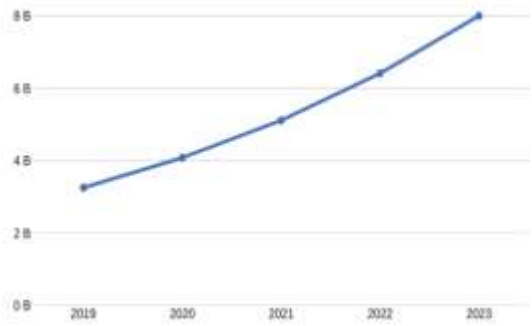


[9]Individual of any age who use a voice-enabled speaker at least once a month.

4.2 [10]Voice Assistant for Education: With its human-like vocal qualities, a voice assistant like Alexa is the ideal tool a teacher can utilise to make learning personal and human for learners. It can communicate a variety of emotions by modulating its voice. Virtual assistants assist in overcoming some of the constraints that other forms of technology in the classroom impose. Making a digital assistant read things out loud allows teachers to retain a strong relationship with their students. Voice-activated gadgets are useful not only for getting work done, but also for gathering and storing data. Teachers may record student presentation, attendance, classroom engagement, and much more only with one device. At the time of periodic assessments, this data can be obtained and reviewed.

https://doi.org/10.26524/royal.110

4.3[11]**Voice Assistant for Home:** Google is famed for its accessibility, and its assistance may be found in a variety of Google products. Google Assistant is available on your smartphone, speaker, smartwatch, laptop, Television, and car. It links to popular services like as Netflix, YouTube, and Spotify. You can use Google Assistant to direct your Roomba where to clean, and it can link to smart home products like a Nest thermostat. Alexa, Amazon's voice-activated assistant, has the capacity to integrate every aspect of your life. Connect your music and play your favourite tunes whenever you want. Request an Uber or place a pizza order. Alexa can be found on Amazon devices such as the Fire Tablet and Echo Dot, as well as through Google Play store and Apple Store apps.



[12]**According to a study by Juniper Research, by 2023 there will be 8 billion voice assistants in use.**

5. PROS and CONS of Virtual Assistant:

5.1 [13]Advantages:

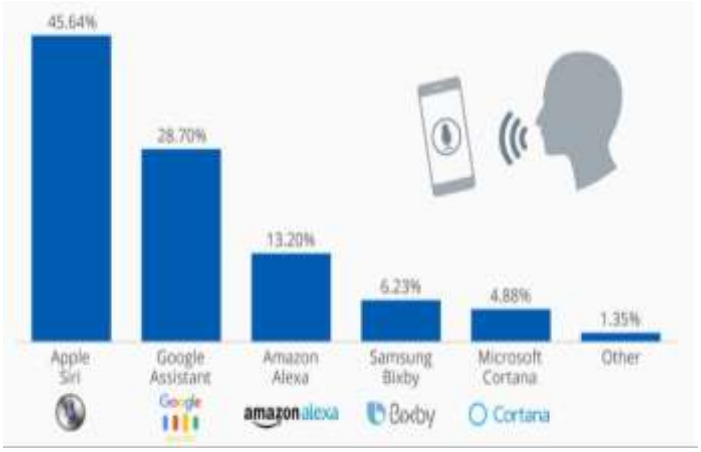
1. It saves a lot a time.
2. Virtual assistance saves money.
3. Increases productivity.
4. Using it electricity can be used by using voice commands.
5. Helps in Expanding business.
6. Plays a vital role in Education sector.

5.2 [14]Disadvantages:

1. Creates a lonely environment among the employes.
2. Students got addicted to the electronic devices.
3. It becomes difficult to separate from work and home life.

6. Opinion

According to me Virtual Assistant is the future of upcoming generation it will reduce a lot of hard work without any human error. It also helps almost every industry which leads to the development of the country and makes a nations financially strong which overall leads to development. However, there are some cons also but as compared to pros cons are very less. Hence Voice Assistant is a Boon for the society.



[15]**Market share of Voice Assistants**

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CHAPTER – 22

ALL ABOUT VOICE ASSISTANCE

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1. INTRODUCTION

[1]A voice assistance is a AI based technology which makes work and stuffs easier ,it uses voice recognition ,as a user gives a certain command ,it processes and give the information about the topic .It is a software based technology which is making today's world updated and featured, it brings technology and vocals together .

Nowadays many devices comes with these feature to make our work easy like Amazon alexa is one of the most used and popular voice assistance device ,some device are made to make our surroundings cool and advanced , all electrical appliances which are used in our home are featured with voice assistance like smart bulbs , refrigerator and other devices.

1.1 WHAT IS VOICE ASSISTANT ?

[2]A voice assistant is a device which takes vocals as an input and then works on language processing algorithm, and voice synthesis to listen to specific voice command and return relevant information or perform specific functions as requested by the user.

voice command needs internet connection to perform its work , they are designed in way that sometimes they can return relevant information asked by the user by listening for specific keywords and filtering out the ambient noise.

Basically voice assistant works as a virtual assistant for a person to reduce his hectic schedule by some extent.

1.2 HISTORY OF VOICE ASSISTANT

[3]Voice assistant has a very long history ,as the work on this idea was started in the early 1800s

As this device got very popular after the launch of Amazon echo.

https://doi.org/10.26524/royal.110

The first trial was done in before 1920 and after lots of research first activated product was released in 1922 as RADIO REX. This was a toy based of voice commands, a dog would stay inside the house and when the command was given "RAX" he just jumps out of the house , this was all done by an electromagnet tuned to the frequency similar to the vowel found in the word Rex.

[4]3. Days which were important for voice assistant :

- 1961- IBM introduces Shoebox.
- 2001-Microsoft introduces speech recognition feature for Office XP.
- 2011 April 14 -Apple launches Siri.
- 2012 July 9 – Google launhes Google Now.
- 2014 – Amazon introducs Alexa and Amazon Echo.
- 2014 – Google launches Google Home.

1.3 TYPES OF VOICE ASSISTANT

There are many types of voice assistant like Alexa and Google home which are used to control home appliances,this work only if devices are smart and have the feature to get linked with Google home and Alexa .

For getting some information about any topic we generally use Google voice assistant and we get all the related info .we can play music or can search for a movie using you tube voice command.

1.4 POPULAR VOICE ASSISTANTS

[5]Some of the popular and most used voice assistant are

1 .Google assistant
2 .Echo
3 .Bixby
4 .Google now
5 .Viv

Some of the most popular voice assistant used in our house are

1. Google home
2. Alexa
3. Siri

2. APPLICATION OF THE VOICE ASSITANT

[6]Voice assistants are powerful hands-free computing tools that gain new abilities almost every week. They are updated with new features .The problem may be that we don't know what to do with them. They're new tech we haven't really begun to stitch into our lives.

2.1 VOICE ASSITANTAT HOME

Voice assistant are used at home for many uses like it is used for controlling all the electrical devices like bulbs and other devices.

Most popular assistant used for home appliance are Siri , Google home Echo

2.2 VOICE ASSISTANT AT BUSSINESS

[7]As nowadays Alexa , Echo, Google are helping us to make our to-do list , playing music, movies and for getting some info about a topic.

[8]Voice assistant at company can help the employee and officials to remember their meeting dates and important date.

Many ecommerce companies can use voice assistant for generating some vocal message, as this will give the user a better experience.

2.3 VOICE ASSISTANT AT EDUCATION

[9]Voice assistant can also provide same level of understanding in a classroom like a teacher as it is closest to the human .through this we can reduce the spread of covid-19 also, there will be no [10]actual classes as voice assistant provide a understandable virtual environment for students to learn and grab the information same as of real classes.

https://doi.org/10.26524/royal.110

It improves the learning process as we can get the answers immediately after asking the question and it is easy to interact with that as it communicates with natural language.

Many of the educational institute nowadays are using voice assistant for providing better content and resources to the student for quick understanding without any lag.

3 .PROS AND CONS OF VIRTUAL ASSISTANT

[11]Working with virtual assistant has many pros like having a flexible schedule , whenever we want to take some help we can .

However it has some cons also like if no internet connectivity then we can't use them and if you want to get an realistic elaboration for a topic then you won't get that experience .

3.1 ADVANTAGES

1. [12] It increases customer engagement.
2. It has advanced search capabilities .
3. No time bound, support round the clock.
4. [13] Minimal effort.
5. Response is fast.
6. comfortably handled by children and old people.

3.2 DISADVANTAGES

1. [14] We are fully depended on assistant.
2. Many smart home devices are expensive.
3. If internet is gone it is hard to use these device.
4. [15] Privacy concerns like recorded data .
5. Misinterpretation of words.

4. OPINION ON VOICE ASSISTANT

In my opinion I have a positive review on voice assistant. As it is a combination of AI and technology which reduces human effort to some extent which is very useful for our daily works and lifestyle .In this growing world this seems to be a great innovation to have almost everything which can be controlled by our vocals. There are some disadvantages but they are overshadowed by its advantages. It has a great impact on the market, in past 5 years the sale for this has been increased a lot. Most of the companies are using voice assistant in their tech and app. There are many other applications of voice assistant, it not only makes our home good looking but has a great impact in educational field.

It was a great invention to combine technology and our vocals frequency with each other to build a device which we will help us in our future.

Day by day some updates are coming in existing devices which are making them better with some new features. Many tech companies are building other devices with more advanced features and they will be the extension of their old models.

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CHAPTER – 23

VOICE ASSISTANTS: FRIEND OR IMPOSTER?

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1. Introduction.

Voice assistants (VA) are becoming an integral part of our lives, in place of typing out the whole query, we now ask the VA by speaking out like we are talking to some other human. Now we can schedule alarms, set meetings, order food, and many other things from just a voice command. Siri and Google Assistant are leading VAs, revolutionizing consumers' way of interacting with daily machines. Alexa can recognize six different voices and will be able to converse with more than one person at once in the future, Amazon said.

What is a voice assistant?

[1]Voice assistants are digital assistants that use Natural Language Processing (NLP) and voice synthesis to understand the text and spoken words in much the same way human beings can. They work on algorithms that can mimic human intelligence and humanize the interaction between consumers and the voice assistant by trying to give them different personality traits. [2]They are mostly software-based and can integrate with other devices from the home electrical systems to the security systems.

History of voice assistant

[3]From 1910-to 1980 be experimental decades, Radio Rex, the first voice assistant, was introduced in 1922, a dog-shaped wooden toy that came out whenever called.

In 1952 bell labs presented "Audrey". It was an automatic digit recognition machine used for voice dialling and was recognizing digits from 0 to 9, but pushbuttons were cheaper and faster.

In 1962 IBM introduced the voice-activated calculator, which can recognize sixteen words and 0-9 digits.

Later in the 1960s, Joseph Weizenbaum developed the first computer program bases on natural language processing called Eliza. It used pattern matching and substitution methodology to simulate

conversation and demonstrated communication between man and machine is superficial.

1970 gave us the next milestone in the advancement of voice assistants. Harpy was developed at Carnegie Mellon University in Pittsburgh. With a vocabulary of 1000 words, it was able to understand sentences that followed pre-programmed rules.

Tangora, the voice-recognizing typewriter, was developed in 1986. It had a vocabulary of 20k words, and it came with word prediction based on past inputs.

1990 was the birth year of the first smart VA. It came pre-installed with an IBM computer. Later, IBM laid the foundation for VA in smartphones and launched its first smartphone, Simon. Later in 1997 transcription of human natural speech without any in-between breaks with a speed of 100 words per second was made possible with, Dragon natural speaking software.

In Oct 2011 first modern digital VA was installed on the iPhone 4s, Siri. It was able to send text messages, make phone calls, set alarms, or check the weather.

These developments laid the path for the current modern and powerful Voice assistants.

Types of voice assistants

Voice assistants can be classified as follows,

- **General Purpose VA:**

[4]As the name state, these voice assistants are designed to serve general things like making a call, getting directions, and opening apps. Google Assistant and Siri are notable examples of general-purpose VA.

- **In-app VA:**

[4]These are voice assistance embedded in apps for assisting users, these are exclusive to the parent app only. Many e-commercial websites are using in-app VAs to improve user experience.

- **Stand-alone VA:**

[4]These voice assistants are not some features added to any application. They have their application, and they are usually built for specific and limited domains.

Popular voice assistants

[5]Amazon Alexa, Google Assistant, and Apple Siri are the most popular voice assistants according to adobe analytics. These all are owned by the biggest tech giants of the world.

[6]Amazon Alexa is a cloud-based voice service. It comes with many pre-set functions such as surfing the internet, setting timers, scheduling events, getting directions, and many more. These functions are almost common in all the mentioned voice assistants. To activate the Alexa user has to say some particular words called wake words, which triggers the Alexa. Whenever Alexa gets triggers, it records the voice and converts it into text using Automatic Speech Recognition (ASR). Natural Language Processing (NLP) is then used to break text data into meaningful tokens. Tokens are further used to understand the user's request and act accordingly. [7]Google Assistant is a google owned AI-powered assistant which is available on mobile and google home, debuted in 2016. It can recognize 30 languages and is available in more than 90 countries. [8]Siri is owned by Apple Inc. It was the first modern digital Voice assistant to be implemented.

2. Applications of voice assistant

[9]Voice assistants are known for enhancing the e-Commerce market, 24*7 customer support, eradicating language barriers, saving time and resources spent on automating repetitive tasks, smart offices, and aiding Hands-free operation.

Voice Assistant at home

[10]Voice assistants are widely used for making smart homes. You can start with an affordable smart plug that can be connected to a lamp or AC and you can have instant voice control to the appliances. If you have a big budget, you can buy smart appliances. These appliances can be integrated with Voice Assistants, and you can have voice control over them. VAs can dim the lights, change light colours, close blinds, control the thermostat, and even close doors without leaving the comfort of your bedroom. Forgot to close the garage door? You can have a smart garage and check whether you closed the door or not, and even close it from voice commands. VAs also provide a routine feature. You can set your routines like 'I'm going to sleep' and VA will do a sequence of actions

like, lights off, nightstand lamp on, doors closed, and playing soothing music. You can customize the routine according to your own needs.

VAs even increase the productivity, you can say, Alexa, turn off the oven in 5 minutes, set alarm for tomorrow's meeting at 5, book doctors appointed for Tuesday, and remind me a day before. You do not have to keep a check on all these things, VA will look out for you.

Kids ask a lot of questions, and sometimes parents get annoyed by these questions. Here VAs can be a bit of help, they will never get tired of answering questions, and it also has educational games like quizzes for kids, so kids can play and learn together.

Planning for trips? Ask VA "what is the weather for this week" or "hill stations near me." Book hotels and tickets from one voice command.

Voice assistants for business

[11]Voice assistants in business provide many advantages such as speeds, Hand-free interface, Ease to use, intonation, and Screenless devices.

Chatbots**:** Ever noticed the small chat section with a mic icon in some corner of the screen while browsing some E-commerce websites? They are the chatbots used by cooperation for assisting the user with FAQs and general doubts about the product and often take feedback from the users.

Voice Payments: Use of VAs in payments is not popular yet, but the organizations are shifting to Voice payments as it enhances the user experience, decreases transaction time, and assists people who are not that good with technology.

Productivity: Areas such as document management, HR (Human Resource), and customer relations are shifting to voice-based assistants to increase productivity and reduce human labour waste. They are even used in factories to schedule some events and automate the workflow from voice commands only. This decreases the need for manual labour and helps businesses to cut down their prices.

Feedback: Voice assistants record the user commands and collect data from them to understand users' usage and recommend personalized ads that a human cannot. Voice shopping is currently evaluated at 2 billion dollars and may hit a market capitalization of $40 billion by 2022 end.

Inclusiveness and accessibility: Many organizations have a customer base with users having a linguistic disability, which makes it difficult to use the services provided by the organization. Android Talkback is such an example that reads out all the content on screen for visually impaired users and helps them navigate through voice commands.

Advertisements: VA gives personalized recommendations to users, for solely this reason many big brands are focusing on advertising their products through VA devices.

Voice Assistant for Education

[14]Voice assistants are being used to assist the teacher in scheduling tests, the daily schedule, and the exam cycle. VAs cannot replace the teachers, but they are being used for assisting teachers in class. Some teachers in the USA use Alexa to answer student doubts which are basic and can be resolved by Alexa only, giving her more time to assist the doubts which can be solved by her only. VAs also assist in keeping track of students' marks and grades, helping teachers to keep a record of each student's performance and to decide whom to give more attention to.

3. Pros and Cons of Voice Assistants

Advantages:

[12]Efforts: Voice assistants require minimum effort, as it is very much very easier to say the query instead of typing it out on the screen.

Zero Eye Contact: Do you feel strain in your eyes while surfing the internet or searching for some doubts? Voice assistants help you here and they also assist visually impaired people.

Hands-Free: You can get rid of the hassle of turning screens on-off and picking up the screen.

It is minimally disruptive, assists with fast response, and is also easy for children to use. It saves a lot of time and helps increase productivity.

Disadvantages:

[14]Security: All the users' interactions are stored in the cloud, which can be hacked, and hence the security of user data is still a big concern which makes users hesitant to use voice assistants.

Voice recognition is still not perfect: You may have experienced where you must repeat yourself because the assistant was not able to recognize the words you said.

Microphone in Home: Imagine someone listening to all the conversations, would not that creep you out. It only responds when the wake word is said but it listens to you all day and it is still a debate whether the data is stored in the device locally or in the cloud and how is the data used.

4. My opinion on Voice Assistant:

Voice Assistants can be immensely powerful and may revolutionize the way we interact with appliances. It is like having a genie that can fetch information, close doors, turns light off, warm food, book flights, and appointments from one voice command. But the biggest concern is how it is shaping our opinions. Voice assistants are listening to our conversation 24*7, and it knows our food choice, shopping habits, music choices, and political views. We still do not know the data it collects when not activated is stored locally or sent to the cloud. You would be wondering how it can affect our lives. Starting from a political view, it can manipulate us by only showing the news which is in the interest of its parent organization want. It controls the content we consume, through which big co-operations can manipulate our thoughts decision-making making. Giving so much power to an organization can be dangerous and can even lead to a civil war. [15]The biggest example of such blunders is the 2016 US election. If we can regulate how voice assistants are using our data, they will be an immensely powerful tool to revolutionize all the industries but if data regulations are not strong enough, it can lead to disastrous events. It will be like living in an indirect monarchy where one cooperation decides the content we consume and manipulate our thoughts.

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CHAPTER – 24

VOICE ASSISTANTS – WIRELESS MAGIC

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INTRODUCTION

[1]A voice assistant is like a virtual assistant that will help us do any digital work without having to type or interact physically with an electronic device like smartphone, tv, laptops, fridge, washing machine etc. As the name clearly suggests, a voice assistant does the work we want just by our command.

There are various options on the voice assistants which will allow us to customize it according to our requirements. For example, Alexa gives the option to change the accent of the device according to the region we are in. This is an extremely useful feature since everyone speaks different accents of English across the globe.

HISTORY

[2] There is a common miscaption that Alexa Echo was the first voice assistant. But the origin of voice assistants extends back from the early 1960s. IBM was the first company that introduced a voice assistant. It was called a Shoebox device. It could understand up to 16 words and 9 digits.

[3] Some important dates in the history of Voice assistants are given below:

- 1961- IBM introduces Shoebox
- 2001-Microsoft introduces speech recognition feature for Office XP
- 2011 April 14 -Apple launches Siri
- 2012 July 9 – Google launches Google Now
- 2014 – Amazon introduces Alexa and Amazon Echo
- 2014 – Google launches Google Home

[4]Some of the most popular voice assistants right now in the market is given below:

- Amazon Alexa

- Google Assistant
- Apple Siri
- Microsoft Cortana
- Samsung Bixby
- Google home
- Alexa Echo

There are several types of voice assistants in the market right now. Gadgets like Alexa, Google home, etc help us to control devices on our home using our voice command. For Example: We can just say "Alexa, change the fan speed to 3" and then the speed of the fan would be changed to 3. But for this we need a smart fan also which can connect to the voice assistants. There are many appliances these days like smart fridge, ac, tv, fan and even bulbs which we can connect to voice assistants and control just by our voice.

[16.]Every voice solution is not a voice assistant, but every voice assistant is a voice solution. To be called Voice Assistants, a voice solution needs to match these conditions:

1. Take the voice as input
2. Convert it- Voice Assistants should be able to have natural and contextual two-way communication with the user.
3. Confirm with the user: - Voice assistants should be able to confirm, clarify and answer the user with context.

2.Application of Voice Assistant

[5]In our day-to-day life, voice assistants can be of huge help. If u start listing down the various applications of them, the list never ends.

The various uses of voice assistants are given below:

- Play music
- Tune in to a Radio
- Keep a shopping list
- Set Alarms/reminders
- Manage your schedule
- Get news, weather, and traffic updates
- Drive handsfree
- Find lost phones

Voice Assistants are so advanced that it can manage the important aspects in a business. It is proved to be extremely useful to the people in the business industry.

[15]Some of the uses of voice assistants in the business industry are:

- Embeddable Voice Assistant Technology for Chatbots
- Consumer Products and Retail
- Voice Payments
- Improving productivity within the organization
- Collecting feedback and developing strategies
- Inclusiveness and Accessibility
- Advertising and Marketing

[13,14]Education plays a key role in a person's life. Numerous studies have been conducted to see whether the use of voice assistants is helpful, if there has been any drastic change in the grades, etc in the education industry. Especially in the era of covid 19 the use of voice assistants is useful and advised by many scientists according to the research they have conducted.

The application of voice assistants on Education are:

- Voice assistants are closest to human teachers
- Voice technology eliminates the need to break eye contact
- Voice technology reduces touchpoints and helps to prevent the spread of COVID-19
- Voice-enabled devices can help collect data in real-time
- Routine learning exercises
- Customizable quizzes and tests
- Reading stories and books to students
- Controlling the environment of the classroom
- Contemporary learning with the help of podcasts
- Teachers' personal assistant

3. Pros and Cons of virtual assistant

[6,7,8,9] I found various pros and cons of voice assistants in my research. Surprisingly, voice assistants have not only advantages, but many disadvantages also exist.

The advantages of virtual assistants are as follows:

- Improved Customer Engagement
- Advanced Search Capabilities
- Customer Support Round the Clock
- Smart Working Environment
- Let Go of The Language Barrier
- Enhances e-Commerce Marketing
- Provides 24/7 Customer Support
- Eradicates Language Barriers
- Helps Streamline Operations
- Saves Time by Automating Repetitive Tasks
- Minimal Effort
- Eyes Free
- Hands-free
- Minimally Disruptive
- Fast response
- Easy for children
- Sharing with people
- Improves ecommerce marketing
- Streamlines business operations.

[10,11,12]The disadvantages of virtual assistants are as follows:

- Initial cost could outweigh savings
- Security could be an issue
- Voice recognition isn't perfect
- A microphone in your home
- Data security concerns
- Disconnected interaction
- Reliance on device makers
- Smart Home Devices are Expensive
- Leads to lost concentration on the task in hand
- Privacy Concerns

4. Opinion on Voice Assistant

My opinion on voice assistant is mixed. I feel like it is of significant use in the current modern world where people are highly dependant on technology. It's so amazing that we can control various gadgets around us using a single voice assistant. This feature is helpful in

smartphones. Instead of typing long sentences which is time consuming and stressful, we can just say out the words to phone and the AI will automatically detect our sound and covert our words to text messages. Another practical use that I found helpful is that we can directly ask Alexa or Google about the weather, traffic, or my schedule instead of having to type it or search for it. Setting alarms and timers using voice assistant is a huge help especially when I am at the gym working out, doing heavy exercises.

Even though there are many pros to voice assistant, I still find one fact really disturbing and alerting. It could encourage the new generations become lazier. Although it makes our work easier, we are reducing the amount of work or effort we must put into something. Technology is improving day by day making our jobs easier but with the help of advanced voice assistants it has come to a point where we can turn on or off the light, fan, or anything else in our home/room. I think this will create a laziness among the kids, youth leading them to have an inactive life. This will lead to an increased level of obesity, diabetes, etc in the society. We should always keep a limit to ourselves and never exploit or misuse the technology .

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CHAPTER – 25

EVOLVING A GENERATIO WITH VOICE ASSISTANT SYSTEMS

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1.Introduction

1.1 What is Voice Assistant?

[1]A Voice Assistant is a computer software that attempts to identify and understand your voice, answers the question or the command asked by the user such as placing a phone call or booking an appointment or a table in a restaurant, and confirms if the command ordered is done. A voice assistant is a virtual assistant or a digital technology that uses voice recognition to listen to specific voice commands and return the required information as requested by the user. It can perform tasks on the basis of textual commands. Voice Assistants are present in the cloud. Since it is a very powerful task for the voice assistants to understand our speech and perform the requested action. So it's difficult to insert a Voice Assistant on a small device like on a Smartphone or on smart speaker devices. Instead, Voice Assistants live in the cloud where there is ton of space available for computing power.

The voice assistants are activated when we say some specific keywords. For example, alexa is activated when we simply say 'Alexa' similarly, Google Assistant is activated when we say 'ok Google'. Neural networks along with AI help these chatbots to understand the context of human language. Voice assistant softwares are also used by the government to answers the basic questions of the citizens.

16 VA image1

17 VA image2

1.2 History of Voice Assistant

[2]In 1961, IBM introduces the IBM shoebox, it is the first ever digital voice and speech recognition tool. Since the launch of shoebox, the voice bot technology began to develop rapdily until the 1990s. It could recognize about sixteen words and nine digits. In 1972, Carnegie Mellon creates the harpy program which could recognize about 1000 words. 1990 was the year when speech recognition tools reached the public (consumers). Dragon launches it's product 'The Dictate' for consumers at 6,000 dollars. In 1996, Microsoft launched clippy, it is a text-based virtual assistant. In 2001, MS launched the speech recognition feature for office XP. In 2011, apple introduces siri, a voice assistant bot compatible with iOS.

[2]In 2012, google released Google Now. In 2013, Microsoft launches the Cortana which was later on made available to windows and mobile devices.

In 2014, Amazon launches Alexa and the Amazon Echo followed by Alexa skills kit, Amazon Echo dot and Amazon tap. In 2016, Sound Hound releases the voice powered digital assistant app, Hound. In the same year google launches it's google assistant as part of Allo, messaging app. In 2017, Google introduces multiple-user support for Google Home. It could recognize up to 6 different voices.

The way smart speakers got adopted in various developed countries is commendable. It is perhaps the fastest adoption of any new modern technology out there in the modern era.

1.3 Types of Voice Assistant

1. Rule-Based Bots

[3]These bots are frequently used to fulfil the small scope requirements of the user, for example "How can I change my wi-fi password". This question doesn't need a complex set of algorithm to provide an answer, and can be processed in the back-end itself.

2. Artificial Intelligence Assistant

[3]These assistants are capable to analyse the complex questions and predict the user's behaviour. AI dosen't follow any set of hard-coded rules, instead AI is about producing it's own rules and finding the required solution and understanding the user's behaviour. In order to generate

these complex algorithms, the Artificial Intelligence (AI) software is given certain instructions as code and a set of training data. This way, AI-powered assistants can complete tasks that would have never been possible using the traditional voice assistants that use less powerful code mechanism. Data is the key factor in improving the AI-powered voice assistant since it uses an on-going learning mechanism. These machines are even capable of imitating human voices that make it almost impossible to distinguish between real and artificial.

3.Grouping Voice Assistants

[3]This uses more than one voice assistant to create a voice user experience. Since it constitutes multiple AI assistants, it improves the engagement and credibility of the process.

1.4 Popular Voice Assistant

1. Google Assistant

[4]Google assistant, a successor to Google Now that performs research and scheduling tasks is compatible with various platforms such as OS-android, iOS, Linux and chrome OS. It learns and digest the user's habits and adapts itself as per the user requirements. It can do variety of activities like control smart home devices, find information online, such as routes, directions, hotel booking, play content online, open applications and make calls, control music apps, running timers and reminders, make appointments, reading notifications etc. This app keeps updating its features with new patch releases. It also has a feature named 'App Actions' which can activate or trigger the actions inside certain specific applications.

[18] Google Asstn

2.Amazon Alexa

[4]It is supported on various platforms such as OS-android, Linux, iOS and Cortana. Alexa became popular within a small scale of time and soon became a widely used virtual voice assistant. The engineers have tried their best to give Alexa a human touch as well as being a personal assistant at the same time. You can use commands such as "Alexa, open the camera", "Alexa, set a 15-minute timer" to interact with Alexa. Although designed to be a vigorous beast, it's device restriction is the only factor that pulls it behind from emerging as the best voice assistant. Recently, Alexa also launched its 'App Action' feature.

[19] **Alexa**

3. Siri

[4]Siri is a speech-recognizable personal assistant supported on apple devices such as iPhone, Apple iPad, Apple TV, Apple watches etc. Siri has access to all the pre-installed and post-installed applications in your apple devices. It works on the principle of Natural language processing and AI, Siri can understand about 10-15 different human languages. With the launch of Siri, iPhones became even more popular. Siri can perform tasks such as answer questions, place calls, send texts, set alarms and times etc. Siri however has less features and poor performance when compared to Alexa and Google Assistant.

[20] **siri**

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2.Application of Voice Assistant

2.1 Voice Assistant at Home

[13]using a voice assistant at home provides us with a lot of benefits. For example, a voice assistant will tell us about the current weather, tell us the recipe for cooking the dish of our choice, or turn off the lights in a room. It will also check all of the electrical appliances and their connection to main supply. All of this is made possible only if they are included in the "smart home" system. With such a powerful assistant, we can completely plan our day, and the device will remind us regarding the list of tasks we decided to do that day.

2.2 Voice Assistant for Business

[5]A major benefit of using voice assistants at business / workplace is having both hands free. It expands the possibility of doing multiple tasks at the same time. In places that require convincing your business partners for a deal, Voice assistants are designed with a tone and intonation to convey a message with greater scale of emotions that simply means intensifying the convincing power.

voice assistant has an important application in customer services. It can act as an effective call centre service solution which is available 24 x 7 at a very nominal cost. IVR (Interactive Voice Response) helps the customers to contact the right agents and resolve their issue through voice commands. Most companies these days are replacing humans with chatbots mainly in the customer service sector as it reduces the cost of operation and workload.

We all have received calls from the sales development representatives, they ask us a series of questions to identify if we are a good fit for their product. Such a process can be controlled or automated via voice assistant bots. The advantage of using this is that the caller will not have to wait for the call to be connected with a sale's representative. Instead the voice assistant bot will automatically start the process right after the call has been made by the customer.

[21] VA home

2.3 Voice Assistant for Education

[6]voice assistants can be introduced in this field in order to make the process of learning fun and interesting rather than a hectic task. The idea of mock tests can be extended to the voice assistant informing the user about their overall performance in the test. The voice assistant can also act as a knowledge hub to help students resolve their doubts. Most competitive exams nowadays are time-based. The voice assistant can be used to help students improve their time management skills along with handling preassure while giving the exams. [15]The analysis is a prime aspect to estimate weather the user is actually making some progress or not. The voice assistant can help give a fair analysis report to the user as to which areas they need to improve upon and which areas they are strong at.

[22] VA edu

[6]Every user is not the same, for example, one may be inclined more towards geography and the other towards history. By using certain powerful algorithms the voice bot can identify the strong and weak points of a student which will help the students to learn according to their interests and level. Students can also use this voice assistant as a reminder for their timetable. For example, staying updated about the upcoming exams and projects.

3. Pros and Cons of virtual assistant

3.1 Advantages

The various advantages of having a virtual assistant is:

- [7]It can reduce hand labour and operational costs. In addition to the employee salary, you will also have to pay for traditional employee's

taxes, holiday leaves, medical leaves, insurance, maintenance, office space and office equipment expenses. All these expenses can create a huge overhead to your business. All these expenses can be saved just by opting to hire virtual assistants. You can save about more than half of your business expenses by simply hiring a virtual assistant.

- [7]A virtual assistant can help you save your time to do more meaningful things. Its better for us humans to focus on one task at a time. The task has to be useful for the growth of our business and we should try to avoid grunt work as much as possible. [14]For example we can outsource some tasks such as scheduling appointments and managing calendars, answering phone calls, Managing and filtering the emails. The tasks which we should do ourselves may include landing of new accounts or clients, Evaluating employees of all grades and ensuring synergy of operations. Having a virtual assistant will give you more free time.
- [7]We can scale our business with virtual assistant support. If we wish to expand our business by setting up client bases in a new country but at the same time we can't work 24x7. our VA can take over the control over communications and management of the client bases in another time zone when we're off the clock.

3.2 Disadvantages

The various disadvantages of a having a virtual assistant includes:

- [8]**Signal strength:** VAs are limited to areas with high speed internet connection. If we don't have access to 5G / 4G or any other strong internet , we will struggle to keep our VAs alive. If we expect our VAs to provide us with the best results, we have to ensure that our network has excellent strength. This basically implies that the people living in rural areas can't get the best result out of it.
- [8]**Voice is mandatory**: another major disadvantage of having VAs is that it can only operate with voice commands. Therefore, in order to get the best result out of VAs, you need to have a very crisp, clear and audible voice. This basically means if you are working in a noisy environment , it will be difficult for the VA to catch up your voice. Hence you won't be able to get the best expected result out of it.
- [9]Security reasons are questioned since the voice assistant systems uses an always on microphone criteria. [10]At the same time there are high

chances that our personal details might get leaked online. Consumers are highly worried about how the tech giants can misuse their personal details.

- [11]Another major disadvantage of using voice assistant is error and misinterpretation of words. For us humans it is easy to find the relation between the words when compared to an AI software. This often causes disruption to any assigned task and we will finally end up paying for the losses in not completing the task.

4. Opinion on Voice Assistant

[9]It's true that Smart devices offer us exceptional comfort at a very nominal cost. Hands free technologies maybe very much useful for elderly people and individuals with disabilities. While Smart VA systems can offer feelings of security and comfort for some people but at the same time there exist a risk factor with an always-on microphone. [12]Also, In order for your voice assistant to provide you with the best comfort, you will need to share so much of your personal information which in turn benefits some other companies working online. They can gain access to your personal information and can sell your personal details at certain price tags or they can monetize it in the form of advertisements. So in my opinion blindly using these Voice assistant systems without concerning about the security reasons is an unhealthy practice.

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CHAPTER – 26

VOICE ASSISTANT- THE VIRTUAL FRIEND

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1. Introduction

1.1 What is Voice Assistant?

[1]Voice Assistant is a virtual assistant which uses voice recognition, programmed algorithms, and voice synthesis to identify the voice commands given by the user and convert them into relative information or perform specific tasks.

Based on some specific commands, the voice assistant can convert the user's commands to relevant information by eliminating noise at the background. This feature improves the accuracy of a voice assistant to perform the tasks better. Voice assistant is software based and it can easily get integrated with other devices.

Nowadays, voice assistants are developed in a way that it can easily get integrated with mobiles, computers, smart TVs, smart speakers etc to make our lives easier. This integration with devices that are used in daily basis, had made the world smaller and widened the application of voice assistant across the globe.

1.2 History of Voice Assistant

The history of voice assistant is Ancient which throw backs over 100 years ago. This may be surprising as apps such as Siri, Google Assistant, Cortana etc are launched in the last few decades.

The first voice activated product was launched in 1922 which is known is Radio Rex. Radio Rex is a simple toy dog which will be resided inside a kennel and comes out once the user calls it with name as "Rex". This was built by electromagnet tuned to the frequency similar to the vowel found in Rex. It was later preceded by modern computers.

At the 1952 world's fair Bell labs announced the Automatic Digit Recogniser called Audrey. It was not a simple device however, its casing stood six feet tall just to house. All the materials required to recognise ten digits.

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In 1962 the tech giant IBM had started their long history of voice assistant at the World's Fair Seattle. They announced 'IBM Shoebox', a device which is able to recognise digits 0 to 9 and some simple operators such as plus, minus etc and hence it can be used as a calculator. As its name suggests it looks similar to the size of shoebox, with an inbuilt microphone. This microphone is connected to three audio filters to match electric frequencies of which was been instructed and matched it with already assigned values for each digit.

In 1971, 'Darpa' funded five years of speech recognition R&D known as Speech understanding Research (SUR) Program. Due to this Program one of the biggest innovations had been taken place which is called 'Carnegie Mellon's Harpy', this is capable of understanding 1000 words.

In 1990, the first consumer-oriented speech recognition program named 'Dragon Dictate' was introduced. The price of this Dragon Dictate was a hot topic at that time as its price is $9000 which is very expensive. This was designed for home PC where the user could dictate to the computer one word at once, which could be a tough task to give continuous commands to the PC. Later after seven years, Dragon Naturally Speaking was released and it accommodated natural conversation. It was brought up with much cheaper price of $695 where it can understand with a word limit of 100 words.

Later as we all know that in 2010 Apple developed Siri. Shortly after Siri, IBM released Watson. Then in 2011, Google launched Google Assistant which will be present in most of the android mobiles. Google assistant came with new advanced features and received positive feedback from the user. In 2015, Amazon introduced Alexa and its name was inspired by the library of Alexandria and also the hard consonant "X" in the name which helps in the accurate voice recognition.

1.3 Types of Voice Assistant

Rule-Based Bots

[2]These intents are used to solve small scope problems such as retrieving forgotten passwords etc. As these types of problems doesn't require complex algorithm, these can be solved using Rule-Based Bots. On the other hand, text-based bots are commonly used in certain parts of an application given their limited scope. Analytics are very important

when VUI designers are dealing with Rule-Based Bots. VUI designer should take care over the queries which are frequently asked, which frustrate the user and which blocks the user from completing a task.

Artificial Intelligence Assistants

These assistants are trendy in the market now, this is because of their capability to analyse the user, fulfil complex questions and predict the user behaviour. Instead of running on coded commands Artificial Intelligence works on producing its own rules through learning. To produce these own set of rules, the AI system is programmed a set of training data as a consequence. AI-powered assistants solve very complex problems using traditionally scripted algorithm.AI can be very useful for VUI designers but it requires a lot of data as it is based on learning mechanism. Tech giants like Google, Microsoft, Apple, Amazon etc uses these AI based assistants whereas smaller companies rely on technical bots.

1.4 Popular Voice Assistants

Siri

[3]It was developed by Apple and was released in the year 2011. Siri is an intelligent voice assistant who enables the user to send messages, make schedules, make calls, play music, videos etc. It is voice based intelligent digital assistant which used inbuilt in iPhones via IOS.

Cortana

This is an application developed by Microsoft. This is a primary intelligent voice assistant which is used to set remainders, find files in the storage, and crack jokes with it. This was successfully launched in the year 2014 in Windows Phone 8.1.

Google Assistant

In the year 2014, Google launched its own intelligent voice assistant which is used for browsing, navigating, making calls, sending messages etc. Its accuracy stands out from the rest and it is compatible. This is very to use as it is present in most of the android mobiles. Its expanding capabilities using AI also made it people's favourite in no time.

Amazon Alexa

Tech giant and e-commerce company Amazon launched their own AI-based voice assistant named 'Alexa' in 2014. Alexa is a device

which can answer your queries, remind your important dates, play music, translate words etc. This intelligent voice assistant emerged as the people's favourite home device as they can connect it to their PCs, laptops, TVs, speakers and many more appliances.

2. Application of Voice Assistant

There are various applications of voice assistant in multiple fields. Some of them are as follows

2.1 Voice Assistant at Home

[5.]Voice assistant can perform various tasks at home. It can play music according to your mood, prepare shopping list, remind your important events, guide you while you are cooking, intimate weather conditions, answer your queries, switch on/off your home appliances, entertain kids, find your lost mobile/wallet etc. On an end note, it can make your home a smart home. Using voice assistant at home can also help you to get over your loneliness as it can have humorous conversation with you.

2.2 Voice Assistant for Business

[6.]At corporate companies these AI-based voice assistant plays a major role in providing HR support as it can conduct meetings, interviews, training sessions etc. It removes language barriers by translating unknown languages to understandable language which improves the communication between the clients and the employees. It can improve customer service in which most of IT companies are lacking in. On a final word it improves productivity of a company by personalizing the clients and boosting human talent.

2.3 Voice Assistant for Education

[7.]Voice Assistant being an emerging technology will definitely blossom in the field of education. Students being the next generation of the country can efficiently develop this voice assistant in the future. The application of voice in education could be in various ways like maintaining students' records, academic details etc. These data analytics can be time saving in the management of institutions. Another application is it gives more personalized academic feedback about a student, this makes the

work of maintaining students' data easier for the management. This also makes parents to stay more connected to the management by tracking their ward's academic info.

3. Pros and Cons of virtual assistant

The advantages and disadvantages of voice assistant are as follows

3.1 Advantages

- **Efficiency and Safety:**

[1.]Nowadays typing had become a boring job for everyone, but with the introduction of this voice assistant had made this a refreshing task. This voice assistant is not only innovative but this is also efficient as it can avoid most of spelling mistakes while typing. Voice assistant had also set a standard in safety of unlocking a device as everyone's voice is different from each other.

- **Quick Learning Curve:**

Another major benefit of using this voice assistant makes our lives easier as one doesn't need to depend upon mic, touch screens etc to pass their commands to the devices instead they can use this voice assistant and can convey their commands just like a normal conversation which can be a major asset for the people who doesn't know to operate electronic devices.

- **Wider Range of Integration:**

As voice assistant doesn't require a keyboard, it can be easily integrated with other house appliances. We may expect smart mirrors, furniture and other appliances launching in the future with integrated voice assistant. These smart mirrors integrated with voice assistant can track our fitness info, connect all the smart home appliances at place, and can display weather info more efficiently. Now there arises a question that how does voice assistant help us to use these smart appliances. Well, the answer for this query is very simple, the integrated voice assistant technology reduces the stress of conveying our commands in a typed format by using your own voice as a medium to pass our commands.

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3.2 Disadvantages

- **Initial cost could outweigh your savings:**

[8]Despite having a time saving device, most of the voice assistants cannot be affordable for everyone. Amazon Alexa's initial cost was around $128 at that time which was expensive and normal people couldn't afford it. Even though Google Home came at much cheaper price but people aren't so willing to buy these expensive gadgets.

- **Voice Recognition isn't perfect all the time:**

Now this could be a major drawback in this voice assistant. Most of the people have pronunciation issues and these voice assistants may misunderstand few statements and can perform unnecessary tasks which was not instructed by the user. However, these let downs appear smaller in front of its pros, even these complaints should be rectified in the future to improve the accuracy and security of voice assistants.

- **Security could be an issue:**

There are few voice assistants which are connected to the internet, but as we all know that nowadays Wi fi security is major issue. If your Wi fi is not secure then there will be some security issues with your voice assistant as it is connected to the internet. But this Con can be easily solved by setting a PIN or a password to both the network and the voice assistant to avoid security problems.

4. Opinion on Voice Assistant:

My opinion is despite having some minor flaws, voice assistant is a very useful device for the people right now. Even though its need in the house may not be convincing but its need in education and in corporate companies is very high. Especially Tech Giants use AI-based voice assistants to improve the personalization of clients and employees which may be a major asset for increment in their productivity. Voice Assistants like Siri, Cortana, Google Assistant can be very helpful for blind people and illiterate people to use mobile efficiently like others and it had broken the language barriers by translating your language to other language more accurately. More specifically Google assistant plays a crucial role in Google Maps, its support to the user to navigate a place is very efficient and can be very useful when you are struck in an unknown place. It is also very accurate in acknowledging you about the traffic conditions.

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CHAPTER – 27

VOCAL ASSISTANTS – A THING OF THE PAST, PRESENT & FUTURE.

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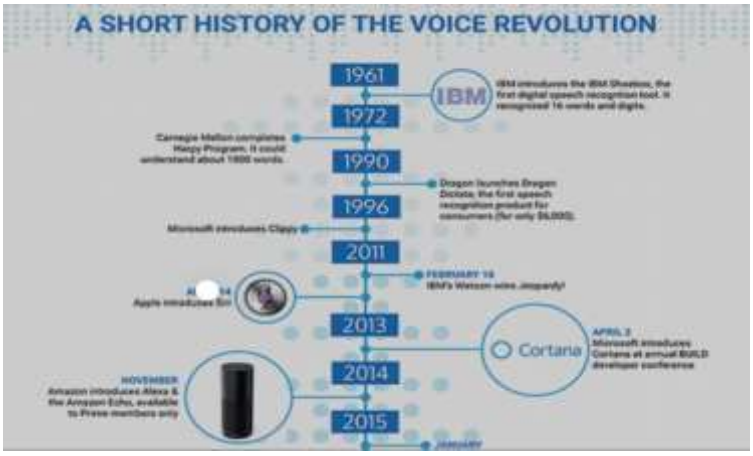
1.Introduction

1.1 What are Vocal Assistants?

[1]Vocal assistance are a digital assistant which uses voice recognition that converts our voice into suitable language or code and then gives the necessary output demanded by user. Some of the examples of vocal assistants are Alexa, Siri, Bixby etc. These assistants are software-based programs designed especially for that device.

1.2 History of Vocal Assistants

[2]It is astonishing to see the rise and development of vocal assistance over the century. In 1961 IBM introduced shoebox voice recognition that could recognize 16 words and digits. So IBM was first in this field. Then around 1980 Carnegie Mellon introduced Harpy program that could understand 1000 words. In 1990s Dragon pulled out dragon dictate for 6000$. Then after 1995 Microsoft also introduced its voice assistants known as clippy. Since then all the companies have evovled in the field of voice assitance after that many smartphones companies also tried their hand in vocal assitance and came out with success.



[15]Time story of voice assistance.

1.3 Types of Vocal Assistants

[3]Most common voice assistants are Rule Based Bots for small scope of information. Text based scope for certain part of applications. Artificial intelligent assistance for complex questions and decides users' behavior. The other type of rare assistants are Grouping voice assiatance having multiple artificial assistance that increases credibility and engagement. Another type is Custom voices in which superstars lend their voices. There are six types of voice user interface(VUI) Automatic speech recognition (ASR), Text to speech (TTS), Speech to text (STT), Natural language processing (NLP), Natural language understanding (NLU), Natural language generation (NLG).

1.4 Popular Vocal Assistants

[4]Since the evolution of voice assistants there were many companies plunged into these field but only some of them are successful. The companies that have good reputation for voice assistance are Amazon Alexa, Apple Siri, Samsung Bixby, Google assistant. [17]There are 4.2 billion voice assistants across the globe.

The best voice assistants: Summed up

	Amazon Alexa	Google Assistant	Siri
	Best for Device Compatibility	Best at Responding	Most Popular Mobile Voice Assistant
Voice-match technology	✔	✔	✔
'Delete recording' options	Voice and Settings	Settings	Settings (limited)
Instant translation technology	✔	✔	✔
IoT compatible brands	7,400+	1,000+	50+
Languages supported	3	4	21

[16]Features of popular voice assistants.

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2.Application of vocal assistant

2.1Vocal Assistant at Home

[5]Amazon Alexa has good compability with all smart home devices. Philips Hue light and Ring door bell camera works excellent with them. It is compatible with 7400 brands while Google with 1000 and Siri with 50. Alexa still has option to pair with third party home automation devices.

2.2Vocal Assistant for Business

[6]In finance world it was reported that 88 percent of business leaders use voice assistant for their growth because it is speedy, hands-free, easy-of-use, intonation and screenless device. Business uses voice assistant as:

1. Vocal assistant for chatbots
2. Products and retails – showed 15% higher demand for vocal assistant.
3. Vocal payment- Garanti-Turkish bank has developed vocal assistance and it will grow by 31 percent in leading countries in 2022.
4. Helping hand in productivity- A survey told that it can compensate 6.2 billion work hours.

2.3 Vocal Assistant for education

[7]School, colleges and universities will be relevantly benefited by vocal assistant. It will benefit education in 3 ways:

1. Makes management time saving – Vocal assistant play a helping hand and aid in managing day to day tasks. Can have casual conversation with students and provide information in a few seconds.
2. Personalized feedback for students' performance – It helps in reminding subjects they have enrolled any assessment to be taken etc.
3. Parents stay more connected – Then they will have no need to wait for a meeting about their child's progress. It can give reminders like fees payment, school transportation and many other things.

2.4 Vocal Assistant for healthcare

[8]Voice assistant in health care has great experience.
1. **Smart health care vocal assistant** – It helps people in solving queries regarding symptoms, illnesses, side effects of medicine.

2. **Voice care** – With help of AI powered vocal assistant patient can book an appointment can get addressed immediately in case of emergency and no need to visit clinic also.

[9]According to a report 57% people in European countries use vocal assistance and as estimated healthcare market will be up to 7.6 trillion dollars when voice assistants would be involved in.

3.Pro's and Con's of vocal assistants

3.1 Advantages of vocal assistants

[10]Since evolution of technology has made our life easier and voice assistants are cherry on top of that. The advantages of it are as follows:

- **Less effort** – instead of type you can give voice command.
- **Harmless eyes** – since typing causes damage in eyes its better to use voice control.
- [11]**No language barriers** – you can search the information in whatever language you want.
- **Smart work space** – you can control office room settings with your voice no need of physical command.

3.2 Disadvantages of vocal assistants

- [12]**Data security** – These devices collect data and store in company cloud. We don't know how these companies use our personal data and it's a matter of concern.
- **Less interaction** – Due to these there will be less in person interaction and fewer engagement activities.
- [13]**Lost concentration** – While using vocal assistance you need to hear the information given by the devices and in doing so you are quite likely to lose concentration.
- **Health issues** – Due to the advance of technology people have become lazy and do carry out works in which they are surrounded by technology, and this has an effect on physical as well as mental health.

4. Opinion on vocal assistants

As coin has two sides similarly voice assistants also have pro and con. If we use voice assistants in necessity, for small work and limited amount of time it's good and beneficial but if we start using daily and for

unnecessary purposes then it can cause harm. Technology and voice assistants are especially a threat to younger generations because in their brain development age if we provide them with technology then it would not strengthen their mental development and they themselves will become lazy. [14]In one incident Alexa told a 10-year-old girl to touch live wire with a coin.

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CHAPTER – 28

VOICE ASSISTANTS – THE UPCOMING FUTURE

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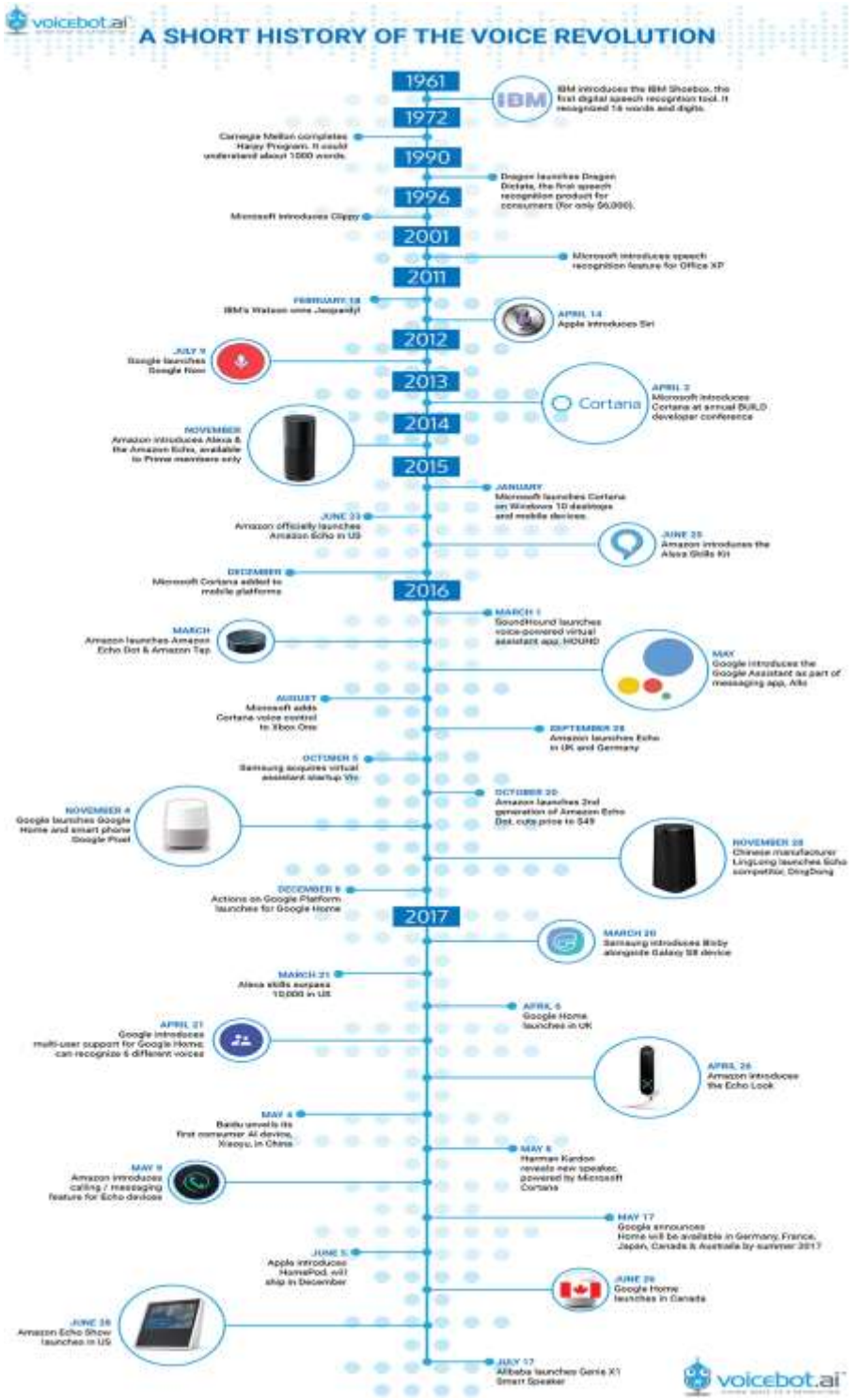
1. Introduction

1.1 What is Voice Assistant?

[1]A voice assistant is a computer assistant that listens to particular vocal commands and returns relevant information or performs specified actions as desired by the user using speech recognition, language processing algorithms, and voice synthesis.

1.2 History of Voice Assistant

[2] As more voice assistants and smart speaker devices enter the market, predicting the rise of voice assistants may become difficult. Voice assistants did not begin with the launch of Amazon Echo, contrary to common assumption. We designed a voice assistant timeline so you can understand how the voice revolution has progressed since its inception in the early 1960s. When you look at the timeline, you will notice that there are four major eras in the history of voice assistants. It all started with the Origin period, as we like to call it. With its Shoebox device, IBM became the first to develop a voice assistant. It could understand 16 words and nine numerals, despite its primitiveness.[3] Long before voice assistants built into our smart speakers could understand our requests to play music, turn off lights, and read the weather report, machines had to learn how to hear, recognise, and process human speech. The technology we use today has been in development for more than a century, and it has come a long way since the first listening and recording devices.



[4]History of the voice evolution

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1.3 Types of Voice Assistant

[5]1. Rule Based Bots
2. Artificial Intelligence (AI)
3. Grouping Voice Assistant
4. Custom Voices

1.4. Popular Voice Assistants

[6]1. Google Assistant
2. Amazon Alexa
3. Siri
4. Cortana
5. Bixby
6. DataBot
7. Lyra Virtual Assistant
8. Hound
9. Mycroft
10. Robin

2.Application of Voice Assistant

2.1 Voice Assistant at Home

[7]It's a device that uses your voice to control various smart appliances throughout your home. A digital voice assistant will typically respond to you audibly while assisting you with daily tasks and scheduling. There are a variety of models available, each with their own set of features. The voice assistant you select has a large impact on how smoothly a smart home runs. That is why it is critical to understand every aspect of digital voice assistants in order to select the best one. You can learn about your options and how a voice assistant can help you by following this simple guide.

2.2 Voice Assistant for Business

[8] Voice assistants, such as Siri and Google Assistant, are common on mobile devices and are examples of Voice User Interfaces (VUIs). Although VUIs have been around since the 1950s, greater technological challenges meant that more traditional modes of communication, such as typing, took precedence in the majority of business implementations.. Aside from improving the customer experience, AI-based voice assistant

technology has the potential to significantly increase a company's productivity levels. According to survey results, using digital assistants can compensate for up to 6.2 billion work hours. This is not only efficient; it allows businesses to achieve superhuman levels of productivity while reducing human labour waste. According to a Capgemini Research Institute survey, enterprises are increasingly relying on increasingly accurate natural-language understanding (NLU) to trigger various automated workflows with voice commands, especially in areas such as document management, customer relations management, and human resource management. [9]Voice assistants, virtual assistants, and chatbots are all examples of innovations that aim to help businesses improve their competitiveness. They assist businesses in increasing productivity while saving time and resources through automation and machine learning. Voice assistants now offer a plethora of solutions, whether they are used to manage queries or to solve complex marketing tasks.

2.3 Voice Assistant for Education

[10]To begin, keep in mind that these devices are intended for consumer use rather than educational use. Consumers use voice assistants like Amazon Echo and Google Home to help automate common tasks like home heating and lighting, listening to music, searching the internet, making online purchases, and sending emails. While some consumer tools, such as G Suite, have an education version with privacy policies and terms of service agreements tailored to educational purposes, Amazon Echo and Google Home do not. [11]Second, given the context of state and federal privacy law, the legal implications of using voice assistants in K-12 schools are, to put it mildly, murky. The most important federal law governing student privacy, the Family Educational Rights and Privacy Act (FERPA), was written in 1974, long before artificial intelligence was a consideration in education. The United States Department of Education has not issued formal guidance on the use of voice assistants in the classroom, but their FAQs on Photos and Videos have. When photos and videos are considered FERPA-protected education records, FERPA provides guidance and examples (the same principles would apply for audio recordings).[12]Students nowadays are surrounded by and equipped with smartphones, computers, tablets, and other electronic devices, which they use in a variety of contexts in their daily lives. Voice is a significant

component and source of engagement for students in any device, whether it is a mobile, tablet, or computer, and has changed the way they understand and study in today's world. It has become one of the most important tools for achieving the goal of universalizing access to education anywhere in the world, as well as reaching out to the visually impaired. We have only recently begun to use voice technology in education in conjunction with emerging technologies such as AI(Artificial Intelligence), which will set educational goals and have a spectacular potential for growth and improvement for the new-age learner.

3. Pros and Cons of virtual assistant

3.1 Advantages

[13]A virtual assistant can handle a wide range of tasks that are required for your company to thrive and dominate. To be honest, hiring a virtual assistant has far too many advantages for any serious small business owner to overlook. Even if you don't need one right now, knowing the solutions they offer will provide you with some insight and help you prepare for when the time comes.[14] Did you know that hiring a virtual assistant could save you more than half of your total business expenses? When hiring a standard employee versus a remote employee, the labour costs alone are 2-5 times higher. The average hourly wage for an Executive Assistant in the United States is $34, according to Salary.com. Meanwhile, My Tasker and Virtual Staffing offer the same level of service for $11.25/hour and $6/hour, respectively. That is a significant difference, to be sure, but keep in mind that you must also pay for a traditional employee's taxes, sick leave, holiday leave, insurance, medical and dental benefits. However, the story does not end there. Hiring a full-time employee also entails paying for office space, maintenance, and office equipment such as desks, computers, telephones, and so on. All of these factors could add up to extremely high overhead for your company. Virtual assistants, on the other hand, only need to be paid for the work that is completed because they are independent contractors who handle their own expenses, such as insurance and taxes.[15] All work and no play is not fun, as I'm sure you're aware. To ensure the success of your business, you must always put in the effort to maintain a home life and a personal life. Removing administrative tasks from your workload at very reasonable rates will not only relieve some of your stress, but will also free up time away from work for recharging, etc.

3.2 Disadvantages

[16]One of the first disadvantages of outsourcing for developing countries is dealing with any kind of language and cultural barrier, especially when hiring client-facing staff. Because your Virtual Assistants will be representing your company, both written and spoken communication is essential. Aside from any obvious language barriers, there may be some cultural differences as well. The availability of a stable internet connection is frequently mentioned as a concern when working with Virtual Assistants in the Philippines. For example, due to the archipelagic nature of the Philippines, some cities' internet connections can fluctuate or even be slow at times. Because the country has over 7,000 islands, building infrastructure to connect with the rest of the world can be costly. Some business owners are hesitant to work with remote employees because they would prefer to work with local employees who are available during their working hours. Outsourcing Angel, for example, has been working with Virtual Assistants from the Philippines for several years, which is typically two hours behind Australia (3 hours during daylight savings). [17]The reality of outsourcing is that trust and commitment must be built and maintained from a distance, which is not easy for everyone. This is especially true if you are a micromanager or someone who frequently says, "It's better if I just do it myself than give it to someone who still has to learn the business!" We have worked with many business owners who are afraid of relinquishing control and tasks, which is understandable given that your company is your baby! But we've shown our clients how to build trust and commitment with their Virtual Assistants to the point where they trust their virtual team enough to look after the business while they're away.

4. Opinion on Voice Assistant

The capabilities of voice assistants are constantly improving. They learn in the same manner as humans, but at a much faster rate. As a result, voice assistants appear to be on the verge of becoming more integrated into our daily lives. Their selling points, for example, include improved user experience, dependability, and a growing breadth of features, making them extremely appealing. Voice assistants are the most recent technological advancement in consumer electronics to enter people's lives. These devices demonstrate artificial intelligence's impressive

development and capability, and they stand in stark contrast to how this technology is portrayed in iconic films. With every tech behemoth, including Amazon and Apple, now offering their own voice assistants, the odds are stacked in favour of these devices becoming more prevalent in daily life.

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CHAPTER – 29

VOICE ASSISTANTS-THE VOICE OF THE FUTURE

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1. Introduction

1.1 What is Voice Assistant?

[1]A voice assistant is a piece of advanced technology with the main purpose of listening to a human's commands and carrying out the given role of it to the best of its capabilities. It uses voice recognition, specific language keywords, and algorithms, which convert the commands to relevant and necessary information for the user. Voice Assistant is a digital assistant that uses speech recognition, speech synthesis, and natural language processing (NLP) to provide services through specific applications. Voice assistants are found in smart speakers and also in most of the mobile phones that we use now.

The voice assistant can also be used to answer questions that may seem too trivial to search on Google or any other website.

1.2History of Voice Assistant

[2]The first-ever voice-activated toy, known as Radio Rex was released in 1922. It was a toy that had the structure of a dog and whenever its name was called it would come out of its house, this was the first time a voice commanded product had been released to the world. After that Bells Labs, in 1952 released "Audrey" which is also called the automatic digit recognition machine. Even though it was extremely big and required a lot of maintenance was still the very first machine that was able to recognize phonemes and the basic units of speech, and could also be used for voice dialing. [3]At the 1962 world's fair in Seattle, an IBM engineer introduced a device called Shoebox, it was a calculator which was voice-activated and it understood 10 digits along with six control words (plus, total, subtotal, minus, off, and

false) which were used to calculate the answers of simple math problems.

All of the above examples used keywords and frequencies to carry out their task and produce sufficient answers for the user. Although these

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devices and machines may not seem like much compared to what we have now, these were the foundations of the advanced technology that we love and use now.

1.3 Types of Voice Assistant

[4]There are two types of voice assistants, the first is the general one (artificial intelligent assistants) and the other is the voice bots. Voice assistants like Siri, Cortana, Amazon Alexa, etc. fall into the first category of voice assistants. These assistants can analyze users, answer complex questions, and predict user behavior.

[5]Artificial intelligence assistants aim to create their own rules through learning, rather than running with hard-coded rules. To create these algorithms, the artificial intelligence assistant system receives instructions and a set of training data. As a result, AI-powered assistants can perform tasks not possible with traditional scripting algorithms. To improve AI-powered assistants, you need data and much more information for them to work smoothly. These machines can learn to understand and respond to complex queries and even imitate the human voice. The second category known as chatbots are often used to meet intents that fall within a narrow range of requirements for example "How do I get the password?" This question does not require a complicated algorithm to provide an answer and can be scripted on the backend.

Text-based bots are often used for specific parts of the application due to their limited scope. For example, if a user browses an item on an e-commerce site, the bot may differ from the bot displayed during the checkout process. This is because the scope of these bots is limited and related to certain parts of the service.

There is also the third type of voice assistant known as the grouping voice assistant which is rare but still does exist. In this, multiple artificial voice assistants are grouped together which increases engagement and credibility. These types of assistants are used mainly for marketing to display different products through different voices i.e., a woman's voice for a women's product and a man's voice for a men's product.

1.4. Popular Voice Assistants

- Amazon Alexa
- Apple Siri
- Google Assistant
- Microsoft Cortana
- Blackberry assistant
- Samsung Bixby

[6]**Fig-1: Siri**

[7]**Fig-2: Alexa**

[8]**Fig-3: Cortana**

2. Application of Voice Assistant

2.1 Voice Assistant at Home

- Helps in playing music
- Easy to tune into the radio
- Set reminders
- Can regulate fans and lights inside the house
- Keep a shopping list
- Keeping alarms and timers
- Get the news and weather reports
- Helps with entertainment
- Keeps the environment healthy
- Helps with the education of kids by making it more interactive

2.2Voice Assistant for Business

- [9]{It has been reported by Finance review and Global banking that eighty-eight percent of the worldwide business leaders think that voice assistants have great potential to aid them to grow their business.
- It has also been found that people would like to hear about the new products and items via voice assistants.

- Another major benefit the voice assistants have is their speed, as dictating a command or instruction is much easier and faster compared to typing it.
- Text-based chatbots are very common nowadays and a lot of companies especially in eCommerce and retail are planning to introduce voice assistants for the best customer service.
- Voice assistants can also help by making voice payments which is faster for the customer and much more convenient.
- Companies are also using voice assistants to advertise and increase their marketing.}
- [10]{Business voice technology helps employees be more productive because voice assistants can remember important dates and deadlines, schedule appointments, and generally keep relevant information up to date.
- E-commerce companies can use voice assistant chatbots to serve their customers. This is especially efficient for people with motor and visual disabilities and provides a great customer experience for everyone.
- Voice assistant technology is integrated with translation services to help you overcome potential language barriers.}

2.3 Voice Assistant for Education

- Voice assistants should be used for education in schools as it makes the class much more interactive and fun and also encourages the students to learn the subjects.
- [11]{Voice assistants could be the biggest aids to the teachers as it has human-like speech and emotions which makes it easier for the students to interact with and also takes a burden off of the teacher. In short, the voice assistants could become the teacher's personal assistant in a sense.
- During the current times, voice assistants play a huge role in classrooms by reducing the risk of the spread of COVID-19 by making all the work voice-activated, which in turn reduces the contact of students with any kind of device.
- Using the voice assistants in class gives the answers to the questions of the students immediately and enhances learning.
- It helps make the quizzes and assessments more fun for the students.

- It also helps in keeping the environment of the classroom good and maintains peaceful vibes amongst all.
- It could also be used to read books to the children, this is mainly for the younger students, to make the class a lot less boring for them.}

3. Pros and Cons of virtual assistant

3.1 Advantages

- [12]{Hands-free
- Reduces the strain on eyes
- Minimal effort
- Fast response
- Interactive for students
- Easy for children to use}
- [13]{Advanced search possibilities
- Provides satisfactory customer service
- Smart working environment
- Forgoes the language barrier
- Helping users with online shopping
- Faster to call or message anyone with a voice assistant.}
- Can be used to access the electronics at home
- May also help in reducing the electricity bill
- Very helpful for physically disabled people
- Saves time
- It can do maths calculations
- It can also aid in making purchases
- Voice assistants also help the elderly as they find it difficult to type on such a small screen making it easier for them to do what they want
- Entertainment
- Helps with destressing

3.2 Disadvantages

- [14]{Privacy is an issue, especially for smart speakers. The smart speaker is always listening to whatever you say at all times which could lead to the breach of one's personal information and life.

- The voice assistants sometimes don't understand what we say may be due to a given accent or the voice assistants haven't learned to do that task yet which in the end leads to unsatisfactory results for the user.
- The voice assistants could also be easily hacked on, which may lead to the leak of the user's personal information.}
- Voice assistants in smart speakers are very expensive, which is also another reason why most people do not consider buying it
- Loss of concentration on the task at hand
- [15]Researchers have recently demonstrated that voice assistants respond to inaudible commands sent using ultrasonic frequencies which could lead to disaster.
- [16]{It depends on the network connectivity i.e., if there is not a proper Wi-Fi connection the voice assistants cannot function
- As voice assistants only work based on the commands and instructions given to them, speech impaired people can therefore not use these facilities.}
- Can't help the user with any of the physical work they have

4. Opinion about Voice Assistant

My personal opinion about voice assistants after using them for quite a while is that despite their shortcomings if used properly the voice assistant is one of the best pieces of technology one could use. Voice assistants for me were very comfortable to speak to and they felt very natural and easy to use while giving the feeling of talking to a friend. I would like it if they decided to add a bit more features to the voice assistants to make it even more interactive for the user and make it more fun to use.

Voice assistants like Alexa can be used to regulate everything in one's house (also known as a smart house), while being on the bit of the expensive side is still a very nice feature according to me, as it makes things very easier for everyone at the household. The voice assistants also are very useful for physically disabled people and elderly people as they can access the internet, call, or message with ease without putting any stress or strain on their bodies. Voice assistants play a huge role in my day-to-day life as I use them for any small or inconvenient thing I have to do which is also one of the major reasons that I have grown attached to

them. Voice assistants according to me are very helpful to teach children and it could be used to teach and help the upcoming generation by making things much more interactive and not making studying a task for them.

I also feel that the voice assistants are always listening to whatever we say throughout the day no matter what the time or situation especially the voice assistants on our phones i.e., Siri, Bixby, etc. are constantly on and hear everything which leads to security and privacy issues which could cause a huge a disaster in the future. Another drawback that is very prominent is that the voice assistants sometimes don't understand what we say as it may be beyond their scope of understanding which is very inconvenient for me as it doesn't give me a satisfactory answer and may also lead to wastage of time.

In short, digital voice assistants have their limits, but there is no doubt that they will improve the convenience and comfort of smart homes. With more voice assistant updates, the future of home automation is on track.

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CHAPTER – 30

VOICE ASSISTANTS

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[1.1] Voice assistants are gadgets that respond to humans using voice recognition, natural language processing, and artificial intelligence. The device uses technology to synthesis the user's message, break it down, evaluate it, and respond with a relevant response. Because data must be sent back and forth to centralized data centers, voice assistants depend on a cloud-based architecture. Because a smart speaker is designed to be simple, the majority of the computing and AI processing takes place in the cloud rather than on the device itself. The idea is that the user can make a request using the voice-activated gadget, and the voice request is then uploaded through the cloud, where it is converted into text. The text request is then routed to the backend, which responds with a text reply after processing. Finally, the message response is routed through the cloud and converted into voice, which is then streamed back to the user.

[1.2] **HISTORY -** Virtual assistants have a long history that dates back more than a century. The first voice-activated product, Radio Rex, was released in 1922, and it consisted of a toy dog that would stay within a dog house till the user says its name, "Rex," at which time it would jump out. This was accomplished using an electromagnet synchronized to a particular to the vowel in the word Rex Simon, created by IBM in 1994, was the first intelligent voice assistant. Simon was a personal digital assistant (PDA) and, in fact, the first SMART phone in history, predating HTC's Droid by nearly 25 years. Google began slowly rolling out search engine for its Google mobile applications on multiple platforms in 2008, when Android first was released, with a specialized Google Voice Recognition Application released in 2011. This resulted in increasingly sophisticated features, ultimately leading to Voice Assistant .

This was followed in 2010 by Siri. The original app, created by SRI International with voice recognition offered by Nuance Communications, was released on the iOS App Store in 2010 and was acquired by Apple two months later. IBM Watson is publicly announced in 2011, not long after Siri was first developed. Watson, named after

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IBM's founder, was created in 2006 with the intention of defeating humans in a match of Jeopardy. Watson is now one of the smartest , intuitively speaking computer systems in the market. In 2015, Amazon Alexa was introduced.

[1.3] TYPES OF VOICE ASSISTANTS–

- **Rule-Based Assistants –** These bots are commonly employed to fulfil intents with a limited scope of requirements . Because of their limited scope, text-based bots are frequently used for specific parts of an application. For example, the bot that appears when an user visits items on an e-commerce site may differ from the bot that appears during the check-out process. This is due to the fact that the reach of these bots is restricted and is related to specific aspects of the service. Complex rule-based bots, on the other hand, can be used all through the application.
- **Artificial Intelligence Assistants** - These assistants are useful for analyzing the user, answering complicated inquiries, and anticipating the user's actions. Rather of following pre-programmed rules, artificial intelligence learns to create its own rules. The Artificial Intelligence system is provided with instructions and a set containing training data in order to create these algorithms. As a result, AI-assisted assistants can perform jobs that would be hard to accomplish with standard scripted algorithms. Data, and a lot of it, is required to enhance the assistant. They learn to understand and respond to complex questions, and they are even capable of mimicking human voices, making it nearly impossible to distinguish between authentic and artificial voices.
- **Grouping Voice Assistant-** Multiple voice assistants can be employed to provide a voice user experience, although it is atypical. Multiple artificial assistants are used in this type of encounter, which may boost credibility and engagement. Grouping voice assistants together, for example, where each one has a different expertise. For instance, consider a news show in which each host presents and covers a separate issue, such as the sports , weather, politics etc. .

1.4POPLULAR VOICE ASSISTANTS

- **Siri** - Today's most popular virtual assistant is Siri , which was created by SRI Inc in 2010 and purchased by Apple in 2011, has swiftly become a vital aspect of the Apple ecosystem, integrating all Apple devices together to coexist. You can ask Siri anything, from simple weather questions to more complicated questions on everything from sports results to the calorie count in food. It can also enable and disable settings, discover content, set an alarm and alerts, make texts and calls, and do a plethora of other things.

- **Alexa -**Alexa was created by Amazon in 2014 and was named after the Library of Alexandria. The interactive voice system on the USS Enterprise from Star Trek was the inspiration for Alexa. Alexa uses the Amazon ecosystem to allow users to communicate with it and connect a variety of smart devices . She can play music, control our smart home, respond to questions, and connect us to our favorite services to help you stay organized, informed, safe, connected, and entertained.

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- **Google Assistants-** As the successor to Google, Google Assistant was introduced in Google used to respond in the form of a Google search results page, Google Assistant now responds in the form of words and makes recommendations in the form of Preview cards. Google Assistant provides voice recognition, along with voice-activated device control, allowing users to complete a variety of tasks after saying the wake words "OK Google" or "Hey Google." It is intended to provide us all with conversational interactions.

- **Cortana-** Beginning in 2009, Microsoft's Cortana has had one of the most widespread visions of providing people with access to voice technology in their regular lifestyle. Microsoft began including it with all Windows 10 desktops and X - box devices, which resulted in a significant increase in the number of enrolled Cortana users. Cortana was reported to have over 800 million active users .

[2]**Applications of voice assistants** –

- **Voice assistants at home** – Making it possible for our homes to communicate. Users can manage their Smart Home with voice by installing a smart hub that communicates with your voice assistant and influencing compatible smart home devices. The ecosystem is constantly expanding, with ever more devices being added.

- **Voice assistants for business** – These company voice enabled bots are a big thing for the E-Commerce industry to delight their customers by allowing them to order online in a most communicative way on any gadget from anywhere .
- [2.3]**Voice assistants for education** – Teachers can record students' Power point presentation, attendance, class participation, and more with a single device. This statistics can then be obtained and analyzed during periodic assessments. Voice search can be a very useful tool in improving students' learning experiences. Students frequently have to spend a significant amount of time seeking information on specific topics or getting their doubts cleared.
- [2.4]**Voice Assistants for Gov Organizations** - Viewing the skills that AI Voice assistants are going to bring to the corporate world, governments also has been quick to adopt voice-enabled applications to improve delivery of public services efficiencies, as well as effective internal planning with increased transparency.
- [2.5]**Voice assistants at offices** - Voice assistants also enable the creation of smart, connected workplaces. If a voice-activated virtual secretary anticipates that a specific area of the office will be vacant, it can communicate with smart office alternatives to turn off the lights until the area is required. Users can accomplish this by connecting a smart thermostat to the voice assistant and telling it when you're leaving so that the heating and lighting are turned off automatically .

[3]Pros and cons of voice assistants –

[3.1]Pros –

- **More convenience to users-** Using voice bots to answer customer queries is a simple way to provide the convenience of speaking to a person in natural language. Customers can seek assistance from the voice bots in the same way they would from a live agent. All of this is done without any need for continual human interference to answer repetitive questions.
- **Lowered costs** - To help in managing high support ticket volumes, an AI voice bot can respond to multiple simultaneous connections without training or equipping support staff. In the long run, the lowered need for human capital can save us a great deal of money.

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- **Precision and accuracy**-Artificial intelligence powers voice bots, which constantly learn from previous interactions. This improves voice bots' ability to answer a greater volume of queries on a consistent basis. Virtual assistants are extremely accurate and precise with their answers because they are built on clear AI algorithms.
- **Safety** - To make it more convenient to keep their home safe, users can connect their voice assistant to one's smart security devices and can, for example, link the Blink security camera to any Amazon Alexa device.

[3.2]Cons

- **Voice recognition isn't flawless -** Voice technology has come a long way over the years, with Amazon and Google's technology ranking among the best. However, it is far from perfect, and one may find ourself having to repeat from time to time in order for the smart speaker to understand the command. The great news is that AI-powered virtual assistants learn to adapt to voice over time.
- **Microphone in homes** - The always-on speakers do not record or send voice commands until a wake word, such as 'Alexa,' is used. However, if having a microphone constantly trying to listen bothers , there is turn off button also available for privacy .
- **Network issues** - They are only available in areas with high-speed networks. If user lives in an area where there is no access to the strong network, individual will struggle to use it One must ensure that the network is fast . This concludes that most people living in rural or remote areas will not be able to get the most out of them.

[4]Future of voice assistants –

a. Voice assistants in healthcare , patients can check their own vitals by just asking for it .
b. Voice assistants will proceed to get more personalized as they improve at distinguishing between voices.
c. It will take a significant amount of time and effort to document a voice for each of the characters' spoken monologues within the game. Developers will also be able to use advanced neural network models to mimic human voices in the coming year.

Opinion –

In my opinions consumer's shift to voice is influenced by changing users' needs, is causing disruption in the customer service industry. Voice user interfaces provide an extremely effective way of communicating and engaging with customers. As users become more comfortable with real-time digital interactions, brands can use chatbots to improve response times and customer satisfaction. Because of these factors, voice assistance is rapidly expanding, and it's extremely possible that nearly all of app will use AI-based voice search in certain capacity within the next five years. The rise of voice assistants will be aided by the fact that voice assistants will become considerably more intuitive, responsive, and user-friendly in the future. There is no denying that voice assistants are and will continue to be a massive achievement of human ingenuity, and they are already infiltrating our lives in some way. With the rollout of 5G and advancements in ML , voice assistants could be positioned to become a device cannot be lived without.

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CHAPTER – 31

VOICE ASSISTANCE-FUTURE OF CONTACT

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1.Introduction

1.1 What is Voice Assistance?

1The scenario out of science fiction movies, where we'd come home and just start speaking to our personal home computer or digital assistant which would take care of our every need, is not too far from being realised anymore. Enjoying the luxury of always having an assistant at our side, who can support us in our daily tasks 24/7, is making its way into our lives at a rapid pace of adoption. Granted their functionalities are still limited, but with time voice assistants will be able to help us with more and more activities. The beginnings of the work done in this area reaches back **to the 1970ies**. When voice recognition of computers was not much more than a grand vision. It took until Apple's voice assistant Siri entered the stage to gain a significant leap forward because it was the first personal voice assistant that was broadly available to the public as part of the iPhone. 2A voice assistant, also called an intelligent personal assistant or a connected speaker, are new types of products marketed by Apple, Amazon and Google and are based on natural language speech recognition. They allow a search to be carried out using a voice command entered by the user, as well as information retrieval by voice synthesis.

1.2 History of voice Assistance

3Though voice recognition technology has been around since the 1960s, virtual assistants as we know it didn't come around until the 2010s.Siri's introduction with the iPhone 4s in 2011 was polarising. In 2012, Google officially launched Google Now on Android phones, which came with a more accurate voice to text function, the ability to understand 18 languages and the ability to connect with a user's search history and calendar.In the early 20th century, the U.S. research firm Bell Laboratories (named after founder Alexander Graham Bell, the inventor of the telephone) racked up a string of impressive technological advances: The invention of radio astronomy (1931), solar batteries (1941), and

transistors (1947). 11 Then in 1952, Bell Labs would mark another groundbreaking technological advancement: The AUDREY System, a set of vacuum-tube circuitry housed in a six-foot-high relay rack that could understand numerical digits spoken into its speaker box. When adapted to a specific speaking voice, AUDREY could accurately interpret more than 97% of digits spoken to it.AUDREY is no doubt primitive by today's standards, but it laid the groundwork for voicedialing, a technology that was widely used among toll-line operators. (Remember those?)

1.3 Types of voice assistants

4In 2021, there will be 4.2 billion digital voice assistants being used in devices around the world. Forecasts suggest that by 2024, the number of voice assistants will reach 8.4 billion units - a number higher than the world population. 12 Before diving into the different types of voice and chat assistants, I'd advise having a quick read about the fundamentals of Voice User Interface (VUI) design. More complex key terms will be explained in another article, such as Automatic Speech Recognition (ASR), natural language processing (NLP), Natural Language Understanding (NLU), Natural Language Generation (NLG), Text-to-Speech (TTS), Speech-to-Text (STT), among others.

1.4 Popular Voice Assistants

[5]The popular voice assistants are Amazon Alexa, Apple Siri, Google Assistant, Microsoft cortana, Samsung bixby. Among these three best voice Assistants are Amazon Alexa - Best for Device Compatibility, Google Assistant - Best for Accurate Responses, Apple Siri - Best for Apple Users.

2. Application of voice Assistance

2.1 Voice Assistance at home

[6] In our smart home survey, we asked over 1200 people about their favorite home automation devices. Smart speakers and hubs came out on top. Add to this the fact that the majority of people use voice commands when home alone, according to a 2019 Perficient Digital survey, and you have a good reason that your voice assistant should be accessible via smart speaker. Google, Amazon, and Apple all offer various smart speakers and hubs that run their voice assistants. Microsoft's is only

available through third-party devices. Samsung doesn't yet offer an in-house hub, though one is slated to be released in late summer 2019.Voice assistants that boast broad compatibility give you seamless control over disparate technology, and, by extension, over the comfort and security of your home. It takes a major platform with a broad range of compatibilities to create a truly worthwhile voice assistant. Other, lesser-known options exist, but can't compete when it comes to controlling devices or responding to queries.[13]Virtual assistants like these can do everything from answer questions, tell jokes, play music, and control items in your home such as lights, thermostats, door locks, and smart home devices.

2.2 Voice assistant for Bussines

[7] With the rise in the Internet of Things (IoT) field, these devices are finding a profound marketplace in business and home applications. In fact, voice assistants are acting as a catalyst for the IoT field.The openness offered by the enterprise voice assistants architecture is enabling businesses to offer their users natural voice experiences while communicating with the business systems like IT service management(ITSM), operations management, business management, IT functions, office management, and HR management. Observing the intelligent and natural communication experiences, no industry is an exception in the usage of voice assistants. This is what made voice as the key business strategy to watch. Mark Madgett, Head of Agency & Senior Vice President, New York Life Insurance stated that close to twelve thousand agents are going to be availed with Alexa abilities in getting policy related information as well as scheduling and preparing for meetings. Also, banking and finance giant JP Morgan & Co is getting voice assistant Alexa to provide research and analytics reports to its clients. Capital One Financial Corp. is the first bank in the United States of America to offer Alexa services to its customers assisting them to bank from their place through voice interactions. [15]Starting a virtual assistant business is an enterprise with very low overhead. You'll need general office supplies, fast internet, and technology such as a computer, basic software programs, a headset, and a printer. You'll want your workspace to be located in a quiet area so that you can take client calls without distractions.

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2.3 Voice Assistance for Education

[8] Each generation has sought to make the transfer of information faster and more efficient than the generation before them, but the world today is changing at a faster and more immediate pace than at any time in our history. For most of our students, this pace is natural, and it is hard for them to imagine life without a tablet or computer. The number of ways our students learn, share and communicate has grown exponentially since the pandemic began. Innovations like voice technology, augmented reality and virtual reality may supplant Facebook, Twitter and Instagram for the next generation of students.

A digital assistant can transform the classroom with real-time answers and built-in skills. Although each voice-controlled assistant has its own unique features, most devices perform similarly and can send and receive information, answer basic questions, set timers and alarms, and interact with other internet connected devices. Recent advances in natural language processing has allowed voice assistants to better understand and interact with students. [14]Voice assistants are becoming increasingly smarter thanks to developments in artificial intelligence technology. While their main function is to respond to commands, in doing so, they also learn. The more a person interacts with voice-activated devices, the more trends and patterns the system identifies based on the information it receives. Then, this data can be utilized to determine user preferences and tastes, which is a long-term selling point for making a home smarter.

3.3 Pros and cons of virtual assistant

3.1 Advantages

1. [9] Time
2. Administrative Tasks
3. Scalability
4. Online Presence
5. Lead Generation
6. Content
7. Bookkeeping
8. Customer Service
9. Improve Process, Products & Services
10. Peace of Mind

3.2 Disadvantages

1. [10] You Need to Hustle to Find Clients
2. Working From Home Comes With a Lot of Distractions
3. Working as a Virtual Assistant Can Be Lonely
4. It can be hard to separate some and work life
5. There are a Lot of Moving Parts to Running a Business
6. There are No Benefits

Opinion on voice Assistance

Voice Assistance has quickly became a part of our everyday lives. Voice assistance technology helps us to perform tasks using voice commands we can control automated devices at home. Voice assistance can be an excellent economic tool where companies can deploy it to improve productivity in workplace. Voice assistant can improve employers productivity as it can remember important dates or deadlines.

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CHAPTER – 32

VOICE ASSISTANT – NEW ERA OF USING ARTIFICIAL INTELLIGENCE

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1.INTRODUCTION

1.1 WHAT IS VOICE ASSISTANT?

[1]Voice Assistant or voice assistance is the method of communicating with our mobile phone or any other smart devices with our commands through our voice using technology called as Artificial Intelligence in present or absence of internet. Or it can be defined as the interface in smart devices which allows us to control many of the functions with hand-free. It is an assistive technology means the technology helps the people who have physical or mental disabilities which affects the usage of normal devices.

Voice controls uses the language which we are using in our daily lives. In these days the voice control is extended to many languages present across in the globe like even india many languages are added in voice assistant like Tamil, Telugu, Hindi etc. In voice assistant is programmed with a specific voice for a specific command. But in high end devices we can customize our own commands which will come to maximum number of devices in future. It will be our part of life in future.

1.2 HISTORY OF VOICE ASSISTANT

[2]The first voice assistant technology is started at the year of 1952 by the researchers of Bell communications called as Audrey system. This system can recognize the digits from 0-9. And they think that the machine has to adapt to the owner for the accuracy. But this has many dis-advantages like it is very big and it consumes more power. Theoretically it is touch less but it take more time to make a phone call from a normal time.

After a decade in 1962 the IBM company make another voice assistant called as Shoebox at world's fair at Seattle. Technically it is the first efficient voice assistant around the world. It is a typical calculator. It can identify ten digits and six word of mathematical commands like off,

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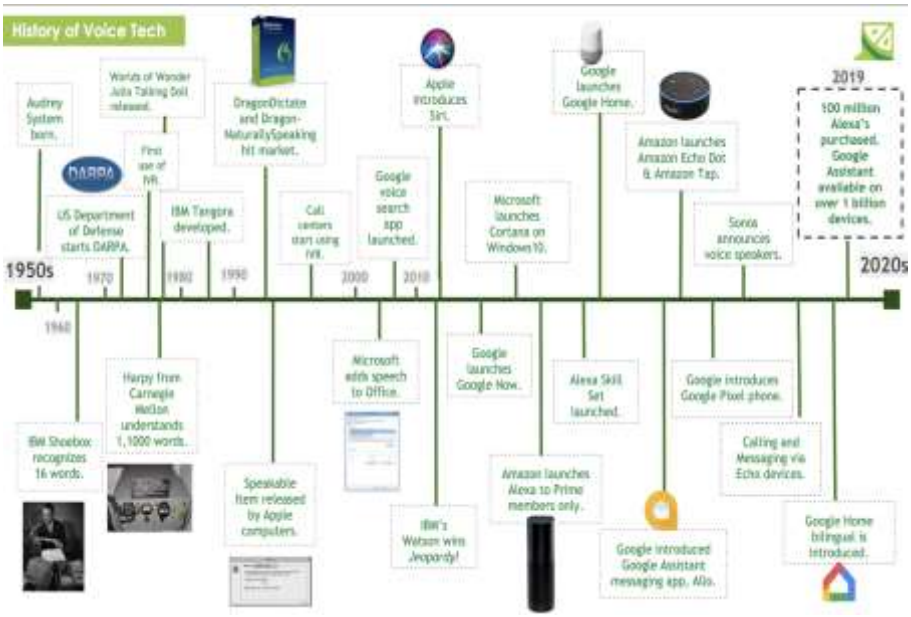
false, subtotal, total, minus, plus. And like Audrey it work accuracy with the frequency of digits

And in 1971 the Carnegie university invented the voice assistant called Harpy had a vocabulary of 1011 words and it can even understand phrases and it can even process speech from the pre-programmed words in it. And it can also have an ability to say "I don't know what you said can you please repeat". It is funded by the Defense Advanced Research Projects Agency(DARPA).

In 1990 the company named Dragon released the first consumer speech recognition. But they released them for a bit costly. This can recognize 100 words per minute.

In 1997 the Clippy was created by the Microsoft but it is completely failure invention because the users raised a many number of complaints in it. So they removed it from the office in the year of 2007 and in Mac 2008.

In 2011 the apple created their own voice assistant called as Siri which is the beginning of modern voice assistant, Google has now and Microsoft has cortana and also done a revolutionary thing by adding microphone feature in its browser chrome.



1.3 TYPES OF VOICE ASSISTANT

[3]In general there are three types of voice assistants

1) Rule Based Bot
2) Artificial Intelligence Assistants
3) Grouping Voice Assistant

1. Rule Based Bot-

It is the type of assistant which is used in the web sites in the times of logging in or signing up for assisting us these are pre programmed bots

2.Artificial Intelligence Assistance-

These are the voice assistants created for giving the solutions for the questions which aredifficult for a normal human. These are useful to predict our face and voice in our different ages of our life

3.Grouping Voice Assistant-

These type of assistants are less in number. But these are more efficient than the above two types. By using these we can do different things at same time. We can search two different two things at a time etc.

1.4 POPULAR VOICE ASSISTANTS

[4]There are many popular voice assistants in our digital world. Almost every digital product manufacturing have their own voice assistant which give them their own trademark in excellence. The popular voice assistants are

1)**Siri-** This is voice assistant created by the Apple in the year of 2011. It is the era of modern voice assistants. This assistant isonly available in apple devices such as Iphones, Ipads , other apple devices.

2)**Google assistant-** This voice assistant created by the company google in the year of 2016. This assistabt in written un the language of C++. In present time it is the most used assistant in the world because now the number of android users are about 41% in the market. This google assistant works in every android devices and also it is used in google chrome which is useful for the voice searching.

3)**Amazon Alexa-** It is the voice assistant of the company Amazon. It is invented in the year of 2016. It is one of the newest voice assistant. Using alexa we can control the smart devices in our house. Also it is available in amazon echo

4)**Microsoft Cortana-** It is the assistant invented by the Microsoft in year of 2014. It is mainly developed for the sake of computers which running

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with windows operating systems and also it is usen in amazon alexa in some points.

5) **Bixby-** It is the assistant invented by the Samsung in the year of 2018. It is designed for Samsung devices. It is mostly written in Javascipt. It is the assistant used in all Samsung devices.

These are the voice assistants which are used by the most number of people.

2. APPLICATION OF VOICE ASSISTANT

2.1 VOICE ASSISTANT AT HOME

[5]In olden days the voice assistants is used only for calculations or to solve any complex in lesser time. But now a days using advanced technologies we can control each and every smart device in our house without moving even our hands. By using voice assistant such as Alexa we can control each and every smart thing through our voice commands. And for older people or physically handicapped which they can be able to talk can control their mobile phones, gadgets with out any interference of 2nd member. And for the people who are listening to music during the work they control their music without any problem.

[6]In well developed countries like United States or United Kingdom even the cars can be controlled using voice assistant which increases our discipline in traffic and also we can also save the money which we are spending on the driver. Even we can drive the car when we met with an accident. Nowadays people are searching for adventures. For these type of people voice assistant is a extraordinary tool to save them when they are in dager.

2.2 VOICE ASSISTANT FOR BUSINESS

[7]In business the voice assistant is mainly useful for the Chat boxes which is useful for the customers with a well understandable language without any employees. Nowadays even the payments can be done by using voice assistant. By using Artificial Intelligence voice assistants the efficiency will be grown considerably. Also this voice assistants can do a lot of complex work even the human employees can complete them.

[8]At the customer care most of companies started using voice assistants as the person talking at the front of customer care number only if these bots cannot able to the humans are into action.

And also many of the notifications, E-Mails, messages are sent by the bots. In the future there will be more actions by the voice assistants which will be more efficient than the assistants in these days and also the businessmen also will be more interested in these bots than humans

2.3 VOICE ASSISTANT FOR EDUCATION

[9]During this pandemic time the utility of voice assistants in education is grown considerably because the teaching through these can be touch less which prevents students to get the virus. And also having a voice assistant like Alexa, Google Assistant in a class helps the student to get their answers for their doubts easier and also it reduces the strain for the teachers. Also having this in a classroom will excite the students and this will helps the students to grasp the concept easier than the normal teaching methods.

[10]In many countries these assistants are already entered into the schooling which is a good initiative. And also these assistants can remember every event or alarm given by the students unlike human teachers where there is a chance to remember them. And also during taking notes or any research article the students can able to write in the notes without loosing eye-contact.

Also these can be useful to teachers by making different questions for every different student.

And these assistants can help the teachers to make their calendar, their events perfectly and without an clash or congested events. And also all type of families can afford these assistants because now every mobile has an voice assistant in it.

3. PROS AND CONS OF VOICE ASSISTANT

3.1 ADVANTAGES

[11] There are many advantages of using voice assistant in almost each and every field because for operating we don't need a labour and also it is also working for almost every language and in natural language. These are mainly useful for the students because the student can communicate with it like a friend and ask doubt which it gives almost correct answer for it.

[12]And for personal usage these can be useful for the time management , alarms, calendar , attending phone calls, controlling music

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without any moment with our hand, and also we can even control our smart devices by sitting on our bed and also with voice command. And mainly intercom which helps in wireless communication which gives us a good quality of audio which is used mainly at doorbells, communication between two people at short distance like bikers , mountaineers etc.

[13]Even this voice assistant is used in hospitals. Voice assistants can play the music according to their condition and they can remove the feeling of loneliness. This will help the patients faster than the normal conditions. And the doctors can observe the patients from his cabin by connecting voice assistant to this patient's. even the patients can easily communicate with the doctors or nurses easily when they are in a critical situation. And also the relatives of these patients can have an easy way of communication when they are not aside. Also they can have the alarms which reminds the patients to get their medicines or any other health related issue.

3.2 DIS-ADVANTAGES OF VOICE ASSISTANT

[14]Even there are many advantages for voice assistant there equivalent disadvantages too. Depending on voice assistant can be dangerous because these are devices are run from the current. In many countries there is frequent current cut. Due to this we cannot charge them consistently. And if we connect our bank accounts we can have a threat from hackers or any

Other people which we can lose our money from our account. And the cost of these voice assistants are expensive. Normal people cannot afford that much only for the sake of voice assistant.

[15]And also we have to note that we have a microphone circulating our house. This can leak our sensitive values and it leads to insecurity for us. Due to this the people will become more lazy and are not interested in doing any kind of physical work. And while we communicating with it we cannot concentrate on other things which are done by our hand. Also there will be issues from microphone and we cannot fix it by our own. And we have to speak with clarity this will be a bit difficult when we are doing some physical stuff

4. OPINION ON VOICE ASSISTANT

According to my opinion is an extraordinary invention. But there are many disadvantages too. We have the same probability of advantages and dis advantages. Because these are just devices with some knowledge. Anyone can control them. If we take some precautions about our security and privacy they are one of the greatest invention in 20th century.

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CHAPTER – 33

INDUSTRY 4.0 - ASSIMILATING ARTIFICIAL INTELLIGENCE TECHNOLOGY EMPOWERED LANGUAGE LEARNING AND TEACHING

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1. INTRODUCTION

Industry 4.0 creates innumerable wonders in the world because of technological inventions and innovations. Some technological features transform and upgrades the level of education. Industry 4.0 encompass variety of technological inventions and innovations like Robotics, Internet of Things (IoT), deep-learning, machine learning, Artificial Intelligence with speech recognition system, virtual reality, cyber-security system and some automated technologies. All those features add value to education which constructs data driven and user-friendly learning environment. Notably, Artificial Intelligence with speech recognition system makes language learning independent and easily accessible. The advancement of Artificial Intelligence (AI) with Natural Language Processing (NLP), Natural Language Understanding (NLU) and Natural Language Generation (NLG) undoubtedly transforming language education especially for ESL and EFL teaching and learning.

[1]Brian E. Penprase holds that the industry 4.0 insurgency will influence profound changes and will set off the need of additional inventive people, with an accentuation on cooperative work, interconnectivity, interdisciplinarity, and intensive intercultural understanding. Language teaching becomes a crucial part in the field of education. Fourth industrial revolution paves a greater way for teaching language with advancement of technology.

[2]According to Ahmad et al., the use of innovation in the time of the modern Industry 4.0 insurgency as an apparatus and vehicle of guidance will orchestrate with the strong learning climate. It will change the instructive course of learning and showing where students can acquire information in a productive and dynamic manner. This paper demonstrates and explores the Industry Revolution 4.0 especially with Artificial Intelligence Technology for language learning as well as teaching.

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1.1 HISTORY OF INDUSTRY 4.0

The fourth modern industrial development re-shaped and re-structured many aspects of industrial areas and also in the field of education. Industry 4.0 has given new boost for educational changes and alterations.

[3]Turmudi states that the modern transformation is characterized as the progressions in assembling and transportation that started with less things being made by humans and later involving machines in bigger scope industrial facilities.

[4]In 2011, the term Industry 4.0 was first coined at the Hanover Fair. In October 2012, the Working Group on Industry 4.0, introduced a bunch of execution proposals to the German government. The term Industry 4.0 starts from a task in the cutting-edge system of the German government. Such undertaking advocates the computerization of the assembling business. It is otherwise called as fourth industrial revolution. Industry 4.0 depends on the innovative ideas of digital actual frameworks, Internet of Things (Iota), which empowers the Factory of the Future (Fofo).

[5]To more readily comprehend the fourth Industrial revolution, it is important to review the past revolutions. The first industrial revolution (IR 1.0) related to oil and steam energy source of production and prominently based on manufacturing. The second industrial revolution (IR2.0) was based on electricity production. The third industrial revolution (IR3.0) was based on implementing electronic models, Information Communication Technology means of production, intelligent based systems and smart modern frameworks. Nowadays, Industry 4.0 transforms multidisciplinary sectors with intelligent computer data systematics. Industry 4.0 redesigns Education as a result of these transformation another term Education 4.0 emerged.

1.2 EDUCATION 4.0

[6]Education 4.0 will some way or another supplement for the peculiarity of advanced consideration in our day-to-day routines where people and machines are arranged to extricate the dissolvable, and obviously, find new hypotheses on development. The Education 4.0 worldview can be characterized in view of two recent manners. One depends on broad development and changes in instruction and teaching method, and the other depends on the joining of innovation brought by Industry 4.0 into Education 4.0.

[7]Education 4.0 is a dream representing things to come of instruction that takes advantage of the capability of computerized advancements, customized information, and the open doors presented by this associated world to encourage long lasting learning.

[8]An instructive transformation permits students to be the draftsmen of their learning, portrayed by the personalization of learning with adaptable, dynamic, and versatile learning pathways.

2. AI TECHNOLOGY EMPOWERED LANGUAGE LEARNING

Artificial Intelligence becomes prominent one in Education 4.0, now it shifts towards language learning as well as teaching. Education 4.0 incorporates AI based teaching aids and programmes for learning and teaching. At present, with the advancement of AI the language education becomes independent and self-assisted learning.

2.1 ARTIFICIAL INTELLIGENCE

[9] Computerized reasoning (AI) is the re-enactment of human knowledge processes by machines, particularly PC frameworks. Explicit utilizations of AI incorporate master frameworks, natural language processing, speech recognition systems and machine learning.

[10]Artificial intelligence is a concept that is divided into major application areas. Some of these areas are natural language processing, automated programming, robotics, computer vision, automatic theorem proof, intelligent data retrieval, etc. Today, these fields of application are so extensive that each can be considered a field of its own. AI is currently best described as a core set of ideas that underpin many of these applications.

[11] The use of machine AI to perform complex tasks, reduce costs, and improve the quality of goods and services is a fundamental principle of smart factories and Industry 4.0.

[12] Artificial intelligence technology is making inroads in the manufacturing industry and unifying the physical and virtual worlds using networked physical systems. The use of AI is making manufacturing smart and capable of responding to modern challenges such as customizable requirements, reduced time to market, and more and more sensors being used. used in the device.

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2.2 AI with NLP, NLU, NLG

Natural Language Processing, Natural Language Understanding and Natural Language Generation are branches of Artificial Intelligence.

[13]Natural Language Processing attempts to create machines that understand and respond to text or speech data and their own text or voice responses the same way as the humans does. It is like just mimicking like humans. The main functions of NLP are speech recognition, grammatical tagging, Word sense disambiguation, Named entity recognition, co-reference resolution and sentiment analysis. NLP also extends to Machine Translation, Virtual assistants and Voice assistants. Voice assistants and Virtual assistants are operating on the basis of NLP.

[14]Natural Language Understanding (NLU) involves in converting human language into a machine-readable format. NLU is a sub-branch of Natural Language Processing.

[15]Normal language Generation (NLG) is one more subset of Natural Language Processing. Normal Language Understanding assists computer to write. NLG is the method involved with producing a text-based reaction in human language in light of a few info information. This text can likewise be changed over completely to discourse design through text-to-discourse administrations. NLP, NLU and NLG undoubtedly enhancing the field of education and also business. These innovations add more advancement to intelligent personal assistants.

2.3 INTELLIGENT PERSONAL ASSISTANT

Intelligent Personal Assistant (IPR) or Voice Assistants encompass Natural Language Processing which boosts the assistants to complete the task correctly and meaningfully. IPRs are user friendly, interactive and data driven learning.

[16]According to Canbek and Mutlu, the IPRs or Voice assistants are intended to acknowledge voice or info input, answers regular language questions, present query items, support simple chats, play music, request on the web, oversee schedules, control Internet of Things (IoT) gadgets, and perform different undertakings.

[17]Some of the notable IPRs or Voice assistants are Google Assistant, Amazon's Alexa, Apple's Siri, Microsoft's Cortona, Samsung's Bixby, Data Bot, Lyra Virtual Assistant, Hound, Youper, Robin. IPRs are involved in language teaching especially in ESL and EFL contexts. By implementing a constraint pedagogy based on performing structure of IPR could lead foreign language learners to learn another language easily.

3. HIGHLIGHTS AND CHALLENGES OF INDUSTRY 4.0 AND EDUCATION 4.0 LINKED AI FOR LANGUAGE LEARNING

[18]The core elements of Industry 4.0 (IR 4.0) are focusing on future difficulties connected with prosperity and quality of life, uniting assets, cultivating advancement, future difficulties connected with thriving and personal satisfaction, solidifying assets, advancing development move and network, improving advancement dynamism in the business, working with development, straightforwardness and cooperation through innovative approach. In Education 4.0 (Edu 4.0), the above structure applies for language learning too. AI applications deeply concerned with NLP and its sub-branches which results in improving language teaching and learning. Major highlights and challenges for adopting AI Technology empowered language learning are as follows.

3.1 HIGHLIGHTS

[19] AI-based applications are user-friendly. This is the most advanced user interface with easy accessibility. It solves some problem in a snap because of built-in artificial intelligence. Taking into account the needs of the learner, AI systems could assist them. Integration of contextual AI education is must for some targeted learners. AI-based guide Programs are only solutions to accomplish specific goals and objectives. In short, it will help learners just focus on the target without any distraction. AI-based programs can be developed with different ways to get few feedback. It can be used to measure and analyse student feedback as needed. Classification, analysis, cross-checking, in-depth presentation, and more can be easily achieved in AI-based language learning curriculum. Preparing feedback manually is a hectic and monotonous undertaking. That takes time. Student progress is measured in all dimensions. As a result, AI software saves time and the time saved can be used for construction purposes. These pros are all some evidences that AI Technology empowered language learning could me made systematically easier.

3.2 CHALLENGES

[20]Inclusive public policy for AI in Education 4.0 is more relevant. While AI has incredible potential to improve the education system,

bringing AI into 360-degree education requires strong political support. Education leaders need help, financially as well as ethically, to focus on nurturing skilled learners to thrive in an AI society. The main issue with AI is it can deepen existing inequalities and divisions, as disadvantaged populations may be excluded from AI-supported education, leading to a digital divide.

[21]Formulating new AI based machine learning software will be more expensive and takes long period of time to implement. Evidently, AI cannot be replace humans.

[22]Unemployment of teachers may increase because of AI adoption into Education sector. Progressive use of AI could lead to loss of emotional intelligence among learners. In few cases, it will lead to communication barrier.

4. CONCLUSION

The purpose of this study is to review and analyse Industry 4.0 embedded Artificial Intelligence based language learning and teaching. This review has found that with the advancement of NLP, AI based applications could assist foreign language learners to learn another language apart from their mother tongue because of its special features like speech recognition, text recognition, semantic analysis. The Z and Alpha Gen love and enjoy engaging with AI robots, Intelligent Personal Assistants or Voice Assistants. Its quite evident that in future AI could transform the world. Especially for language teaching, AI could adapt to it and may perform new innovative tasks with human intelligence. Even though Industry 4.0 and Education 4.0 embedded together but some major problems occur which questions the reliability of technology. Experimentation is needed for implementing AI based language education. Experimental learning towards AI applications must be encouraged. Those experimental learning may provide adequate data to resolve certain issues. This could pave more ways for future research enhancement. Educators and Governmental organization must promote the AI based language learning. Hence AI could be the futuristic technology which could transform education and business sector.

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CHAPTER – 34

VOICE ASSISSTANT – THE HANDS-FREE FUTURE

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1. Introduction

1.1 What is Voice Assistant?

[1]A voice assistant is a virtual assistant that listens to your voice commands and returns relevant information or does tasks as desired by the user, using voice recognition and language processing algorithms.

While voice assistants can be software-based and integrated into most devices, others are intended expressly for a certain function, such as Amazon's Echo Show, which is integrated with Alexa and is very useful for hands-free calling, streaming movies, and watching videos, among other things.

1.2 History of Voice Assistant

[2]Rex, a toy dog, was the first voice-activated product. The dog would wait inside a dog house until its name was called, at which point he would jump out.

The Automatic Digit Recognition system, dubbed "Audrey," was introduced by Bell Labs in 1952. It took up a six-foot-high relay rack, had a tangle of cables, and drank a lot of electricity. Voice dialling was possible, although push-button dialling was faster.

During the 1962 Seattle World's Fair, IBM Shoebox's voice-activated calculator was unveiled to the general audience. This device could identify the numerals 0-9 as well as six simple commands like 'plus, minus.'

ELIZA, the first natural language processing computer program, was created by MIT professor Joseph Weizenbaum. To stimulate conversation, ELIZA used pattern matching and replacement methods in scripted responses.

In 1971, Darpa launched a five-year speech recognition research program known as the Speech Understanding Research (SUR) program, intending to achieve a vocabulary of 1,000 words. Stanford Research Institute, IBM, and Carnegie Mellon University (CMU) were among the companies and universities that participated in the program.

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Tangora released an improvement to the Shoebox in 1986. It was a voice-recognition typewriter named after the world's fastest typist at the time; it featured a 20,000-word vocabulary and used prediction to determine the most likely outcome based on what had been stated previously.

Dragon's NaturallySpeaking software, released in 1997, could recognize and transcribe natural human speech at a rate of 100 words per minute, eliminating the need for users to wait between words when creating digital documents.

Then, this was followed by Siri in 2010. Developed by SRI International with speech recognition provided by Nuance Communications. Then, with the release of the iPhone 4s, Siri was officially released as an integrated voice assistant within iOS. It aimed to aid in tasks such as sending a text message, checking the weather, setting up an alarm, or making phone calls. Over time, it has developed to provide restaurant recommendations, provide driving directions and search the internet.

Shortly after Siri was first developed, IBM Watson is announced publicly in 2011. It was named after the founder of IBM and is currently one of the most intelligent, naturally speaking computer systems available.

[1]Later Amazon Alexa was announced in 2015. Its name was inspired by the Library of Alexandria and also the hard consonant "X" in the name, helps with more accurate voice recognition. In November 2014, Amazon announced Alexa alongside the Echo. Later the Echo line-up of smart devices was announced to bring smart integration to consumers' homes for an inexpensive route.

1.3 Types of Voice Assistant

- [3]Rule-Based Bots are frequently used to fulfill intents that fall within a small scope of requirements, for example, "How can I retrieve my password?". However, the design process can be fairly complex when it involves a fair amount of analysis and producing dialog flows (or conversation paths). When building and using rule-based bots, analytics are extremely important.
- Text-based bots, on the other hand, are often used for certain parts of an application given their limited scope. For example, the bot when a user is browsing items on an e-commerce site could be different from the bot popping up during the check-out process.

- [4]Computational Intelligence Assistants are capable of analyzing the user's behavior, answering complicated queries, and forecasting it. Rather than following pre-programmed rules, artificial intelligence learns to create its own rules. Data is required in large quantities to improve the AI-powered assistant. Sundar Pichai, Google's CEO, showcases Google Duplex at Google I/O, a technology that leverages natural language interactions over the phone to complete activities such as making a restaurant reservation. AI can be incredibly valuable in the realm of VUI design, but it does, as previously stated, necessitate massive amounts of data due to its continuous learning mechanism.
- [5]Grouping Voice Assistants is when more than one voice assistant can be used to create a voice user experience. This type of experience consists of having multiple artificial assistants, which could increase credibility and engagement.

1.4 Popular Voice Assistant

[6]There are various voice assistants in the market but the three big players in the voice assistant space are Amazon, Google, and Apple. Amazon pioneered the field with its famous Alexa technology, and currently produces several Echo products that utilize Alexa. Google's Nest series is Amazon's natural competitor, and their products run parallel to the Amazon line. Apple also entered the space with their HomePod, which is powered by Siri. We also have various third-party voice assistants such as Jarvis which is available on various android devices, Cortana which is the default voice assistant for all the Microsoft products, and Bixby which is pre-installed on all the Samsung devices.

[7]Amazon Echo Dot (4 Gen)

[8]Google Nest (Mini)

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[9]**Apple HomePod (Mini)**

2. Application of Voice Assistants

2.1 Voice Assistant at Home

- [10]Voice-activated assistants can be personal DJs that give instant access to nearly every piece of music you would want to hear. The Google Home voice-activated speaker, the Amazon voice assistant Alexa, and Apple's Siri all play music natively.
- You can add items to your shopping list and view them in the app provided for the assistant. For example, when you're in the store, open the Alexa app on your phone to view the list. Swipe right to cross off products as you put them into your cart. Plus, anyone at home can add last-minute items without the need to call or text.
- A voice assistant can control smart appliances such as speakers, televisions, air conditioners, lights, etc. With multiple units in different parts of the house, you can also use them as an intercom system.
- One of the best voice assistants use is setting multiple timers. You can also set alarms for naps or waking up each morning.
- [10]Children can entertain themselves in dozens of ways with voice assistants. Some even help them learn. Voice-activated assistants can play games as well, including 20 Questions, Rock-Paper-Scissors, or choose-your-own-adventure stories.

2.2 Voice Assistant for Business

- [11]Text-based chatbots are becoming increasingly popular, particularly in retail, eCommerce, and financial applications. Many firms want to add speech recognition capabilities to their existing applications since increasing customer experience is a primary goal. Voice-enabled devices have been used in the banking industry to reduce time and improve customer service, both of which are important in growing business.

- Apart from enhancing the consumer experience, AI-based voice assistant technology offers great potential to increase a company's productivity levels. Results from a survey indicated that using digital assistants can compensate for up to 6.2 billion work hours.
- AI-powered voice assistants are also capable of processing and analyzing extremely large chunks of data. This can be used to automate repetitive tasks or labor-intensive tasks. An interesting implementation of this can be found in numerous HR departments around the world.
- Voice-activated aides are also excellent secretaries. Instead of using your thumbs to make calendar reminders, say, "Hey Siri, arrange a doctor's appointment." Siri will prompt you for a date and time, which she will enter into your calendar. The same approach works with Google Assistant and Amazon Alexa, of course. With any app, you can utilize assistants to take notes and add to-do list items.
- Voice assistants can help you print files from your devices by just saying "Hey Alexa, ask HP Tango smart printer to print my exam date sheet." A ride can be easily booked or scheduled which will help you save time and get to work faster.
- Get the latest news, weather information, directions, and traffic updates directly to your device with the help of voice assistants. You can even set up your voice-activated assistant to work from sensors so it flips on the lights when you walk through the door or turns on your A/C unit when the temperature passes 78 degrees.
- Instead, as consumers begin to spend more time on their smartphones and computers, the most effective way to advertise is using voice technology. As consumers embrace VAs as a normal part of their life, the way they interact with marketing campaigns is also changing considerably.

2.3 Voice Assistant for Education

- [12]Voice assistants can help overcome some of the restrictions that other types of technology can have in the classroom. Reading material from a device, for example, causes the teacher to lose eye contact with the students. Making a voice assistant read things out loud allows teachers to retain a strong relationship with their students.

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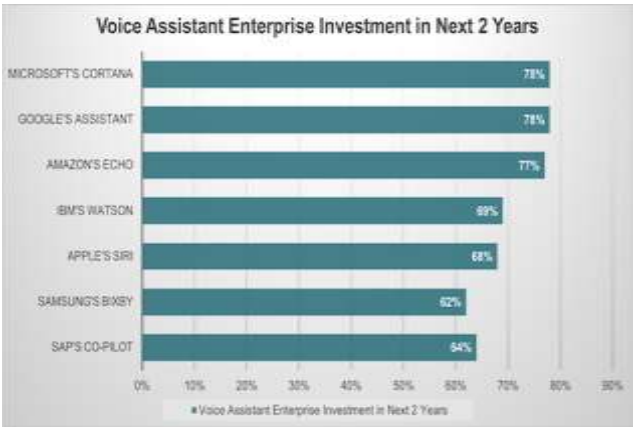
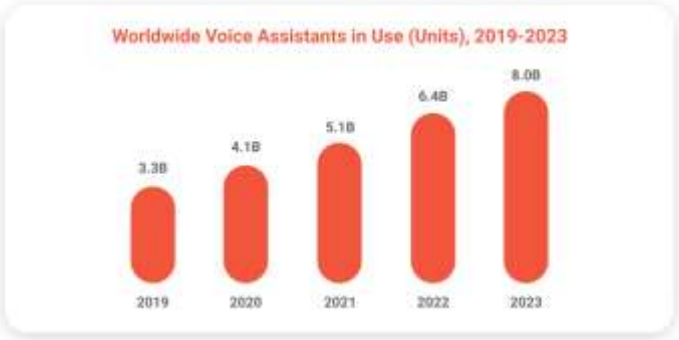
- Voice tech devices not only help get work done, but they are also an important asset for collecting and storing data. With just one device, teachers can record students' presentations, attendance, classroom participation, and much more. This data can then be accessed and studied at the time of periodic assessments.
- Voice search has the potential to significantly improve students' learning experiences. Students frequently have to spend a significant amount of time looking for information on specific topics or clearing their concerns.
- Voice-activated smart devices can be utilized for everyday tasks like memorizing spellings, learning the definition and pronunciation of a new word, translating for foreign language studies, and so on.
- When using Amazon's Echo Dot smart speaker, the 'Skill Blueprints' tool enables teachers to design specific interactions for various classroom activities.
- Voice assistants have access to a variety of online audiobooks. It has the potential to elevate storytelling to new heights by making the stories interactive.
- Voice-activated gadgets can also operate as personal assistants for teachers, in addition to supporting them in their instructional activities.



[13]**Voice Assistant Enterprise Investment**



[14]Voice Assistant Usage

3. Pros and Cons of Virtual Assistant

3.1 Advantages

[15]By a long shot, voice AI has made customers' life easier. You may order a pizza and have it delivered to your door with just a few voice commands. Because voice AI is more conversational and can spot trends, it can help firms better cater to their customers. This makes the customer feel more appreciated and adds a personal touch. AI can also handle more consumer load, making detecting and addressing problems considerably faster and more efficient.

Voice AI technology simply eliminates the redundancy of typing, as typing requires the full concentration of all faculties, making multitasking extremely difficult. AI is capable of picking up verbal cues required to consolidate the information and provide accurate results at a moment's notice.

AI-powered voice bots can successfully react to all of your requests thanks to large data packets and machine learning techniques. 24/7 customer support helps users tackle any issues in the middle of the night and facilitates instantaneous ticket resolution.

AI voice bots can be installed at front desks to direct visitors to the appropriate section easily. Additionally, voice assistants can be employed to carry out repetitive tasks or perform secretarial duties.

[16]A voice bot's portfolio can include numerous languages. Because of the bilingual functionality, client interaction is not limited by language. This enables firms to sell their products to a wider audience while also resolving difficulties in their native tongue.

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3.2 Disadvantages

[17]In recent years, voice recognition has come a long way, and Amazon and Google's technology is among the best so far. However, it isn't flawless, and you may discover that you need to repeat yourself from time to time for the smart speaker to grasp your demand.

Even though people are using voice assistants more frequently, there is still a lot of anxiety about the data these devices collect and the corporations that create the apps that run on them. Consumers are concerned about how data is held, who sees it, and what happens to it.

Smart home devices operated by virtual assistants are not cheap, and not everyone can afford them. They use a lot of electricity as well. You might expect to incur a larger electricity bill if you have a lot of smart home devices. You can't use them if there's no electricity.

Voice assistants are also susceptible to a variety of other threats. Voice assistants will respond to inaudible commands transmitted at ultrasonic frequencies, according to new research. An attacker might approach a target, play the ultrasonic command, and the victim's gadget would react.

[18]Anyone who has access to a voice-activated device can ask it questions and obtain information about the device's accounts and services. Because the gadgets will read out calendar contents, emails, and highly personal information, this poses a significant security concern.

4. Opinion on Voice Assistant

The huge development in the use of voice assistants, in my opinion, indicates how valuable they are in improving quality of life and how vital they have become in the business and education sectors. As more individuals begin to use voice assistants, the amount of data collected from each discussion will aid in the development of Artificial Intelligence. Furthermore, as AI advances and voice technology becomes more mainstream, voice-controlled digital assistants will become not only more natural but also more integrated into devices. Users will no longer have to pause and wait for the voice assistant to catch up in the future, and will instead be able to have natural conversations with their voice assistants, resulting in a more calming and natural experience. With the advancement of AI, voice assistants will be able to execute more complex jobs with ease.

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CHAPTER – 35

VOICE SUBORDINATES

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1. Introduction

1.1 What is Voice Assistant?

[1]A voice assistant is a computer-based assistant that listens to vocal commands or voice synthesis and returns proper information or performs specified action as desired by the user, using speech recognition, language processing algorithms, and voice synthesis. Voice assistants can return relevant information based on specific commands, sometimes referred to as intents, spoken by the user by listening for specific keywords and filtering out noise. Voice assistants are integrated into most devices, but some are specified for single device applications for example amazon Alexa wall clock. Voice assistant clearly helps the user basis. Voice assistants are built in all modern technologies like cell phones, computers, laptops, etc..

1.2 History of Voice Assistant

[1]The first product as like voice assistant was released as Radio Rex in 1922. This was accomplished using an electromagnet tuned to a frequency like the vowel in the word Rex, and it predated modern computers by more than 20 years. Audrey was introduced by Bell Labs at the 1952 World's Fair. The Automatic Digit Recognizer, on the other hand, was not a small and simple device; its casing stood six feet tall just to house all the materials required to recognise ten numbers.

IBM launched their long history of voice assistants in 1962, at the World's Fair in Seattle, with the announcement of the IBM Shoebox. This device recognised digits 0-9 as well as six simple commands such as "plus, minus," allowing it to be used as a simple calculator. Its name referred to its size, which was like that of a shoebox, and it contained a microphone connected to three audio filters that matched the electric frequencies of what was being said and matched it with previously assigned values for each. Amazon officially announced Alexa with echo in November 2014. Siri was first introduced in iPhone 4S on October 4th, 2011, which is considered as the first modern digital voice assistant.

a. [2] In 1870's phonograph was invented by Thomas Edison. This device will record the speech and play it back.
b. In 1880's graphophone was invented, which is the next version or developed version of Edison's phonograph. This device is used for dictating letters.
c. In 1950's Audrey - If speaker pauses in between this machine understood 0 to 9 digits and this the first speech identifier or speech recognition. This was built by researchers at laboratories.
d. In 1960's Shoebox, this was introduced by an IBM engineer. This is a voice – activated calculator. This was attempted in 1962.
e. In 1970's Harpy - Carnegie Mellon University launched in 1976 by getting fund from Darpa (Defence advanced research projects agency). This machine understands entire phrases which had 1011-word vocabulary.
f. In 1980's Tangora – This was the upgraded version of shoebox
g. In 2010; s Watson and Google Assistant – An average person could use this assistant as voice recognition and artificial intelligence, and this has set a future for all.

1.3 Types of Voice Assistant

1) [3] Rule – Based Bots – These bots fall in small scope of requirements which fulfil intents for the users.
2) Artificial Intelligence Assistants – These assistants predict users' behaviour, analyse questions, and returns specified action desired by user. Google, Apple, Amazon etc are some of the AI assistants.
3) Grouping Voice Assistants – This consists of multiple AI assistant which improves engagement.
4) Celebrities, Podcasts, VUIs
5) User – Generated VUIs
6) Companies Providing AI – Powered VUI Technologies

1.4 Popular Voice Assistants

- [4]**Siri** - It is an Apple's voice assistant and it can be used in any Apple device. It is the most popular voice assistant. More than 40 percent of users prefer this technology and users connect this with both personal and business.

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- **Google Assistant** - When it comes to general information, navigation, commerce, Google assistant has more accurate responses than the other major popular assistant. It gives 25 percent of share in digital assistant market. Users prefer who has android phones.
- **Cortana** – Cortana is Microsoft's virtual assistant. It provides answers to users by utilizing Bing. It is particularly useful for directions and local service.
- **Bixby** – This voice assistant is Samsung's own virtual assistant. Samsung users prefer both Bixby and google assistant. Apart from being customizable, its help us to compose emails and looking up the fact.
- [5] **Alexa** – It becomes the personal assistant for amazon users and widely spread among all citizens.
- **Mycroft** – It is a Linux based Operating System. This is used for developers. It is a free and open-source software.

2.Application of Voice Assistant

2.1 Voice Assistant at Home

[6]Voice assistant can respond voices and fulfil intents of the users. Users can give question to the voice assistant and playback voice (Media), listening to songs and music and can control automatic devices in their home. Managing their emails and calendars are also some applications of voice assistant at home.

Children can use voice assistant to improve his / her knowledge and skills, and this helps students to complete their daily basis. During the covid pandemic instead of touchpoints this digital virtual assistant helps to communicate and this plays a pivotal role for all users in this pandemic

2.2 Voice Assistant at Business

[7]It was reported that 88 percent of business peoples thinks virtual assistant helps in developing business across the world. These digital virtual assistants can boost the company profit and marketing.

Voice assistant helps in marketing ideas and it includes development of their strategies and their works.

In Business it helps in all ways and all industries and factories came up to use voice assistant as their main key.

2.3 Voice Assistant at Education

[8]1) Virtual technology is closet to teachers
2) Voice assistant eliminates break eye contact
3) Reduces touchpoints
4) Prevents the spread of COVID
5) Collects Data in time

[9]Teachers can ask questions and get answers from students immediately. Schools can follow routine learning skills. It helps in conducting quizzes / Tests.

3. Pros and Cons of Virtual Assistant

3.1 Advantages

[10]1) **Minimal Effort** – Instead of typing them on smartphone screen, it is easier to use voice assistant.
2) **Eyes and Hands free** – No need of eyes and hands as voice assistant helps you to communicate easily.
3**) Fast responsive** – Virtual assistant does not have any difficulties and in returns users gets faster response.
4) **Improvement of customer engagement** – Interaction between users gives a new experience in voice assistant.
[11]5**) Smart Working environmen**t – Develops Smart working among users and environment gets better.
6) **Avoids Language barrier** – No language barriers among users and improves better communication.

3.2 Disadvantages

[12]1) **Voice recognition is not perfect all times** – Recognition of voice is not perfect every time when we use voice assistant. There will be a lag or some disconnection often. This is the main disadvantage of Voice assistant.
[13]2) **Lack of function** – Still users did not get a 100 percent perfect assistant (Lack of function) and in coming days there will improvement in modern technologies and users might get a proper voice assistant.
3) **Lack of controls** – This is also considered as a disadvantage. Lack of controls will be solved in future days.

4. Opinion on Voice Assistant

Voice assistants are the modern technology which gives all answers to the users. It is a minimal effort where users do not need to give their challenging work. Time management is the key in voice assistant. It helpful for all young kids to old adults. Voice assistant clearly helps the user basis.

Voice assistant has some disadvantage in it but modern technologies solves that. So, users might feel some issues today in Google assistant, Siri, Alexa but these will be best once its clears some bugs and users will increased in coming days.

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CHAPTER – 36

VOICE RECOGNITION

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1. Introduction

1.1 What is Voice Assistant?

[1]Voice Assistant is an artificial intelligent software which are used in devices and works on language recognition process. Based on the commands given by the user, the assistant filters keywords and ambient noise to search for suitable results and return the corresponding results inform of voice using a speaker output. It is a digital assistant which uses voice recognition, process natural language and synthesis speech to provide services to user using a corresponding application.

1.2 History of Voice Assistant

[2 14] The history of voice assistant belongs to early 20th century. In year 1922 the first voice assisted toys was launched named 'Radio Rex'. Then in 1952 Bell labs came with their product 'Audrey' (Automatic Digit Recognizer) which was a big machine in terms of size and was used to recognize ten digits. IBM in 1962 launched their shoebox sized product 'IBM Shoebox'. This was used to recognize 10 digits and six simple mathematical operating commands. In 1971, DARPA a US research agency launched one of the biggest innovation 'Carnegie Mellon's Harpy' which used to recognize over 1000 words. The in 1990 first consumer-

based voice recognition program was designed to be used in home PC's the 'Dragon Dictate'. It was followed by 'Dragon NaturallySpeaking' which was more advanced and with faster speech recognition. Four years later IBM came up with 'Simon' which was first smart voice assistant. With rolling out of android, Google in 2011 launched it's dedicated Google Voice search program. These were followed by 'Siri' the Apple device integrated voice assistant. In 2015 Amazon Alexa bought intelligent assistance to consumers at less price. 'Alan' launched in 2017 was first AI voice program targeting consumer application and enterprise use and configured in a quick and efficient manner.

1.3 Types of Voice Assistant

a. **Rule-Base Bots**- These bots are used for small scale requirements. The arguments which do not include complex algorithm can be processed. These have limited scope.
b. **AI Assistants**- These software are designed to predict and analyze user behavior and respond to complex arguments. It is developed on basis of machine learning by developing their own algorithms'.
c. **Grouping Voice Assistants**- It consists of multiple assistants which increase reliability and engagement. Each Assistant may respond to particular voice commands depending on their correspondence.
d. **Custom Voices**- In this voice user interface, the voice of known personalities is used or lend to companies which incorporate these voices in the voice assistant program device.
e. [16]**General purpose voice assistant**- these voice assistants help in general actions like event management alarm setting, placing calls, app launching in phones, etc.
f. **In-app assistants**- Many brands have added voice assistants to their apps or websites which are smoothening the customer experience.
g. **Stand alone assistants**- These voice assistants are not any app based and are sufficient themselves in stand-alone program. Some examples are Suki and Niki.

1.4. Popular Voice Assistants

[24]Siri is the most popular voice assistant. It is now the integral part of Apple devices. It has a main advantage of understanding multiple languages.

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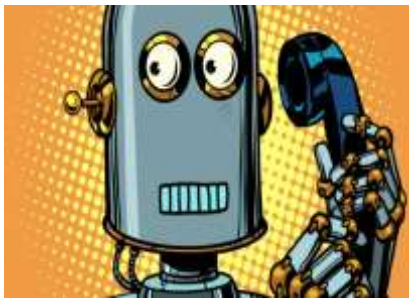
[4]Amazon Alexa is the best device compatibility voice assistant. It has smart home support with easy shopping feature. It can easily answer general questions and perform day to day voice assistance tasks with ease.

[4]Google Assistant has wide range of capabilities with high compatibility features with great accuracy.

[2]Cortana is a voice assistant developed by Microsoft which aims to provide people access to voice assistants in daily lives.

[2]Alan which launched in 2017 which enables voice assistance to all applications. It provides a platform to developers to control voice according to their convenience It enables next level AI features in all applications.

Samsung Bixby is widely used in Samsung gadgets to perform tasks like on phones. It is created as an alternative to Google assistant which is present in nearly every phone. It is currently most used voice assistant.



2.Application of Voice Assistant

2.1 Voice Assistant at Home

[5]The voice assistants like Amazon Alexa, Google voice, Apple Siri, etc. are web connected, they get commands, interpret and perform corresponding actions. At home in day-to-day life, these assistants answer questions, perform app-based tasks, place online orders, operate home appliances, track user phones and linked gadgets, and many more simplified tasks like playing music, listen to news and weather forecasts, managing shopping lists, etc. It also provides latest news and updates of what's going around the world. If someone is at risk or has undergone any mishappening and not in a position to call emergency, voice assistant can easily call emergency contact and life of the victim could be saved.

2.2 Voice Assistant for Business

[6 12] AI voice assistants are changing ways of doing business with their advanced interaction technology. These Assistants can be used as a virtual secretary to maintain appointment calendar, manage and read emails, manage projects on various linked apps. Interactive assistants are being used by companies for consumer interface. Chatbots ease the communication of the customer in buying products, searching them and using different services 24/7 hence improving customer services without increasing service costs. [7]These voice assistants are removing language barriers by translating services which in turn is providing a good working environment. In business including research where people are in a lab wearing kits, they can't type anything to search and thus voice assistants are changing their ways by automating their tasks. A company's database can be created and linked with these assistants, employees can easily access to customers details using voice commands.

2.3 Voice Assistant for Education

[8 11] Voice assistant is modernizing the teaching ways. In the field of education, the voice assistant can be used as a co-teacher which could be used to clear small doubts related to concepts, reading stories and books. Customizable oral quiz can be taken through these devices

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allowing students to develop interest and maintaining a proper record of their performance and leaderboard. Time bounded mock tests can also be conducted. A proper performance analysis can be maintained for every student easing the teacher's work load too. Voice assistant will help both teacher, parents and students to keep them remember about the updates, timetables and reminders allowing them to be more precise and efficient.

3. Pros and Cons of virtual assistant

3.1 Advantages

[8 9 10]The biggest advantages of using virtual assistant are

Ease of doing things- giving commands is quite easier task than typing everything. Listen to the answers for the given searches make us do multitasking at same time rather than switching to different screens. Also, it allows us to be hands free causing us to do our tasks simultaneously knowing things going around. In every field whether it is education, business, household use, etc. virtual assistants make our tasks ease going in every aspect.

Quick response- While searching for a topic on web, we have to go through multiple websites whereas these assistants provide exact answers in minimal tome duration. Fast response to our queries saves individual time in turn benefiting teaching-learning process, ease of doing business and shopping with better customer experience. Some of the more advantages are increasing efficiency in doing and searching for tasks, less errors in spellings. It provides much safer services like while driving or cooking if we have to call someone or want to play music, we can easily do that with our commands. Voice assistants are easy to use. Other advanced devices require some time to understand their functioning even

mobile phone but voice assistants use our natural conversation skills and our voice commands to interact which makes it much more user friendly. Voice assistants can also be easily integrated with latest technology being launched in near future like smart glasses, appliances, etc.

3.2 Disadvantages

[9] [10] Everything has disadvantages too. Voice Assistants also have some. People use and share their personal data with the voice assistants but there is a concern on the reliance of the companies making such devices and software. Use of Voice assistants is decreasing the visual interaction of users causing less involvement of users in physical appearance of products. It is also restricting the users to stick only to the result given by assistant and decreases the researching skills. Another drawback is cost effectiveness, these assistants are expensive and may also lead to high electricity bills. Some more disadvantages include fewer involving interactions with users with less engagement and website surfing. It is also very costly to produce voice assistants and require large amount of marketing budget. Easy Hackability is an issue because as voice assistant uses voice, anyone can give command to alter one's information.

4. Opinion on Voice Assistant

Voice Assistants although started to develop in early 20th century and its advanced version with latest technology has been developed in recent years these assistants have always been in popular and used by consumers in a more accepted manner. These AI assistants are providing huge services in every sector of daily life. It not only helps to make decisions for people but also guide them to the best suited option and yes more importantly users are most of the time convinced with it. But still some hurdles are to be come over which include more reliance of users on the production company, users' personal information safety, price, etc. A lot is to worked on increasing the accuracy of these devices. More designs are to be developed to understand multilingual language commands. More advancements are required for devices to be easily and efficiently used by visually impaired people.

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CHAPTER – 37

VOICE ASSISTANTS – THE ERA OF NEW VOICE

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1. Introduction

1.1 What is Voice Assistants ?

[1]A voice assistant, also called an intelligent personal assistant or a connected speaker, are new types of products marketed by Apple, Amazon and Google are based on natural language speech recognition. They allow a search to be carried out using a voice command entered by the user, as well as information retrieval by voice synthesis. [2] An intelligent assistant (IVA) or intelligent personal assistant (IPA) is a software agent that can perform tasks or services for an individual based on commands or questions . The term "chatbot" is sometimes used to refer to virtual assistants generally or specifically accessed by online chat . In some cases , online chat programs are exclusively for entertainment purposes. Some virtual assistants are able to interpret human speech and responds via synthesized voices. We can ask our questions on control home automation devices and can run other simple tasks like sending an email any research and basic calculation or an calendars etc. Since 2017 the capabilities and usage of voice assistants are increasing in market. Apple and Google have large installed bases of users on smart phones . Now a days the IVA or IPA have become a person with which we can interact with and has primary work to help virtually.

1.2 History of Voice Assistants .

[3]The first voice activated toy is Radio Rex (1922) . It was made up of wood in a shape of dog that would come out of the house when its name was called . Bell labs introduced " Audrey" the Automatic Recognition machine. It occupied six foot high relay rack , consumed substantial power , had streams of wires that exhibited the myriad maintenance problems . The machine could understand the fundamental speech, phonemes . [4]The rise of pre-modern was begin when the virtual Voice Assistants were introduced in market for first time. Dragon's speech recognition and transcription . And even the Microsoft based

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textual based virtual assistant ' clippy' was brought in language in text could tracked . The start of the Modern era transitions of smart speaker revolution was begin when siri and modern era of voice assistants were introduced in markets. This is were the voice and smart phones interaction collided. Siri is the first voice assistant which has reached out to the wide audience. Than in 2014 Amazon introduced the Alexa voice assistant and Echo smart speaker , which has now reached out to the every corner of the world.

1.3 Types Of Voice Assistant

[5]The most common voice Assistants are, 'rule-based bots' this kind of bots are preferred only when there is small scope of requirements .The the question which no need of complex algorithm to provide a answer and can be scripted in the back end are called as rule based bots. Text based bots on other hand , are often used for certain parts of an application given their limited scope. 'Artificial intelligence Assistants' , this assistants are capable to analyse and complete the complex quires or questions and predict the users behaviour . AI are the assistants which is about producing its own rules and usage method through out the learning process. In order to produce these algorithms, the Artificial Intelligence AI system is given instructions and set of training data as a consequence. This assistants can even complete the difficult or impossible tasks. [6]Amoung the many types of PDAs now available are palm OS, windows CE, symbian OS PADs, Tablet PCs .

1.4 Popular Voice Assistants

[7]Digital assistants are used to perform certain given tasks with hest of inputs and access to GPS location . Digital assistants are gaining popularity with the help of technology . Now a days people make use of the voice assistants for quick results. The most popular voice Digital Assistants are –

- siri , Developed by Apple , Inc. , siri is an intelligent digital assistant who allows users to send text messages make schedules , makes calls, play music and videos, etc. it is a voice activated intelligent digital assistants which was first incorporated in the phones through iOS 5 released in 2011.

- Google Now, Google's intelligent , Google now is incorporated ia all android devices . Lunched for the first time in 2012, Google now is used to schedule appointments , send text messages , search for directions
- Cortana, This is a primary intelligent digital assistant which was developed by Microsoft and launched along with the release of windows phone 8.1 in the year 2014

2. Application of Voice Assistants

2.1. Voice Assistants at Home

[8]There are many usages of voice assistants at domestic places like to answer the questions, to interact with apps , order food etc. Voice activated assistants come pre installed on smart phones but speakers like Amazon Echo and Google home speaker.[9] Example - play songs , Voice Assistants can be personal DJs that give instant access to nearly every piece of music we would like to hear., we can use assistant to keep the shopping list, and to create a smart home or office , Manage timers and productivity, For entertainment and to make life easier with skills, and also to get news ,weather, and traffic .

2.2 Voice Assistants for Business

[10]Amazon's Alexa , Apple's siri, Microsoft's cortana may be the flag bearers of Voice assistant Vas but the technology itself is no longer limited to mega orations . Instead, it is finding its way to numerous enterprise level apps and locations. The voice Assistants are very useful for business like for Global banking and finance purpose . up to 88% of global business leaders think that the voice assistant can grow in business. However, most of those technology barriers have been over come and VUIs of today offer many important advantages like, speed, hands free, easy to use, intonation, screen less devices etc. The ability to speak and get things done has virtually unlimited use cases but the following five use of cases explore the most popular implementations of voice assistants

2.3 Voice Assistants for Education

[11]Voice technology isn't just meant to automate task and save time. It is also pretty useful for modernizing the way teachers and students interact with each other. Here are the major advantages of Voice

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assistants-voice assistants are closest to human teachers for example a voice assistant like Alexa, with its human like voice features, is the best aid a teacher can use to make learning more personal

3. Pros and Cons of Virtual assistant

3.1 Advantage

[12]Virtual Assistants will allow you to scale operations and with less risk. Since growth requires capital and virtual assistants are comparatively cost effective alternative to IRL employs.

Here are some advantages of virtual assistants

No time constrains , save time, reduce employ related expenses ,pay per use, pay for work only etc .Exponential growth , don't stop to let the traditional time consuming hiring process run its course . Hire a VA instantly and grow your business fast. Virtual assistant improve the profitability , by hiring a virtual assistant , we experience reduced employee related costs which soon add up to boost your profit margins. AVs are low maintenance.

3.2 Disadvantage

[13]Not all virtual Assistants are skilled in every industry , not all will be digital experts, and not all will be right for us the same goes for any vacancy, but it's a point worth acknowledging.[14]While there are many positives to be gained from hiring a virtual assistant, we should also recognize that there could be few downsides with this new relationship.As the number of virtual assistants swells around the world , it is expected that not all of them will come with quality training and skills that we need to improve your business

4. Opinion on Voice Assistants

In today's era the technology has became the essentials part of human life , with out which human life will be difficult . But the technology of voice assistants has became the most important and use full virtual devise which has its own speciality . Now a days each and every indusial has its own personal virtual digital assistant in our phones which we use it in our every day life. There are some disadvantages to it also, but more over of advantages like we can use it for our daily retune , in our business expansion, for education purpose and also for entertainment.

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CHAPTER – 38

VOICE ASSISTANCE – THE FUTURE VOICE

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1.INTRODUCTION

1.1 What is voice assistance: -

[1] voice assistance also called as voice control is a user interface which makes the smart devices operate by only talking to the devices, this allows hands-free operation of the smart devices. [2] voice assistances are programs designed to listen and respond to a verbal command. If the user has any questions or some tasks to be done, the user instead of typing or using hands can directly command through voice assistance and can get the work done.

1.2 History of voice assistance: -

[3]The invention of the first voice assistant was way back in 1910's. 1910-1980's were the experimental decades of the voice assistants. The first voice assisted toy was released in 1922 and named as radio rex. This toy was designed to come out of its house when its name is called. In 1952 researchers at bell laboratories built, Audrey the first true speech recognition device, Audrey could understand 0-9 digits and was used for voice dialling machines. Though Audrey could recognise voices it had its challenges, and many people did not find it useful as it was very costly, and the voice recognition system was not fully accurate. Then later in the year 1962, An IBM engineer designed shoebox It understood 10 digits and six control words — plus, minus, total, subtotal, false, and off — and instructed an attached adding machine to calculate and print out answers to basic spoken math problems. [4]Like Audrey, the device attempted to recognize and act on the specific frequency of the vowels in each spoken digit. Then in the year 1971, the defence advance research project agency (DARPA) has funded for the improvisation in the voice assistance and after 5 years of research the Carnegie Mellon university launched the voice recognition machine called as Harpy in the year 1976. Harpy had a 1,011-word vocabulary and could also understand phrases and sentences and

where different words started and stopped. After Harpy, Tangora was the latest version of voice recognition. Tangora is an updated version of the previous voice recognition Shoebox, but instead of operating an adding machine, it connected to a typewriter. Tangora recognised around 20,000 words and processed speech by predicting the most likely result based on what it had interpreted so far.[5] In the year 1990's users were more available with computers and the Dragon's 1997 NaturallySpeaking came up as first large vocabulary speech to dictation system. It was the ground-breaking product though it had some issues such as users had to stop between individual words but, later they improvised their device and made the devices even work without pausing between each word.

1.3 Types of voice assistants: -

[6] **Rule-based chatbots:**

Rule-based chatbots also known as decision tree bots can only answer the question up-to a certain limit. These rule-based assistants cannot answer the questions outside the defined rules. [7]A rule-based chatbots uses a tree like flow instead of AI to help with our queries. The structures and answers are all predefined so that you are in control of the conversation.

[8]**Artificial intelligence chatbots: -**

Artificial intelligence chatbots are text or voice-based interfaces which helps create the human users to have an experience of person-to-person conversation. [9]these programs are designed to answers users complicated questions and can also predict the user's behaviour. This makes the interaction more lifelike and helps the user with their problems.

[10]**Grouping voice assistants: -**

Grouping voice assistants is more than one assistant which can be used to create a voice user's experience. For example, in fashion designing there are two types of fashion men's fashion and women's fashion, men's fashion can use male voice assistant women's fashion can use female voice assistant.

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1.4 Popular voice assistant: -

[11]Google assistant: -

Google assistant is one of the most popular assistants, which is used in android devices, it can also make call or send text for you, it can control your devices in your smart home.

[12] SIRI: -

Siri is also one of the most popular AI based voice assistant available in all iOS devices. Siri is a voice assistant which can make calls or send texts for you, it can even send notification through air pods.

[13]Cortana: -

Cortana is also a voice assistant which is used in windows laptop, it can manage your calendar and keep you schedule up to date, it can create files, it can find facts in your computer.

[14]Amazon Alexa: -

Alexa is also one of the voice assistants which can control smart homes and it can also answer your question, it comes with a high-quality speaker.

2.APPLICATION OF VOICE ASSISTANT

2.1 Voice assistant at home:

[15]Voice assistants are powerful hands-free computing tools that has many abilities and makes our lives easier. voice assistants that are ai based digital assistance such as Amazon Alexa, Apple Siri, Google voice assistant or Microsoft Cortana, they are software tools that waits for our command listens to them and take actions. they can answer questions, interact with apps, turn on lights order food and even find lost phones. voice assistance set up at home is like a smart home, like if you set up special routines like," I am going to bed" and your smart home will turn of all the lights, turn on your nightstand light, make sure the main door in locked, and starts playing gentle music and etc. for instance, if we leave the house without turning off the lights or AC we do not need to worry and just command the lights to turn off by just using our mobile.so these are some applications of voice assistance at home.

2.2 Voice assistant for business: -

[16] The ability to speak and get things done has unlimited uses and some of them which are extremely helpful for the growth of business are by saving their time and money is by using voice assistance. Voice assistance in business world can be used as –

- Embeddable voice assistant technology for chatbots
- Consumer product and retail
- Voice payments
- Improving productivity within the organization
- Collecting feedback and developing strategies
- Advertising and marketing

In the recent reports it is shown that 88% of global leaders think that voice assistance technology can grow their business. These are the applications of voice assistance for business.

2.3 Voice assistant for education: -

[17]Voice assistant for education is the new era of technology, where students and teachers can use their voice to interact with the technology which gives critical information, and it also saves time. In voice assistant technology you can ask the question and you can get the solution immediately, it would be helpful for customizing tests and quizzes, Voice assistant have numerous books and they can access any time and it would be helpful for students. Voice assistant can also be teacher's assistant and can make the announcement conveniently.

3. PRO'S AND CON'S OF VOICE ASSISTANT

3.1 Advantages of voice assistant: -

[18]Advantages of voice assistant are:

- Improved customer engagement
- Advanced search capabilities
- Customer support round the clock
- Smart working environment
- Let go of the language barrier
- Reduces our efforts
- Supercharge marketing efforts

3.2 Disadvantages of voice assistant: -

[19]Disadvantages of voice assistant are: -

- Privacy of voice recorded data
- Error and misinterpretation of words
- Cybersecurity risks
- Voice assistants are not cost effective
- Always needs internet connection
- Physical side effects of throat if constantly used
- Background noise interference

4.MY OPINION ABOUT VOICE ASSISTANT

In my opinion voice assistants are really useful, although they have few side effects it also benefits us hugely by making our tasks easier in less time. Voice assistants makes us feel naturally speaking to it, and it feels like talking to a friend.

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CHAPTER – 39

VOICE ASSISTANT- WHAT WE SHOULD KNOW?

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1.Introduction

1.1 what is voice assistant

[1]The voice recognition is the intelligent voice assistant. It is also called as personal assistant. This voice assistant is using language recognition.

1.2 History of voice assistant

[2] The first voice assistant name is Simon by IBM. It was found in 1960. It was involves voice design and activation as well as smart voice devices.

1.3 Types of voice assistant

[3]There are five voice assistant in using

1. Amazon Alexa
2. Google assistant
3. Apple Siri
4. Microsoft Cortana
5. Samsung Bixby

All are available in viva smart phone.

1.4 Popular voice assistants

[3] Number one is Amazon Alexa. This is the best for the device compatibility. The most peoples are using this.

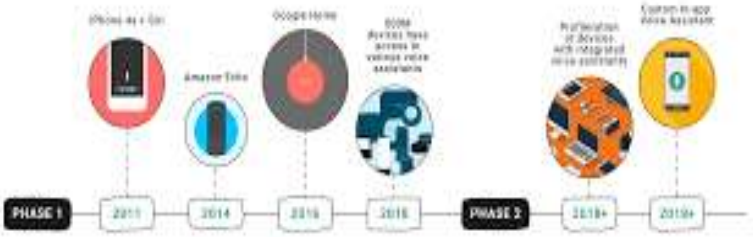
Number two is Google assistant. Google assistant is very easy to access. It has many features in it.

Number three is Apple Siri. The Siri is using in Apple only. It has also many features.

Number four is Microsoft Cortana. This is using in windows. This is usually using in windows. Especially in windows 10.

2 Applications of voice assistant

2.1 voice assistant at home



[5]**The voice assistant at home**

Voice assistant is very useful in our home. It makes our life so easy like if we want to search anything we can easily search that through our voice. It is more useful for blindness peoples. We can control our daily use devices like our mobiles, cars, Ac, etc.… This voice assistant is also using for play music, tune into radio, shop keeping list, it makes the home as a smart home, This is control the television. This voice assistant can help us to do the multiple tasks and we can control the automated devices at home. We can manage the calendar and emails or messages. We can change our calendar as per our convenient.

2.2 voice assistant at business

[6] **Voice assistant at business**

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In the business field the voice assistant is playing main role. Voice assistant is very usefull between the employees. The many kind of people will working in many companies, in there they will face one problem that is language problem, But the voice assistant is giving the best support between the employees. The can easily handle the language problem. Many more companies and business sector. It also is giving the very much useful information's like the statics of that company last two year, whether conditions and if we have any doughs and problems the voice assistant can give the solutions for that problems. The voice assistant within our company it will improve our employee's productivity. The voice assistant can remember the deadline, scheduled dates, important dates and it keeps the relevant information updates. The ecommerce companies also using this voice assistant.

2.3 voice assistant for education

[7] **Voice assistant for education**

The voice assistant is very essential for students and parents in education sector. It can note the progress of the students. They will get the personalized feedback. The voice assistant is remembering the students about their enrolled subjects. The students can get the every updates continuously that is happening in their schools and universities. Enable the parents stay with their kids. Parents can be always stay closely connected to their children's schools.

Parents and students can ask the questions and doughs, the voice assistant will clear the doughs about the grade, attendance, percentage, etc.…. Through this voice assistant the students and teachers can personally learn anything in easy and understanding way. So many countries are using this voice assistant in their class rooms and their schools and universities.

In pandemic situation it was very useful to the schools and universities.

3. pros and cons of virtual

3.1 Advantages of assistant

[8]**The advantages of voice assistant**

[9]The voice assistant improves the engagement. The voice assistant is very useful to the customers. It is more conversation and recognizes the trends conversational. While we typing, it is incredible difficult to multi- task. The voice assistant is giving more convenient life style. It is giving the accurate answers. The voice assistant is also very useful in the field of customer service. Even mid night also It is helping the customers.

The multi language features ensure the customers interacting with each other. There is no limit for language. The voice assistant is resolve the problems in mother tongue. When the market products ready for selling In many countries. It is boosting the customers experience and the subsidiary sectors also benefiting from this. The voice assistant can improve the revolutionary. It can help to campaign, analyze the strategies, very easy to understand the customers.

Voice assistant is becoming the very big thing in our future. It is more benefits with superior economics and productivity.

3.2 Disadvantages of assistant

Not the all assistant are skilled in every industry. Not all the assistants digital experts, not all the assistant suitable for us. This is so expensive. The best assistants are only five, others are having the some issues. It can be become the peoples little bit lazy.

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4.Opinion on voice assistant

The Assistant is very useful to the society. The first voice assistant was invented by IBM. It was called Simon. This was invented in 1960s. It was involved some voice design and activation as well as smart voice devices.

It was continuously growing in every year and generation. Many more features were added in the assistant. It was improving step by step. There are five assistant in use , Amazon Alexa, Google assistant , Apple Siri, Microsoft Cortana, Samsung Bixby. All the assistant are available in via smart phone. In many assistants Amazon Alexa is the best assistant and Google assistant. The assistants can use to measure our progress . We can get the personalized feedback also.The assistants also reminding the students about the subjects continuously that is happening in school and universities. It is also using the parents always connect with their kids. The voice assistants very useful to get the answers for our doughs and the questions.We can the idea about the grades, percentage and attendance. This assistance has the multi language features. So the many customers are using this voice assistants to the language problem. It has thousands of the language around the world. So we are using like google translator ,Translator. It is more using to the customers when they going to marketing around the world .Through this voice assistant we will know about the whether, daily updates, new inventions, the importance of that day and reminding the events and fumtions in our calendar. This is very use to school, college students and also entrepreneurs. This is useful to the time management.

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CHAPTER – 40

VOICE ASSISTANCE- REVOLUTION OF INTERACTION

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1. Introduction

[1]In this hectic world, people need assistance to make their life easier. So, voice assistance is an artificial intelligence enabled assistance which is being used to get the information via interaction in ergonomic manner. It is software-based technology used to do task with the help of voice command.

[3]It is future of interactivity to redefine the ways user interact with their devices and this create a bridge between user device. The voice assistant bridge is majorly created by companies like Google assistant, Amazon Alexa, Apple's Siri and Samsung Bixby.

1.1 What is the Voice Assistant?

[7]Voice Assistant is an assistive technology which requires internet connection to perform task given by user in the form of voice command. It works in simple three steps listen to command, interpret them and take action.

Now a days, voice assistance feature is pre-installed in every smartphone. People are becoming more aware about this feature and are using this in their daily activity. It is being used in speaker called as smart speaker which can many things like to play the songs, read news for you, telling scores of sports, alarms, reminders and also helps in using other smart appliances.

[8]Different Brands use different voice assistance. So, it basically depends on the device which you use and have access to one or more varieties of voice assistant right now. Because of several advertisement and digitalization people are using this more and more from finding location to texting your friend. It indeed is a piece of technology which is growing and moulding itself better day by day.

1.2 History of Voice Assistant

[14]It all started from the era of 1960s when IBM introduced the IBM Shoebox, the first digital voice recognition tool. [13]It can understand 16 words and digits. In 1976, a device named Harpy was being developed which can understand phrases and different words. Then Tangora which was the upgrade of the Shoebox which can read around 20,000 words.

Around 1990s the scenario changed when a device called Dragon Dictate by Dragon was launched for customers as a first speech recognition device for $6000.

IBM's Watson wins jeopardy which became a viral news during 2011. During this time, itself one of the biggest tech giant Apple introduced Siri. After this Google launched Google Now and in 2013 Microsoft introduced Cortana. Then came Amazon Echo, Alexa and google assistant. Samsung also released Bixby with their flagship devices. During 2017 it created a major advantage for customers to choose best device with voice assistant. Now after more growth and development in this field created a new sector of smart homes which can be controlled by your device for many appliances. Voice assistant are used for translation at many places.

1.3 Types of Voice Assistant

- **General Used Voice Assistant-** The voice assistant which is easily accessible for everyone to person some daily life activities like setting an alarm, putting reminder, weather forecast, news, maps, replying texts and many more. These all features have become a part of our living which is fulfilled by several voice assistants like Google Assistant, Alexa, Siri and Bixby.

- **Specified In-app Voice Assistant-** There are several platforms which are trying to grab attention by using the new tech like artificial intelligence. As of now, apps like Flipkart, Amazon, Myntra, Big basket and Jio are using voice assistant to find the product which customer asks the AI via interaction. These app recognizes the product name and try to show the best possible output. Music Apps like Ganna, Spotify, Wynk, YouTube Music uses voice assistance technology for finding the song name which people plays on phone like a short form of song. Moreover, these keep on developing and recognize your favourite genres of music which is kind of smart approach.
- **Bots based Assistance-** These bots are used to entertain customer query in short and limited context regarding particular things. But this requires huge Data base to ensure a variety of things asked by user regarding the particular product or topic. In this the developer need to get the idea of the frequently asked question and try to give the best possible solution regarding that issue.
- **Thirty Party Devices-** Voice assistance is being used in devices other than the developer owned products. It is majorly used for smart speaker of several different companies like Boat, Bose, Amazon Echo and Sony. Devices like smart band and watches also use voice assistant with some features common as smart phones.
- **Service Based Industry-** In restaurants, airport and mall robots are being used to guide people the way to order food, to get the information about the pathways and many more with the integration of voice assistance in many languages.

1.4 Popular Voice Assistant

It all started during 2017 when 4-5 voice assistance came into competition. [19]Siri, Google Assistant, Alexa, Bixby and Cortana were major voice assistants created by big tech companies. As the time passed and by gradually in hand testing, we were left with only three voice assistant which were reliable and those were Google Assistant, Amazon Alexa and Siri by Apple. They were becoming famous in consumer market as it was easy to use and with best possible outcome. But at last Google just surpassed every other assistant because of its database and this helped them to give the solution of every answer possible. Moreover, Google Assistant is present in every android device which is affordable and due to these all-reasons people loved the Google Assistant.

2. Application of Voice Assistant

Voice assistant is changing the way of technology and has become an integral part of our life. It is being used from day-to-day life to the complex apps for performing specific tasks. One of the most efficient and ergonomic way to handle different situations.

2.1 Voice Assistant at Home

[16]We often use new gadgets in our life when it becomes affordable. So as the Tech-driven is moulding itself we are able to experience many technologies in our home. Voice assistance is one of that technology which is making a large amount of space in our life. We are using this for making shopping list, listening our favourite song, getting information and finding location. Now a days, this smart voice assistance is being used for smart homes in which we can use a single device to operate many things. From switching on fans, television, smart locks, ambient lighting and working of other appliances this voice enabled gadgets are controlled by a single smart device known as smart speaker. It is just the beginning of new revolution for smart world.

2.2 Voice Assistant for business

[23]Due to the explosive growth of the technology, voice assistance has formed its own path for making life easier. Use of voice assistance in apps are increasing day-by-day with tremendous speed. It all started with the big companies like Flipkart, Amazon, Zomato, Netflix, Ganna and Dominoes. They are taking the request from customers regarding

products via voice search and giving them the content or product related to that. In addition to this, it helps in increasing the database of company by recognising different set of voice and their need. [24]As we all know still the fastest way to do interaction is voice which is called as talking or voice interaction. It doesn't require touch so it's hand free tech which is being used to take orders in drive way for Dominoes, KFC and several others. As it also received and opportunity during covid period which helped in contact less order of products in malls and store. In parking lot, we can use voice assistance to get the particular slot without being in contact with the device which is necessary during covid. The chat box, enquiry-based apps and service-based search uses artificial intelligence like for knowing the banking details, phone bill query, customer support and order support by use of voice interaction. The productivity is also increased by using AI devices by collecting feedback and developing strategies. It is going to be the future of the automated world by the smart voice assistance.

2.3 Voice Assistance for Education

[25]Voice Assistance is used for new innovative technique to do interaction with students in the fun way. Like in the text book there are some scanning bar codes given which gives the brief idea about that topic with voice assistance. [20]It can be used to speak different accent of same language to get the students experience about different parts of world. As it is very useful for learning the different languages in educational field as the time is passing its usability is increasing. It is being used in self-learning devices for disabled students to get the quality education at any place. A product named Annie created by Thinkers Bell Lab was shown on TV show Shark Tank India. It helped a 10-year-old child to know and learn about their surrounding with help of AI and voice assistance. This kid was blind and because of this device he was able to get the quality education. This demonstration of product was showcased by this kid which impressed everyone and by this the edtech product got the exposure. So, there are many fields in which we require smart assistance for education. It can be used for asking question or having interaction. It helps in the translation which can help students to gain the exposure of different cultures. It is being adapted in our life to get the best outcomes possible.

3. Pros and Cons of Virtual Assistance

As everything can't be perfect for everyone perspective. Like everything is good for some part and bad for some part and in the same way voice assistance has both its pros and cons.

3.1 Advantages

It is a hands-free usage software and is highly efficient. Moreover, it allows to do multi- tasking and increases productivity. It has become a part of life style as we use it quite often to set up alarms, reminders, replying text, calling people by voice command and many more. For entertainment purpose like voice searching songs, albums, podcasts, movies and news is being used right now. Making of routine becomes easier by this. As we all know the fastest way to interact or share information is voice interaction so it is creating new opportunities for voice assistance. Several apps and platforms are taking benefits of voice assistance to give more interactive experience to customers. The use of voice assistance is done in every field now and government are also using this in their apps. Voice interaction was used in Aarogya Setu app by Indian Government during covid period to guide the public about the protocol. Education field is also using this for better understanding of students. This also helps in noble job of teaching and helping disabled people. Robots are one of the best examples for future reference of voice assistance.

3.2 Disadvantages

[26]A complete version of smart appliance is quite expensive which reduces its affordability. Basically, all these smart voice assistances generally require a good internet for the whole time which increases the other expenses. It makes people to lost concentration on the task which they are performing right now by major notifications. It has some security concerns too like any person can use voice assistance to gather information regarding the device owner. [27]This can read out the important details like messages, calendar marked dates and mails. It is also being a matter of fact by researchers that the device will work on the inaudible ultrasonic voice which can create a threat for device information. It is making people lazy too.

Privacy concern is one of the biggest drawbacks of voice assistant like by default your device is listening to your voice and talks which disrespect people's privacy. It is being observed by the data's that whatever product name your say during interaction with others the phone gets the all data and show you the advertisement related to your interest. This is a threat for the security of data of people. This creates a loop for cybercrimes too.

4. Opinion on Voice Assistance

So, Voice assistance is a new growing technology which is creating a huge impact in our day-to-day life. From waking up from alarms till setting up the reminders it is being a part of life style. But still its usability for full fledge work is quite expensive which is needed to solved. Moreover, its work for education is still on a very initial stage and is trying to help students to get better experience. For disabled people it is creating and impact as they can get idea just by speaking. The privacy concern should be solved as soon as possible. As we know everything has its own pros and cons just, we human beings are smarter to understand things and use this in beneficial way for growth of our society.

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CHAPTER – 41

VOICE ASSISTANTS – CONNECTING VOICE TO TECHNOLOGY

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Introduction

What is Voice Assistants ?

[1]The Voice Assistant is a software on digital devices which is used by people by giving voice commands. By listening to the voice commands given by the user they provide necessary results to the user. [2]Voice assistants are also known as the subset of Virtual Assistants. Voice Assistants work on three process first hearing of the user speech, second artificial intelligence which is used to understand human language also known as NLP (Natural Language Processing), third voice assistants give results to the user using speech synthesis. [3]Voice assistants are also called as bot which give us results for what we ask in audible format and hold conversations with the user. When we give command to the Voice Assistants it takes input as data and then it sends data to the database where it find the best results for the input and then it replies to us the best answer and it increases it productivity day by day as it get more command more it tries to become better.

History of Voice Assistants

[4]The history of Voice Assistants is centuries ago, before Thomas Adison patent the light bulb he built phonograph in 1877 which was used for recording as well as playing the sound. Then in Alexander Graham Bell made an upgrade edition of phonograph and named it as Graphophone. In 1952 the Bell Laboratories built a digit recognition device and named it Audrey who could understand digits between 0-9 but it didn't create a mass appeal for this device because of its cost and accuracy. [5]In 1962 IBM introduced Shoebox which could understand digits between 0-9 and some control words such as plus, minus, total etc. and calculate the simple problems. In 1971 US Defense Advanced Research Projects Agency (DARPA) funded a speech understanding project which introduced Harpy which was provided with 1011 words

program in it. In 1986 IBM formed an upgrade version of Shoebox which has 20,000 words program in it. Then in 1990s Dragon's Naturally Speaking software for released foe consumer which could understand human voice. Then in 21st century the AI industry boomed and then Apple launched Apple Siri, Google launched Google Assistance and Amazon launched Alexa and Echo and these companies have the highest number of users now because they have the mass appeal in the sector of Voice Assistants.

[5]IBM Shoebox

Types of Voice Assistant

[2]The Voice Assistants can be divided into three types of categories as General Purpose Voice Assistants, In-App Voice Assistants, Owned Voice Assistants. The General Purpose Voice Assistants which are used in day to day life and are pre installed in your devices such as Siri, Google Assistant, Samsung Bixby etc. The In-App Voice Assistants is that some company's has started giving voice assistants as service of mode of communication, companies which provide these services are Domino's, SpiceJet, Jio, Flipkart etc . It involves providing the customer services through Voice Assistants for 24/7 which helps the customer for his/her doubt. The Owned Voice Assistants are the companies which provide the service of voice assistants to other companies such as Erica provide to Bank of America and Capital One has provide to Flipkart and Eno.

Popular Voice Assistant

[6]There are Voice Assistants present in the market but only few have generated the mass appeal among the people such as Alexa by

Amazon, Google Assistant by Google, Siri by Apple and Cortana by Microsoft. [7]The Apple Siri and Google Assistant both enjoys a market share of 36% where Amazon Alexa has 25% of the market share, Microsoft Cortana has 19% of market share and rest by the other players in the industry. The main reason behind huge market share of Google Assistants and Apple Siri is as they come pre installed in your devices such as mobile, laptop etc. [8]Their is different qualities of different Voice Assistants as Amazon Siri is best for the compatibility of the devices, Google Assistant is best at giving responses to the user questions and Apple Siri has a huge popularity among the people. Many Voice Assistants are also their which provides services to the apps or websites are also very popular.

Application of Voice Assistants

Voice Assistant at Home

[9]The application of voice assistants in home can be in many ways such by setting alarms, playing music. It helps to manage our time and saves our time and by setting reminders it also help to recall our work. It is also used by kids for their entertainment by playing songs, playing games and also provides a learning for kids as the voice assistants are programmed with multiple languages kids and elders both could learn new languages. Kids can play riddles with the Voice Assistants by help children to broaden up their mind . By just saying give me the news, weather report for today it could update with it. It also provides direction when you are driving and you don't know the routes it helps you with it. You can also find you lost devices which were connected to the voice assistants by just saying find my phone. [10]The most of the market of voice assistants used at home is mostly owned by Amazon Alexa and Google Home as they can turn off-on lights on just giving the command to the smart speakers. By just connecting all the smart devices with Voice Assistants we can operate all of them by just giving command, by connecting smart door locks we can lock door through voice commands.

Voice Assistant for Business

[11]The application of Voice Assistants for business is done in many ways as person who is working but at the same time he need guidelines or instruction the Voice Assistants can help in doing that. It saves our

time and helps us to complete our work. By just connecting printers to the device and giving voice command to print the paper it will save our time as a person going to the printer and then getting it printed and then again coming at his desk. By just giving the command for scheduling a meet with the employees it could schedule a meet. It helps to improve your business productivity. [12]By getting notified about the work when you are not at the workplace as you are driving or on a leave as what has been sent through the emails. [13]By just ging command to schedule my appointment on this date it could assign your appointment in the calendar. It can also read your emails when you are doing some other work but want to know what is in the mail. By collaborating with the makers of Voice Assistants with the company you can advice them to make Voice Assistants devices according to your need. The Voice Assistants market is growing day by day as it includes more user to it more devices would be needed with provide employment to the youth and it will make into more market. If you collaborate with a where there is a language difference the use of Voice Assistants is very helpful in it as it can provide you with the results within seconds of time. By using Voice Assistants as the customer service will help customer as well as the company as it will be accessible by customer 24/7 and company as it will save their money as they need to hire people for customer support.

Voice Assistant for Education

[14]The Voice assistants is bringing many benefits to the students as well as teachers as during reading the teacher is not able to make eye contact with students the connection is not stronger but now because of Voice Assistants the teacher can have eye contact and can easily connect with the students. It also helps to the teacher as it can store data in it as it could store task submitted by students, attendance of class etc. The Voice Assistants can narrate stories and also ask quizzes and question to the students. [15]The teacher can customize a test or quiz according to his/her choice as it might me a time based or not. The Voice Assistants provide a fun and easy way to learn for the children and it can also called as a personal assistant to a teacher. Many online education platforms has already taken the service of Voice Assistants in their app or website.

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Pros and Cons of Virtual Assistants

Advantages

[16]For the persons who can not read or type and for those people who doesn't know a language the Voice Assistants can be very helpful by just commanding with your voice it provide you with the results with high speed and accuracy. As typing is also a very time consuming process to do whereas give command to Voice Assistants is easy than typing and helpful for many people who are not good at typing. As on calling customer can only be provided in a certain time but by using the Voice Assistants their can be use of them 24/7 which helps the customer to solve query. It cut off the language barrier as by using it you can translate to any language within seconds and easily get your outcome. [17]It provide you the result with effortlessly as you just need to speak for what you want rather than typing as it would be time consuming. It is also very easy for small children to perform it as it only require speaking. It is a process where you do not have to use your hands and eyes. [18]As in a brand if the usage of Voice Assistants increase it will provide your brand with more connecting to the costumers. The usage of Voice Assistants can be personalize according to the user and many have already started doing it. The popularity of Voice Assistants is increasing day by day as many are using this application in their day to day uses.

Disadvantages

[19]The cost of Voice Assistants is very high and not everyone could afford it and use for their purpose. Security is a major issue in Voice Assistants as the voice command given by the user to the Voice Assistant is stored in cloud and the cloud is not hacker proof and one can hack it and used in wrong means. The sound command given by the user to the Voice Assistants is not always responded correctly sometime user has to repeat the command which also becomes sometime time consuming. [20]There is no virtual or face to face interaction which makes it boring for the user. As there is no meaningful connection between the user and the Voice Assistant. For your devices to work on the command of Voice Assistant your device also needed a certain model and if you do not have those device with the specific model then you need to spend more money on the devices and it would cost more and cannot be affordable to everyone.

Opinion on Voice Assistant

My opinion on Voice Assistant is very excellent as it has bring a leading tech revolution in the Artificial Intelligence Industry it help to us to do many work at same time and saves our time. We could get updated with the world by just giving voice command to the Voice Assistants "Please tell me today's news" and it will produce the required result. From older generation to the newest generation it is very easy and comfortable to use the Voice Assistants by just giving voice commands. For the people who does not know how to read and type in the electronic devices it's the best device for them to connect with the technology. By connecting Voice Assistants to the other devices with your home appliances and by just giving command you can use your home appliances such as turning off-on lights and it will make your home smart home. But there is also need to price down the devices as it can't be affordable by everyone to use it and get benefits from it. There are leading brands in Voice Assistants such as Amazon, Google, Microsoft and Samsung which provides us Alexa by Amazon, Google Assistant by Google, Cortana by Microsoft and Bixby by Samsung. The Voice Assistants can very useful at many workplaces such as school, offices etc. they could manage the mails of the workplace and give notification to the employees by the head by just giving the command to notify employees. Voice Assistant is also been used at customer service by many companies as it is available in less amount and also provide services 24/7 but on the other view many people has lost job because of this so their kind be a mixed opinions on this issue.

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CHAPTER – 42

VOICE ASSISTANTS – KEY TO ADVANCED TECHNOLOGY

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1. Introduction

1.1 What is a Voice Assistant?

[1] Having an assistant while you are working helps us to accomplish the job quite easily as compared to when you do it alone. A Voice assistant is a virtual assistant that we can always have access to, and it helps us to accomplish daily tasks. It accepts voice command as input and performs the action which is the output. [2] Voice assistant is mostly built into operating systems in mobile phones, it provides a user interface that allows hands-free operation of a device. [3] Voice assistants are the next step in Artificial Intelligence (AI). In Artificial Intelligence there are a vast number of domains and Speech Recognition is prominently used in Voice Assistants. Once the speech is recognized, the Machine learning domain plays the role of manipulating the data in a certain way that the Machine understands what we want. So based on research voice assistants are a form of Artificial Intelligence that understands the output of your speech in your day-to-day language and learns about your interests and provides you better results every time you use them. Speech Processing and Natural Language Processing (NPL) are used by companies to create a program in such a way that the devices which have Voice Assistants installed in them respond to the user via verbal language.

[4] Voice assistant.

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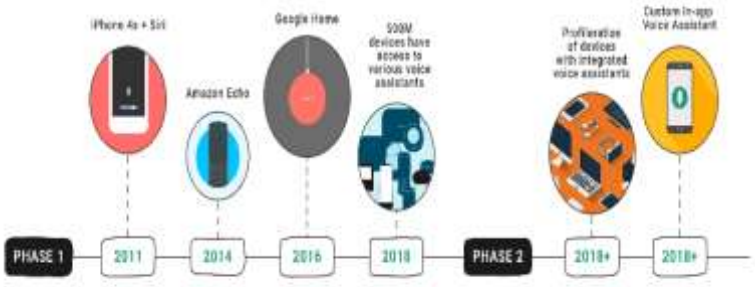
1.2 History of Voice Assistant

[5] According to history the first voice assistant for hand-free dialing or Audrey was built in 1952, but it had its drawbacks in aspects of its size and capacity. Later in 1962, at Seattle World's Fair, an IBM engineer introduced a Shoebox which is a calculator which can be activated with our voice. It could identify 10 digits and control words like plus, minus, etc. It accepted commands through a microphone. After many attempts and many modifications in 2010, Watson competed with the best champions at a famous Television quiz and defeated them with total points. It gave the world an open door to the very first question answering system and 2 months later Apple launched Siri which could be controlled by our voice. [6] Google assistant however was introduced in the beginning as an extra part on Google's Allo chat app, it was designed in a way to pop up during chats or whenever it is useful or when it is called by its command. Around 2017 they introduced a feature by which Google Assistant can be activated by the long press of the home screen on Android mobiles. [7] Cortana is a voice assistant which was introduced by Microsoft in 2014 in the US for Windows Phone 8.1. Later developed into a powerful voice assistant, its power varies by the device it is installed on. [8] Amazon introduced Alexa as their voice assistant which helps users in their shopping and other basic stuff. The makers restricted Alexa to merely a shopping assistant in the beginning but nowadays it is undergoing improvements to be a lot more than a shopping assistant



[9] **History of Voice assistant.**

1.3 Types of Voice Assistant

[10] There are many types of Voice assistants over time, Rule-based voice assistants which will follow a specific algorithm once it is set by the user. It is based on automating whatever flow the user sets. AI assistants are the ones that are very highly popular these days, AI-based voice assistants are focused on learning the user's behavior and likewise improve its results and working. There is another type of Voice assistant called Grouping voice assistants, they are a mixture of 2 voice assistants or even more and each assistant performs its specific task, and it is assigned to work on its field of expertise for example one of them can be used to check weather reports and normal day to day basis and the other can be used as a shopping assistant. This type of voice assistant is not into that use yet and is still in trials. [11] VUI (Voice User Interface) voice assistants are one of the most advanced voices assistant models we have in our day-to-day life currently. VUI plays a crucial part in helping us with our work. It has two key steps, it needs to train the user in the voice commands he can use, and it needs to interact with the user very well and maintain a good rapport with the user with day-to-day language.

1.4. Popular Voice Assistants

[12] Popular Voice assistants include The Google Assistant from The Google, Siri from Apple (iOS), Alexa from Amazon, Cortana from Microsoft, and Bixby from Samsung are the most popular voice assistants used quite across the world. They are designed in diverse ways and have different uses and functionalities.

[13] Popular Voice assistants

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2. Application for Voice Assistant

[14] Voice assistants can have a lot of applications and these applications are based on the voice assistant you use. Voice assistant technology is a very vast field, and its applications improve day by day. For example, from just being a shopping assistant in the beginning Alexa now has reached the level of VUI (Voice User Interface). Even Google Assistant at the beginning of its evolution was just a pop-up in a chatting app. Companies have applied artificial intelligence and machine learning to these voice assistants due to which they have the scope to develop always. They can turn on lights, order food and book tickets for you, etc.

[15] Applications for Voice assistants

2.1 Voice Assistant at Home

[16] There are certain voice assistants built exactly for home and domestic purposes like the VUI (Voice user interface) modeled Alexa which is hand-free, eye-contact free must be connected, and can be used while doing any work by calling out the commands. Many voice assistants designed for the home have a remarkably high power of performing tasks such as turning on smart devices and operating CCTV (Closed-circuit Television) cameras. [17] Similarly a voice assistant model for home introduced by Google is used for creating a shopping list, it can control smart devices including TV, and speakers, and it can be used to plan your day. We are given an option to create shortcut commands and use them to get things done easily. It can make calls, give information about news, facts, calculations, meanings, etc.

2.2 Voice Assistant for Business

[18] Voice assistants at the business place increase productivity to exceedingly elevated levels. They can be used for communication; they can be used to set reminders which play a key role in Task tracking and time management. Voice assistants have analytical skills at a high rate they can be used to analyze. They can assist with sales and executing work. Play a key role in HR (Human Resource) and IT support since AI gets better day by day voice assistants to play a very key role on the work front.

2.3 Voice Assistant for Education

[19] Voice assistant helps to interact with technology which unlocks learning at a very deep level. Students can use the voice assistant to track the events, and deadlines on their calendar. They can get study references and study-related resources just by using voice commands. Students can get appointments with either lecturers in school or coaching centers without opening devices. On the other hand, teachers can use voice assistants and can quickly gather resources. It is extremely useful to check the statistics and analyze data**.**

3. Pros and Cons of virtual assistant

3.1 Advantages

[20] Advantages of being familiar with the usage of Voice assistants is that the efforts we put in to use phone get reduced, it is extremely helpful for people who have problems such as eye strain or if wearing glasses, voice assistant helps because its eyes-free and hands-free user interface. It has a comparatively faster response than what you want. Also, it is easy for children to use. [21] Surveys revealed that voice assistants help in self-talk and that many users talk to voice assistants about their thoughts and get things sorted. It also has the advantage of reaching multiple users at a time.

3.2 Disadvantages

[21] Most of the issues with voice assistants include data is not that secure fear of losing data is a very prominent, the disconnected interaction when we do not have a proper network mostly the voice assistants do not run. Also, if your voice assistant can control your appliances then there is the chance there of a technical issue and due to this it is going to cause a huge issue.

4. Opinion on Voice Assistant

Voice assistants are the future of technology, soon they will have many more changes made and become much more advanced. Voice assistants make our job easier by giving us data and material without us using a particular device in our hand. It helps differently abled people to use technology very easily. They have evolved a lot in the past few years from just controlling our mobile phones limitedly, now voice assistants have grown to a level where they can control our home appliances. But also, to have home appliances connected to voice assistants we need the appliances to be smart devices because unless they are smart devices, and they do not have IoT (Internet of things) applied to them it is difficult to get the connection to voice assistants. Also, they have a threat of easily losing our data because they do not have high security, they can be very vulnerable to getting hacked. Also, when we install voice assistants in our homes, there might be a high chance of technical glitches and issues related to it. So, I feel voice assistants will gain over their disadvantages with time and get better because they are a part of AI (Artificial Intelligence) they get better every day.

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CHAPTER – 43

VOICE ASSISTANTS – FRIEND IN FUTURE

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1. Introduction

1.1 What is Voice Assistant?

[1]New type of product which are marketed by amazon, apple, and google that is based on natural language speech recognition which allows the user to search using voice command and voice synthesis to retrieve the information. The voice assistant is also known as an intelligent personal assistant.[2] The Technologies like Siri, Alexa, Google Assistant, and Cortana are designed to perform many similar tasks. It doesn't require a network connection to work.[3] It is a complete software-based one and it integrates most devices and some of them are specially designed for single device applications. Simply it is the digital assistant which uses voice recognition, voice synthesis, and language processing algorithms to relevant information or performs a specific task requested by the user by listening to the specific voice command. The voice assistant relieves information to the intent spoken by the user by listening to specific keywords. It filters the ambient noise.

1.2 History of Voice Assistant

[4] Voice assistants have a long history that goes back over 100 years, which could seem surprising as apps like Siri have only been released within the past ten years. This toy was very simple, wherein a toy would stay inside a dog house until the user exclaimed its name, "Rex" at which point it might stick out of the house. This was all done by an electromagnet tuned to the frequency just like the vowel found within the word Rex, and predated modern computers by over 20 years. the automated Digit Recognizer wasn't any low simple device however, its casing stood six feet tall just to deal with all the materials required to acknowledge ten numbers! IBM began its long history of voice assistants in 1962 at the World's Fair in Seattle when IBM Shoebox was announced. This device was ready to recognize digits 0-9 and 6 simple commands like, "plus, minus" therefore the device may well be used as an easy calculator.

Its name noted its size, just like the typical shoebox, and contained a microphone connected to 3 audio filters to match the electrical frequencies of what was being said and matched it with already assigned values for every digit. Darpa then funded five years of speech recognition R&D in 1971, referred to as the Speech Understanding Research (SUR) Program. one in every of the largest innovations to return out of this was Carnegie Mellon's Harpy, which was capable of understanding over 1,000 words. The next decade led to amazing progress and research within the speech recognition field, leading most voice recognition devices from understanding some hundred words to understanding thousands, and slowly making their way into consumers' homes. This was the primary consumer-oriented speech recognition program designed for home PCs. The user could dictate to the pc one word at a time, pausing in between each word awaiting the pc to process before they might pass on. Seven years later, Dragon NaturallySpeaking was released and it brought more natural conversation, able to understand continuous speech at a maximum of 100 words per minute, and a far lower cost tag of $695. In 1994, Simon by IBM was the primary smart voice assistant. Simon was a PDA, and, the primary smartphone in history, considering it predates HTC's Droid by practically 25 years!

1.3 Types of Voice Assistant

[5] Many conversational assistants today combine both a task-oriented and knowledge-oriented workflow to hold out almost any task that a user can throw at them. A task-oriented workflow might include filling out a form, while a knowledge-oriented workflow includes answering what the capital of a state can be or specifying the technical specifications of a product. A task-oriented approach is using goals to tasks to attain what the user needs. This approach often integrates itself with other apps to assist complete tasks. as an example, if we were to ask a voice assistant to line an alarm for 3 PM, it'd understand this to be a task request and communicate along with our default Clock application to open and set an alarm for 3 PM. it might then communicate with the app to work out if anything was necessary, like a reputation for the alarm, then it might communicate this need back to us. This approach doesn't require an intensive online database, because it is especially using the knowledge and already existing skills of other installed applications. A knowledge-

oriented approach is the use of analytical data to assist users with their tasks. This approach focuses on using online databases and already recorded knowledge to assist complete tasks. An example of this approach is anytime a user asks for an online search, it'll use the net databases available to return relevant results and recommend the very best search result. If someone is searching up a trivia question, this can use a knowledge-oriented approach because it is trying to find data rather than working with other apps to finish tasks

1.4. Popular Voice Assistants

[6] Siri is the preferred voice assistant today. In All Apple devices, Siri become a quick integral part of the Apple ecosystem, and applications together to use in tandem with each other. Alexa is made by Amazon in 2014, Alexa has been named thanks to its similarity to the Library of Alexandria. Enterprise in Star Trek. Alexa was released alongside The Amazon Echo, a sensible speaker intended for consumers to dive into the planet of home automation, uses the Alexa platform to permit users to interact with the Amazon ecosystem and permit a plethora of smart devices to be connected. Google Assistant is Originally unveiled in 2016, Google Assistant was the spiritual successor of Google Now, with the most improvement being the addition of two-way conversations. Where Google now would return answers within the sort of an exploration results page on Google, Google Assistant gives answers within the type of natural sentences and returns recommendations within the sort of Feature cards. Cortana is beginning in 2009, Cortana by Microsoft has had one of the longest visions of giving people access to voice assistants in their daily lives. Microsoft began shipping Cortana with all Windows 10 and Xbox devices, resulting in a large increase in the amount of registered Cortana users. In 2018 it had been reported that Cortana had over 800 million users. In 2017 Alan started to require voice assistants to the subsequent level, by enabling voice AI for all applications. Using domain-specific language models and contextual understanding, Alan is targeted at creating a brand-new generation of Enterprise Voice AI applications. By using the Alan Platform, developers are ready to lead of voice and build an efficient workflow that most closely fits their users with the assistance of vocal commands. Tasks Third-party developers are flocking to one or two well-known platforms. so as of their popularity with developers: Amazon Alexa Google Assistant Apple Siri Microsoft Cortana Samsung Bixby. the simplest voice assistant Amazon

2. Application of Voice Assistant.

2.1 Voice Assistant at Home

[7] Amazon Alexa boasts the best compatibility with other smart home devices of all the voice assistants we compared. Most voice assistants work with popular smart home picks just like the Philips Hue lights and therefore the Ring doorbell camera. Granted, Google Assistant is catching up, but Alexa still leads the pack when it involves the number of options we have got for automating our home -- a crucial feature if we would like to buy third-party devices as we build our smart home." Voice assistant technology continues to be within the early stages and requires a learning curve." Alexa is employed for simple shopping. Most voice assistants will facilitate our complete general tasks, but Alexa's connection to Amazon offers the foremost seamless shopping experience. we'll have an Amazon Prime membership to buy, but the service makes it easy to put, cancel, and track orders. we'll be able to even ask Alexa if Amazon is offering any exclusive deals.

2.2 Voice Assistant for Business

[8] Embeddable Voice Assistant Technology for Chatbots Text-based chatbots became very commonplace, especially in retail, eCommerce, and banking applications. And since improving customer experience is the top priority, many businesses want to feature voice recognition capabilities in their existing applications. Embeddable Voice Assistant may be a technology developed by Master of Code that permits existing mobile apps to speak with Microsoft Azure Bot via Direct Line (or the other bot framework). This brings voice assistant capabilities to existing apps at a fraction of the value of developing a voice assistant from the bottom up. Consumer Products and Retail A recent report on voice and text-based assistants found that customers of the retail industry demonstrated a 15 percent higher future preference for voice assistant technology to speak assistance. There are some reasons behind this shift, one of the foremost prominent reasons being that several web shoppers need a more efficient alternative to browsing dozens of product pages in modern eCommerce stores. Voice assistants effortlessly direct them to the relevant products through one voice command. Voice Payments The finance industry has been using voice-enabled devices to save lots of time and enhance customer service, which is essential in developing business in this industry. The communication isn't one-way either. The voice assistant can even notify the customer about recent promotions/offers and analyze their usage patterns to make a customized experience.

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2.3 Voice Assistant for Education

[9]A virtual assistant could be a self-employed independent contractor who provides administrative or technical services to a client while working remotely, outside the client's place of business. They typically assist with tasks that take up considerable time for their clients, like scheduling meetings and appointments. Virtual assistants usually work from home but have access to the digital resources necessary to try to do their job. as an example, they will be ready to enter data into a client's database and add appointments to their digital calendars. Most clients opt to hire virtual assistants with a minimum of a baccalaureate, preferably in communications, commerce, or business administration. However, counting on the kind of labor, some employees might prefer higher-level education or training.

3. Pros and Cons of virtual assistant

3.1 Advantages

[10] We'll Save Tons of Time. With the help of a virtual assistant, we'll be able to free up some of our precious time. In business, time is money. Train our virtual assistants and show them all of the ins and outs of our business. Once we've developed a relationship and we feel confident that they know the ropes, we're able to focus our attention on other things like growing and operating our business. Virtual Assistance Saves Money Since the term virtual assistant means they'll be helping us remotely, we're able to save a lot of money on overhead costs. Most virtual assistants work from their own homes, which means we won't need to pay for additional office space, morning coffee, or office supplies for that matter. And, since most are considered contract workers, we probably won't have to pay for other costly extras like benefits either. Productivity Will Increase Some of the duties of virtual assistants include things like managing our email and keeping up with spreadsheets. Daily tasks like data entry, answering phone calls, communicating with vendors, clients, and payroll translates into better productivity for us. Once we hire a trusted VA, we can enjoy the extra ability to focus on growth. Freeing up time means we'll also free up our resources, and that's a great thing for everybody. A good virtual assistant should also be able to point out areas where we can be more productive and save time that we might not be aware of.

3.2 Disadvantages

[11] We Need to Hustle to seek out Clients. the toughest part of starting a business is finding the first paying customers. this is often true

for working as a virtual assistant, similar to many other jobs. As beginner virtual assistants, we'll work effortlessly to seek out those first clients, especially if we don't have most custom testimonials and a longtime portfolio. Unfortunately, the necessity for that hustle never really goes away, even after we've established ourselves as a professional. we'll still reach out and pitch to prospective clients. After all, if we don't work, we don't make money. This isn't to mention it's impossible – every virtual assistant should start somewhere, and even the foremost successful VAs have to work to seek out clients. Still, the constant chase for work is exhausting, and it's something to stay in mind as we think about this job. functioning from Home Comes with plenty of Distractions engaging from the house is a dream come true for lots of individuals, but others find it extremely difficult. If we're hoping to try and do this job so we'll be home along with our kids during the day, that's great! I highly recommend this mutually of the simplest jobs for moms. Still – functioning from home with children isn't easy. we'll constantly feel a pull on it slow and a spotlight as we struggle to balance work with childcare duties. It can also be extremely difficult to figure out after we know our favorite Netflix show is simply a click away. Or were relief wants to require us out for lunch. It's especially hard to figure out from home once we have friends and family nearby who don't understand what it's we are doing. [15]If we've always been available for park play dates during the center of the day, they probably won't understand why all of a sudden, we have got to figure during these hours. Finding the motivation to resist these distractions and focus entirely on work after we have the prospect isn't always easy, but it's vitally important for fulfillment.

4. Opinion on Voice Assistant

Alexa is best for device compatibility. The Pros are Intelligent Smart, home support, and straightforward shopping. The Cons are Inaccurate answers and no mobile experience. Google Assistant is best at responding. The Pros are Accuracy, Expanding the range of capabilities, and Google compatibility, The Cons are Second-best in device compatibility. Apple Siri is the hottest mobile voice assistant. The Pros are Apple integration, HomeKit compatibility, and Language support. The Cons are Limited voice applications, Limited device control. Thus, Voice assistants can change the world in the future.

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CHAPTER – 44

VOICE ASSISTANTS – HUMANIZING TECHNOLOGY

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Introduction

1.1 What is Voice Assistant?

[1] In the most basic form a Voice Assistant is an application created with the help of various algorithms written in a particular programming language in simple words it takes voice as an input command by the user to perform certain task or provide relevant information as directed.

[2] These are completely based on software today we can see many of these kinds in the market as a single device or these can also be found as an inbuilt feature in our TV, mobile phones, tablets and also in Bluetooth devices. Some of these are designed to perform any specific task while some of them are there to help in every aspect.

1.2 History of Voice Assistant

[3] Voice assistant have a history of almost a century. The first voice recognising product that come into existence was "Radio Rex" in 1922, it was a toy in which a dog stays inside a house until someone exclaimed term Rex, it was done by tuning the frequencies.

In 1952 a device Audrey is introduced by Bell Labs which is used to recognize ten numbers. In the long history of Voice assistant in 1962 IBM also contributed by announcing "IBM Shoebox" which is capable of recognizing digits from 0-9 and do simple commands like plus, minus and four others.

[4] After few years of IBM Shoebox in 1971 biggest innovation in this field of that time come into existence that is "Carnegie Mellon's Harpy" under speech understanding research (SUR) program by Darpa. This device was able to understand around 1000 words. The next decade was the turning point in the history of voice assistants as many advanced devices were introduced in the market for general purpose at a very cheap cost like in 1997 Dragon Naturally speaking was released which was capable of understanding continuous conversation almost 100 words per minute.

https://doi.org/10.26524/royal.110

Later in 2008 when android come in existence google started introducing voice search for all the android mobiles and eventually growth of this industry started at a very high pace.

1.3 Types of Voice Assistant

[5] There are basically three major types of VA's available in the market which are as follows:

- **General purpose voice assistants:**

The most popular example of this type of assistants is Google assistant, Siri, Alexa and many more. All of these VA's help you to do some simple tasks like setting alarm, opening apps, making calls, scheduling events and many more.

The API's of these VA's are nowadays available in smartphones, speaker, Bluetooth devices, watches.

- **In app voice assistants:**

By seeing the future and demand of VA's many brands started introducing VA's in their apps and websites to ease or enhance the user experience. Some example of brands that are using it are YouTube, Amazon, Gaana, JioMart etc.

- **Stand-alone voice assistants:**

These type of VA's are a type of communication channels they are self-sufficient these are build for some limited work and for specific domain.

Some example of such type are "Suki" and "Niki.ai". Suki is a VA in an app built for doctors.

1.4. Popular Voice Assistants

[6] Nowadays there are many VA's that we come across in our daily life some of those are-

- **Siri:**

It is an intelligent assistant which allow you to open apps, play music, browse internet all done by speech, it was first released in 2011 for iOS 5.

- **Google Now:**

This was launched in 2012 by Google for all the android mobiles, features are somewhat advanced like scheduling meetings, searching shops near our location.

- **Cortana:**

This VA was developed by Microsoft and was released by windows 8.1 was released that is in 2014. Cortana has a feature to tell jokes with good sense of humour.

- **Alexa:**

It was developed by Amazon which can do a lot of things when like playing music, streaming podcast, giving weather information and it can also order things from Amazon itself. It is also used to control other smart devices like smart bulb, fan etc.

2. Application of Voice Assistant

2.1 Voice Assistant at Home

[8] Voice assistant has many uses in our home it can simplify our lives by performing task on behalf of ourself by just a voice command. It can control smart devices of our home including LED bulbs and fans when connected to it and operate them on command. VA can manage the security of our homes like locking smart door locks, managing CCTV cameras.

We can also call a friend using VA get news, weather conditions, control our smart TV. And the best thing is technology is evolving day by day so we can observe various new features in VA which will ease our lives even more.

2.2 Voice Assistant for Business

[9] VA's have a wide range of use cases in business place. VA's are being used for the purpose of of automation in business, it helps to increase productivity, it somehow decreases the work stress of employee by doing simple tasks like cold emailing at one go.

[10] VA's can be used for the purpose of conversation which will improve productivity and according to a report by Capgeminin Research Institute that the ability of VA's to interact with people is continuously increasing. Around 74% of the consumers use VA's while purchasing goods or interaction with the business in some other way, and according to that report many of them are completely satisfied with introduction of this type of technology in the businesses. Customers are preferring VA's over real customer care people and they are using chat bots to get there problem resolved. VA's will more useful for business as the chatbots are optimizing.

There are various ways we can use VA's in our business and some of these are-Use VA's as a secretary, use it as a customer service provider, search voice related content that customer want, can be used for the purpose of security etc.

2.3 Voice Assistant for Education

[11] Voice Assistant are not only used to automate things they can also be used to modernize the interaction between the teacher and student and to convert classrooms into smart classes. VA's can be used to store date of all the students at one go like their assigments, attendance and this almost reduces the problem of human errors and biasness. Paper work will be reduced and data can be accessed real-time.

[12] By using this technology student will get immediate answers of there questions, learning speed will be increased and there will be no scope for wrong answers, voice searching option will help to provide more accuracy and access to tons of resources present in internet without texting long paragraphs.

3. Pros and Cons of virtual assistant

3.1 Advantages

There are many advantages of Virtual Assistants about which we are still unaware, in the past few years this technology has increased drastically as we know many big names like Google's Assistant, Amazon's Alexa etc.

[13] With the help of VA's the problem of language barriers for most of us has almost eradicated as we can see Google Assistant is capable of working with 27 different languages, using this we cab talk to anyone easily without having a person for translation.

[14] VA provide hands free experience to any function of our mobile as we need only speech to activate it. People are also using VA tasks like cooking, driving, studying etc. It help us to make schools and offices smart and to ease work by automating repetitive tasks. It has also enhanced E-Commerce marketing by enabling chatbots which give 24/7 customer service support which is not possible with humans.

3.2 Disadvantages

Despite of many advantages every technology has some its disadvantages so VA's also have few and the one which has to be considered first is the lack of accuracy and misinterpretation due to speech accent sometimes this problem leads to major disturbance and wate of time so in place of a boon it becomes ban.

[15] Privacy concern is the second most important disadvantage when we are talking about virtual assistants, if someone has a VUI device then his/her data might get tracked by the manufacturer and can be misused. Many big companies are aware about this and working to resolve this problem to offer better privacy controls to consumers.

[16] Third disadvantage that I will consider is the high prices of smart home devices and everyone can not afford it. These devices are not made to run without electricity and the electricity consumed by them is also a lot so one can expect high electricity bill.

4. Opinion on Voice Assistant

I believe that technology can drastically change our living standards in positive ways until its used correctly, same is the case with Voice Assistants. It is like talking to a device and getting your work done.

There is no doubt that VA's are and will continue to be the helping hand of humans and will continuously improve their work experience.

This is the future we can expect more evolved form of VA's in coming time and will be able to have more meaningful conversation with VA's to get more accurate output. Hence, we should try to except the technology and get some positive things from them as much as possible.

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CHAPTER – 45

VOICE RECOGNITION – THE FUTURE ASSISTANCE

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1.Introduction

1.1 What is Voice Assistant?

[1]A device, app, or computer program which responds to human voice is a voice assistant. The service provides fast, reliable interaction between a device and human. It is a solution that listens to user's spoken language, analyzes the contents spoken for meaning, performs one or more actions in response and provides to the user that often includes a spoken component. These assistants can use custom keywords, custom speech, and custom voice to provide a good input. [2] These assistants with an interactive voice interface, gives users a hands-free way to interact with their electronic devices. Users can use their voice to perform everyday tasks like checking news, listening to music etc. Users can also use their voice to control cloud connected electrical appliances like lights and thermostat. A voice user interface is similar to graphical user interface. Instead of pressing buttons and selecting options we just use our voice and get the response. Often, the voice interaction is of very much short duration than graphical user interface.

1.2 History of Voice Assistant

[3] Voice assistants have been there in the world for almost more than 3 decades now, It was found even before artificial intelligence. The first voice assistant was created by IBM in the 1960s. It was embedded in a device called shoebox. This was the most primitive voice recognition technology in the history. Since then voice assistant technology began to develop rapidly from the 1970s and 1990s. in 1970 Harpy program was invented by Carnegie Mellon which was able to recognize 1000 words which was a huge improvement from the shoebox which only recognized 16 words and 12 digits. These above 2 products were just prototypes which wasn't created for sales, It was only around the 1990s the voice assistant products were actually sold to the public. And the following few years it wasn't that significant for voice assistants. Again in 2011 it started

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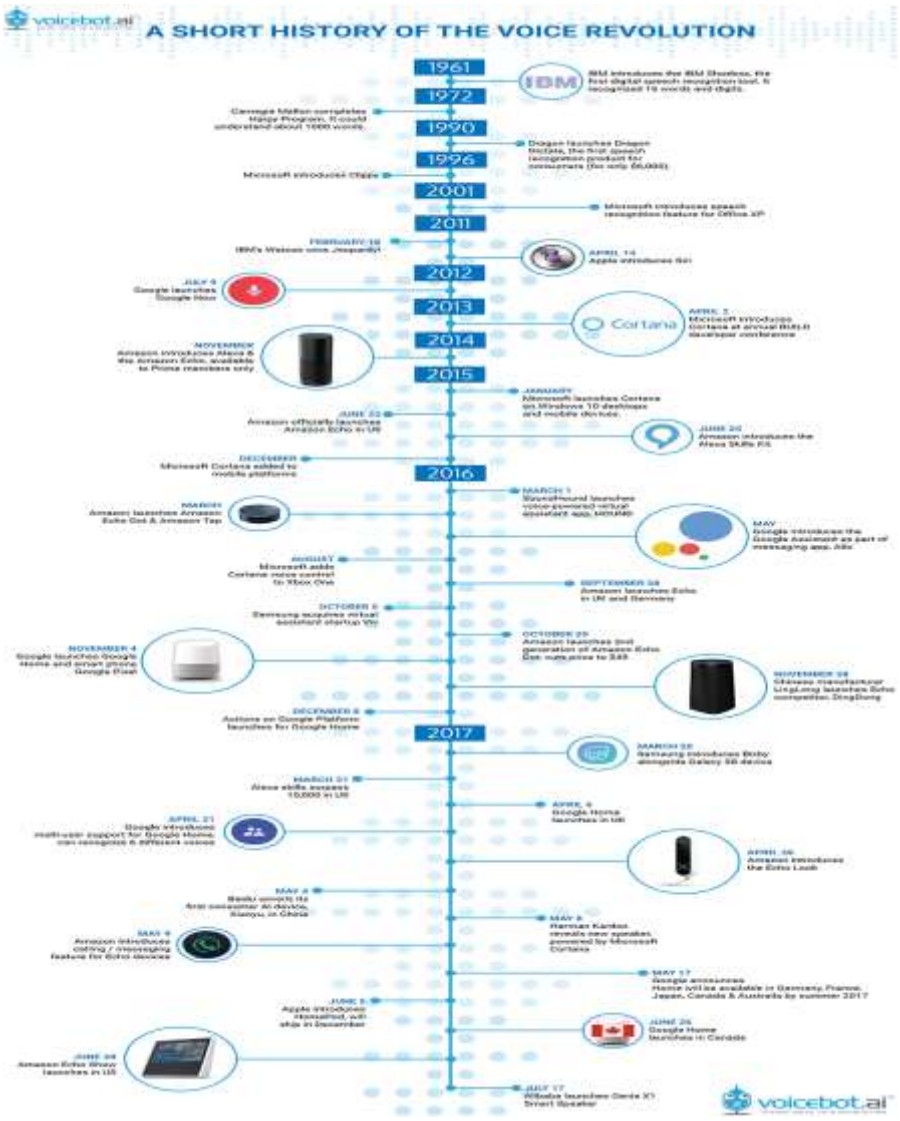
to develop. Apple for the first time introduced Siri. The virtual assistant that includes voice assistant were built-in in all their iOS and MacOS products and following them google, Alexa, Microsoft etc.



1.3 Types of Voice Assistant

[5] Most common voice assistants are Rule-based bots or Artificial Intelligence assistants. [6]According to Microsoft speech service provides multiple solutions for creating assistant interactions. For flexibility and

more adaptiveness, we can add voice in and voice out capabilities to a bot by using 'Direct line speech' channel or you can simply author a 'Custom Commands' app for simpler task-oriented conversations. If we need our assistant to answer for various questions like 'what kind of pizza can i order?' we recommend Direct Line Speech as the best option. It offers rich set of tools and aids to answer our queries. For simple task-oriented things Custom Commands is used.

If you want…	Consider using…	Examples
Open ended conversation with robust skills integration and full deployment control	Azure bot service Bot with Direct Line Speech channel	"what kind of pizza can I order?"
Voice command or simple task-oriented	Custom Commands	"Turn on the overhead light"

1.4 Popular Voice Assistants

[7] Amazon's voice activated assistant Alexa has emerged as the most used voice assistant on the market. The number of products that support Alexa has grown 200 percent in the past three quarters. There are many voice assistants today that are popular which includes Siri by Apple, Cortana by Microsoft, Google Home by Google etc. [8] Alexa is amazon's cloud-based voice service available o n more than 100 million devices from amazon and third-party manufacturers.[9] Google home has prominent features like cloud to cloud connect Local home sdk etc. [10] Siri by apple lets us stay connected without lifting a finger. It can make calls send texts set alarms, timers and reminders. we can access applications with very much easier shortcuts too.

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2.Application of Voice Assistant

2.1 Voice assistant at Home

[11] Voice assistants are a great way to interact with your house, Ask a quick question, Set a timer or control our devices. The more the assistant knows about us, the better it is able to help you. Today's Assistants big problem is that they store data in cloud, don't provide APIs to allow other companies to build products on top and are run by companies whose core business is building profiles. The assistants should be like that keeps Data local, Not in cloud.

2.2 Voice Assistant for Business

[12]As in today's world some of us maybe accustomed to be typing but still speaking is a much faster way of communicating. In business areas efficiency is always more important than anything and for us to be efficient we should use much more fast ways to do our jobs. One way is to use voice assistants to communicate. Another major benefit is its hands free which further enhances the possibility of multitasking for employees working in that company. Text messages lack tones that convey emotion whereas these voice assistants are designed with tone, volume and rate of speech to convey greater range of emotions. Voice assistants also play a role in business things like embeddable voice assistant technology for chatbots, Voice payments, improving productivity within the organization, collecting feedback, accessibility, Advertising and marketing etc.

2.3 Voice Assistant for Education

[13]In today's lives every movie we see has futuristic technology. Children today are totally dependent on smart devices for many things. A child enters a room and asks for a weather update, to turn on the tv, etc. Coaching institutions are a big part of the learning experience for the students. The idea is to make learning fun rather than a task, which can be achieved by voice assistants. Learning can be done in fun ways like game formats. Voice assistants can act as a "Quiz show host". It can be highly interactive and immersive. The voice assistants can act as a knowledge hub for students who may have questions, which may or may not relate to the subject matter. There's no denying that voice assistants and conversational AI are playing an increasingly important role in our personal lives and will soon find their way into other areas, including education.

3. Pros and Cons of Voice Assistant

3.1 Advantages

[14]Voice assistant can make calls or send texts for you. it provides proactive suggestions so that we can stay in touch with everyone. Voice assistant can help you set alarms, timers and reminders. It analyses your routine and offers you assistance to tackle the day without any worries. Voice assistant can find the song you want to hear. It can also suggest a favourite playlist based on your activities. Voice assistant has answers to most of your questions. It is as simple as asking a real person. voice assistants are optimised for each device to perform powerful task, so you get the right kind of help, anywhere you are. Shortcut apps give you a library of useful shortcuts to choose from. In addition to that we can also create our own shortcuts to streamline our tasks that we do all the time. Machine learning makes voice assistants smarter. We can have them speak one of 21 different languages.

3.2 Disadvantages

[15] While voice assistant devices help us to make time and money, but they don't always come cheap. It is important to secure our home Wi-Fi network by using strong passwords and to install software updates regularly. Voice assistants have developed over the years. However, it's still not perfect, we might find ourselves in the situation where we have to repeat our command. [16] Over the course of time voice assistants learn and adapt to our voice as we go along. If having a microphone constantly listening bothers you, it can be easily turned off for privacy. You should more concerned regarding the cyber security. Since the interactions are only voice based it can minimise some meaningful engagements that marketers can have elsewhere. Most important drawback they won't work without active internet connection.

4. Opinion on Voice Assistant

In today's world voice assistants are everywhere like in every field mankind pursue. Children, Parents, even grand parents are using the voice assistants in home to various everyday activities like hearing the news, weather, send texts and calls just by speaking. Voice assistant can help you set alarms, timers and reminders. Voice Assistants like amazon Alexa, Google's Assistant, Apple's Siri, and Microsoft's Cortana have had a great

impact on the consumer market, but many businesses immediately recognized that they had important potential applications in business as well. It analyses your routine and offers you assistance to tackle the day without any worries. In future, more the things get advanced the more accessible everything becomes. Almost every device in future will be voice enabled. Of course, there are downsides to everything, but at the last, speaking is more efficient than typing.

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CHAPTER – 46

VOICE ASSISTANTS EMPOWERING COMPUTATIONAL LINGUISTICS

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1. Introduction

1.1 What is Voice Assistant?

In broad terms, voice assistants are certain pieces of software that help living beings interact with machines. They make our lives easier by direct communication and interpretation. They usually look for a trigger words like "Siri" to activate and start listening to user to understand it, interpret it and then fetch the most suitable results to the users to make lives easier.

[1]With the growth of natural language processing and field of computational linguistics and various tools they are becoming more and more popular. The set of responses and queries are day by day making the databases more comprehensive to increase the accuracy of results.

[2]Voice assistant software is usually embedded in various smart home devices, and it uses automatic text recognition to engage in conversation with humans.

1.2 History of Voice Assistant

[3]The origins of Voice assistants predates to the 1950s when the first system was successfully developed to automatically recognise speech by Davis et al. Then in the 1960's pattern recognition systems were developed. Which were followed by various statistical methods like the neural networks and hidden Markov models. In 1990s too the development of text to speech and various semantic models to improve accuracy the voice assistants in modern world.

Later in 2005 these helped fellow researchers named Juang and Rabiner to make systems to understand more than 1000 words. Then in the subsequent years google and apple also launched their voice assistant applications.

https://doi.org/10.26524/royal.110

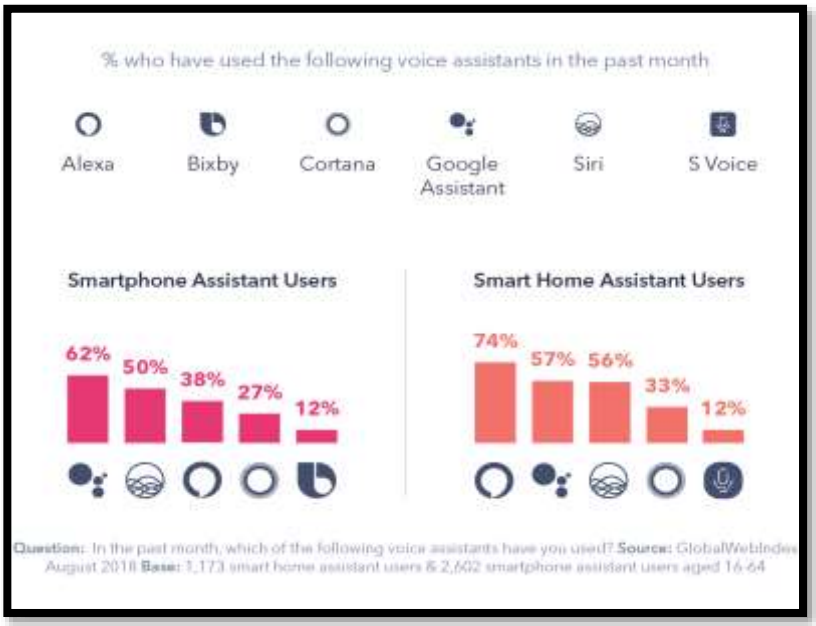
1.3 Types of Voice Assistant

Generally, voice assistants fall into three categories. [4]The first is a general-purpose voice assistant. Usually these are the ones we use on a daily basis, like setting an alarm or dialling someone or even launching an application. Second comes the in app voice assistants like the ones offered by big tech Amazon, Facebook, Bank of America they are present in app to make the user experience easier and faster along with making it accessible to the not so tech savvy.

Third these are the standalone voice assistants like the ones use by robotics companies like Boston Dynamics and Suki which help the robots to interact with humans. This kind of Voice assistant is very helpful and is set to grow exponentially.

1.4 Popular Voice Assistants

With the group of Artificial intelligence and machine learning models the voice assistants are now being able to train themselves. [5]Some of the voice assistants ahead in the race are Siri developed by Apple which at present supports over 21 languages followed by, Google assistant by Google and then there is the voice assistant used in a huge proportion in home automation which is Alexa by Amazon. Samsung has also been working on its voice assistant Bixby.



2. Application of Voice Assistants

2.1 Voice Assistant at home

Voice assistants are use in home automation. Some of the big players are Alexa in this field. [6]These voice assistants help users to control various home applications based on voice of the user and sends these to databases to find the most accurate results and send them to various IoT devices which are usually using Raspberry Pi to perform the tasks. They can be uses to set up alarm or reminders or add something to a to-do list along with controlling applications like television, lamps and many more. Voice assistants at home are of a great advantage to old age people. Mostly smart speakers at home are used to buy movie tickets or book a cab. Apart from the IoT devices the [7]Voice assistants can be of great addition to interactive home health care. Various applications like 24/7 heart rate monitor can be improves by using voice assistants.

2.2 Voice Assistant for Business

The Growth of Computational Linguistics which help in [8]development of voice assistants are very helpful in automated industrial sites and along with that in use of ML. The implementation of voice assistants can help a business widen its reach and to attract more customers. A popular company [9]Airbnb recently conducted a study. This study aimed to see how much the guests would be comfortable to adopt Alexa in their own websites. Their multiple group analysis suggests that self-efficacy on perceived functional value contrasted significantly between everyday users and occasional users.

Apart from this the hospitals also use voice assistants to deliver the patients lab reports and monitor patients. The voice and web integration helps patients to have a seamless experience. Apart from this in the healthcare ecosystem nowadays many devices like sugar monitoring devices have started releasing their own apps which have voice assistants to help users keep a track of any changes.

[10]Voice shopping is also nowadays becoming a trend. It involves placing online orders with the help of voice. The number of people purchasing though smart speakers are increasing at a rapid rate but this rate is widely dependent on the product categories. Many supermarkets are now enabling the users to buy things using smart speakers. Nowadays various hotels and restaurants have opened bookings using voice assistants like Alexa.

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2.3 Voice Assistant for Education

In the field of education voice assistants are used on a huge day to day basis. Many students use the google search engine's voice assistant to just ask the question and get answers instead of them typing it. The voice assistants along with chatbots are integrated in various education website to help the students. The voice assistants are also nowadays very helpful to learn foreign languages as it along with teaching also improves yours speaking skills.

[11]To emphasise on this recently some authors introduced a voice assistant of Yandex-Alice, in Russia as a foreign language class. They found out about the various ways in which Alice supplements the language learning model for beginners. So in this way voice assistants can be very useful for spoken language skills by improving the vocabulary along with pronunciations.

Apart from that voice assistant's ability to speak in multiple languages is a game changer for the education industry now no one is restricted by language as a single video lecture can be translated to other languages with the help of voice assistants. This would increase the quality of content delivered to students.

Many companies are working to make voice assistant based systems to help lawyers in various law schools where the voice assistant can help the lawyers to improve themselves by countering their arguments using valid arguments from the internet with the help of artificial intelligence and machine learning. This can greatly help the law schools to train the lawyers better.

3. Pros and Cons of Virtual Assistants

3.1 Advantages

Voice Assistants help make our lives easier in numerous ways. Firstly improved customer engagement with a simple command you can book a car and go to your desired location or even order foods and groceries. [12]In particular, voice assistants can help the brands serve to their consumers because it can recognizes patterns. As a result, the customer feels more appreciated and receives a more personalized touch. Furthermore, AI can take on more consumer workload, which can lead to faster identification and resolution of issues.

Secondly they help in advanced searching. Since typing is a very cumbersome task and can be over whelming sometimes. Voice assistant help us to remove this redundancy. It also allows users to do multiple tasks at the same time as the arms are freed due to the use of use.

Thirdly, it helps remove the language barrier as a voice assistant is programmed to allow users to interact in multiple languages. Voice assistants also help to make the application available to small kids who cannot type every small details. Also apart from this Voice assistants make the entire process eyes free as you can just ask the bot to perform a certain task by using its trigger word. Also use of these assistants can help reduce the response time as the response is given immediately after the question is asked.

Voice assistants are also very helpful in transportation vehicles. These voice assistants are put in the entertainment systems of various cars, trucks etc. It helps the driver to focus more on the road and not leave the steering wheel to change music or say temperature. A user can just give a voice command and according to that set the various conditions. This is very helpful to avoid accidents. Users nowadays also use this feature to receive and make calls.

[13]Apart from that even in the banking sector it is very advantageous as banking can be a circumventing task to deal with especially the ATMs. In recent years it has been observed that many ATMs have installed voice assistants in them to mainly help the elderly and the not so tech savvy.

[14]Voice assistants can help in creation of smart offices. Suppose a desk is currently not in use we can just tell a command which will turn off the lights or even the air conditioning and other electrical appliances.

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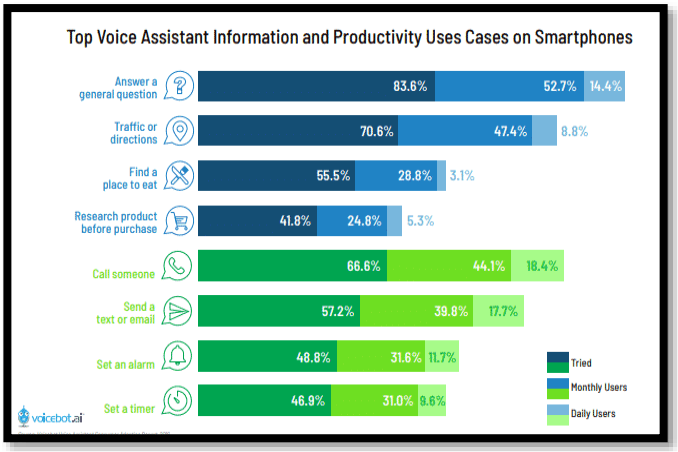

3.2 Disadvantages

Now there are many disadvantages of voice assistants too. For example we need to always ensure that there is electricity and Wi-Fi and that our Wi-Fi network is secure. In home security systems the voice assistants need to be properly secured. Also there are many privacy issues in such voice assistants like in a home automation system as the number of voice assistants increase there is mic everywhere around you and it can be hacked and use as a spying tool. This can be of grave danger. Especially in offices there are many things which ae confidential and can have disastrous effects if got public. This increases the chances of corporate sabotages.

Apart from the above problems there is another issue whenever we give voice commands the requests are sent to the servers and stored in cloud to improve the voice assistants. The voice assistant providers need to constantly ensure that these are properly encrypted and stored in secure databases. This increases the maintenance costs.

Also as discussed above the use of voice assistants in the banking systems if are vulnerable can be very dangerous. Suppose a person uses the voice assistant to withdraw money from the ATM and a hacker gets hold of the conversation he can just empty out the bank accounts.

Similar problem with voice assistants in cars too if a hacker gets hold of the system he might set the conditions in such a way that it distract the user a lot and lead to accidents. So with this malicious intent the hacker can injure the driver badly.

Voice recognition has come a long way in recent years, many companies like Apple, Google, [15]Microsoft and Facebook are working on their voice recognitions systems. But still even with this huge amount of data collected over the years users still find difficulty when communicating with the voice assistants. Users can constantly find themselves repeating the same sentence over and over as people from different regions may have different accents and the voice assistants may not be configured to understand that accent. This leads to bad results and of commands.

Apart from these all there is one more disadvantage that these are expensive voice assistant integrated speakers usually start from at least INR 5000 which might not be affordable also smart home devices consume a lot of electricity this can lead to rise in the amount of the bills.

4. Opinion on Voice Assistant

In my opinion voice assistant are very helpful and must be promoted as they can help us in various situations and make our lives a lot easier. They can help to automate a lot of stuff which helps to save time. Apart from it also makes technology more accessible to wider population. It can help us in a lot of day to day tasks be it setting up alarms or reminders, or order food or book a cab.

Nowadays we can see that the number of voice assistants are growing and more and more companies are investing their resources in the development of the natural language processing and computational linguistics to make the voice assistants more accurate and understand a wider variety of accents. This has significantly also increased the number of users heavily relying on the voice assistants.

We can find voice assistants at almost all the places be it restaurants, vehicles, railway stations, airport and even railway stations. I believe that this will help increase the voice assistants interact with in more effective ways and help in the development of voice assistants and as the voice assistants become more and more advanced it can be better integrated in the machines or robots and this can help the field of robotics to grow.

Although there are so many advantages of course there are some disadvantages too. The top one is privacy concerns. I understand most people will not prefer someone listening to them all the time or they being

surrounded by microphones. I believe strict laws and proper enforcement can help make the situation better apart from this the companies must give the amount to data they are using and storing to the users via say an application and along with that allow users to restrict the data if they don't want that to go out.

Also as the voice assistants can be hacked the companies must employ proper methods to protect their users from this. In the corporate world the voice assistant must be very secure else confidential information might get leaked out.

Although there are these advantages we need to understand that voice assistants are the future and one cannot ignore them. The voice assistant help in development of computational linguistics. As the robotics industry is set to grow more and more robots will be using voice assistant to help detect the human and understand them and hence this field is one of the most important ones.

So I believe we must balance the amount of interaction with computers with voice assistants and human interaction and not get completely devoted to interaction with machine and ignore all human connections as this might lead to isolation. An individual must understand how much and to what extent the voice assistant are helpful and not get overwhelmed by them.

So I would like to conclude by stating that yes voice assistants have disadvantages but there are many advantages too and we must find a way to incorporate them into our life as they make our lives a lot easier. Voice assistants are foundation of computational linguistics and must be studied upon and it is a field with a lot of potential in future.

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CHAPTER – 47

VOICE OF TECHNOLOGY-VOICE ASSISTANT

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1. Introduction

This short research focuses on the voice assistants, their uses in various fields and finally their advantages and disadvantages. The voice assistant is slowly becoming a part of daily life for many people due to their various uses and at the same time, they are complaints about them in our everyday life.

1.1What is Voice Assistant?

[1]Voice assistants (VA) are AI that has voice-enabled. AI or Artificial Intelligence can be described as the intelligence exhibited by the machine which allows them to mimic the behaviours of a human. AI is often compared with a human brain for cognitive functions since they both develop by gaining knowledge and experience.VA has developed a lot in recent years from being just a character in science fiction movies to a product used by consumers every day. VA is becoming an important part of consumers' common lives. VA in any form like mobile applications or smart speaker allows the user to call someone, send a text message, control smart appliances, listen to music and change/pause/play the music, order food/cab and many more uses. The consumer base has grown tremendously in the past few uses from 14-million to 53-million which accounts for 21% of Americans (according to National Public Radio and Edison Research).

[2]The result of the expansion of information technology in the way to help make life easier and more convenient is the invention of voice assistants. VA help us do many things in the shortest possible time.

1.1 History of Voice Assistants

[3]The first voice-activated consumer product was called "Radio Rex" which is a toy dog released in the year 1911 that will come out from its house when its name is called. [4]In the year 1952 an automatic digit recognition machine was presented by Bell Labs which was named

"Audrey". Later in 1961, IBM presented a voice-activated calculator "IBM Shoebox" during the 1962 Seattle World's Fair.[4] MIT professor Joseph Weizenbaum developed the first natural language processing computer program called "chatbot ELIZA" in the 1960s. Which was created "to demonstrate that communication between a man and a machine is superficial". The next milestone in virtual assistants was the development of "Harpy" which understood 1000 words. Harpy was developed at Carnegie Mellon University, Pittsburg in the 1970s with the support of the United States Department of Defense and its DARPA agency along with IBM, Stanford Research Institute and Carnegie Mellow University.

[3]In 1990s the speech recognition technology became a part of personal computers. The foundation for the present-day smart virtual assistants was also been laid by "IBM Simon" in the year 1994. The first modern smart assistant that we use was Siri which was introduced in October 2011 during the launch of the iPhone 4s. [4]Later Amazon launched Alexa with their smart speaker Echo in 2014 and in 2017 they released a service that can be used to build conversational interfaces for creating any virtual assistant.

1.2 Types of Voice Assistants:

[2]The voice assistants can be classified as different types based on the way they interact with the user and the network & technology and whether they have a physical form or just an app. On based the above factors they can be classified as:

- Intelligent Personal Assistant or IPA is used to assist the user with small tasks normally by natural language. They can be used for doing an action or searching for something online.
- Virtual Digit Assistants are the automatic programs that are used in applications or platforms to assist the user either by understanding the input from the user either in voice commands or in written form.
- Voice Assistants are virtual assistants that use voice recognition, speech synthesis and natural language processing (NLP) to understand the voice commands of the user and provide the output to the user.
- Smart Assistants are usually referring to smart devices like smart speakers. These usually have a wake-up command for example Google Home has commands like "Hey, Google" or "OK, Google" to wake

them from sleep after that user can give input or have a conversation with them. The other popular smart speakers are Apple's HomePod and Amazon's Echo.

1.3 Popular Voice Assistants

[5,6]These day every company are developing their own VA, most widely used and popular among them are:

Apple's Siri: Siri is the first modern virtual assistant and the most popular mobile voice assistant at present. Siri was launched along with the iPhone 4s which came with IOS 5 in 2011. Siri allows the user to send text messages, make schedules, music controls like play/pause/skip tracks, make calls etc. Siri is now present in many Apple products like iPads, Apple watches, HomeKit devices and HomePod (smart speaker). Siri has a user base of around 500 million people and over a billion devices featuring Siri. Has huge language support for over 20 languages.

The drawbacks of the Siri are that it is limited only to Apple users and Siri is not supported in any other operating systems (OS) other than IOS (Apple's OS for iPhone, iPads) and macOS. Siri can only control lacks versatility in many devices.

Google's Assistant: Google Assistant was launched first time in 2012.[7]The major mobile OS is android with over 75% of the market and all android come with Google Assistant pre-installed which most accessible voice assistant in mobile phones due to Google Assistant is the most used with 39%.

[5,6]Google assistant can be used to make a call, get directions to a place, music controls like play/pause/move to previous or next songs, send text messages in various apps and so on. In the test conducted by Stone Temple before the Perficient Digital merger, Google Assistant constantly outdid all other major voice assistants in the industry. Google assistant is also faster.

Google assistant is rapidly extending its capabilities and google assistant has a huge compatible device range but is only second when it comes to compatibility with other devices.

Amazon's Alexa: [7]Alexa is the perceived as "most intelligent" voice assistant which is followed by Google Assistant and Siri in second and third places respectively.

[5,6]Amazon Alexa is first when it comes to intelligence and also smart home appliances compatibility. Alexa is the fastest growing voice assistant and learns more quickly than its competitors. Alexa is compatible with over 7000 brands whereas Google Assistant supports only around 1000 and Siri with only around 50. Since Alexa is incorporated into the Amazon shopping app it makes shopping with Alexa easier compared to other VA. The disadvantages of Alexa are that its answers are inaccurate and have no mobile experience like Siri and Google Assistant, those two come pre-installed on mobiles. Even though Alexa is there in Amazon apps and Amazon Alexa app we need to separately install those and also, they aren't seamless as the other two.

2. Application of Voice Assistants

2.1 Voice Assistant at Home

[8]Voice Assistants have various uses in the home. It can be used to play music and video on our mobile devices like smartphones, laptops and also on television or through smart speakers. Helps in creating schedules and creating a list like shopping lists. For example, if we running low on something we can just ask the voice assistant to add that thing to a shopping list which we will be accessed later whenever we want. We will create a "smart environment" that can be controlled via voice assistant. For example, if we have a smart bulb at our home we can just say "Turn on the light" to turn it. But for this to work both the voice assistant and also the smart device should be connected to Wi-Fi. We are able to access information hands-free as we can ask for news weather traffic and maps through voice commands.[9]Voice Assistant can help to take care of the health of patients while they are in their comfortable place. The smart devices which can be used to monitor the health of the patient can be connected to virtual assistants. Elderly patients will be benefited a lot from this.

2.2 Voice Assistants for Business

[10] Voice-enabled appliances like Google Assistants, Alexa, Siri and Cortana are widely used. The voice assistant services provide an open-architecture platform, APIs, integration solutions and tools to help the business organization to build a customized version of the default application (also called "Skills") and service experiences as per their needs.

These skills help the voice assistants to be installed for various uses and it is the fundamental reason which allowed us to build a strong voice application ecosystem. With the introduction and increasing use of the Internet of Things (IoT) in business, voice assistant uses have also been growing in the industry. Voice assistants act as a catalyst for the IoT. Voice Assistants can be used for getting information about policies and scheduling a meeting.

It can be used to provide the clients with a report about research and analytics. Capital One Financial Corp is the first band in the USA to provide their clients with a service to assist with banking from their place with a voice assistant (Alexa). The voice-enabled chatbots make shopping a lot more convenient, this allows the user to shop whenever and wherever they are if they have an internet connection. Businesses that use a voice-enabled chatbot can create profiles for the users and whenever a certain user uses the application the voice is used to recognize the user and show the results based on the data collected previously while that user is using the application. This helps to personalize the shopping for each user even if many people use the same account/application.

2.3 Voice Assistant for Education

[11]MOOC (Massive Open Online Course) platforms like Coursera or edX have shown the world that technology can be used for more learning processes that haven't been realized before. Cloud computing can be used as the base for video streaming host, interacting quizzes and embedded tools to provide education throughout the globe. This has allowed the people who lack educational access in physical form (schools, colleges) also have education through MOOCs, even though MOOCs as it is a huge they can be also personalized as per the user's requirement and allow the user to learn at their own pace and practise quizzes on the topic they want whenever they wish to. Voice assistants allow the users to engage in a learning conversation with them.

[12]Using Amazon Blueprints and Google Assistant Template Actions even a teacher with no coding ability can create voice content specifically for their students. This allows them to teach their students even when they are not able to come physically to educational institutes and also give a briefing to the parents on their kid's performance. For example, when a student/parent asks the Alexa for instance "Alexa,

what's my flash briefing?" it replies with the information given by the student's teacher like "Bring you Artbook for your class" which helps the student to remember to bring his book which otherwise he might have forgotten before.

3. Pros and Cons of Virtual Assistant

3.1. Advantages

- [13]Improves the customer's experience with a website, app or device. Makes the customer service better by resolving the issues quickly and efficiently.
- Increases the search capabilities. It helps the user to multi-task better since the user need not take their hands off from the work they are doing to search or ask something from the voice assistants.
- Allows customer service and emergence services to be active 24/7 without any break. This reduces the need for waiting in a long line for the customer support from a live agent and also, they are no specific working which allows us to contact customer service whenever we want and not wait till the next working hours of the customer service.
- Helps to make the home and office smart environments. We can add smart devices in-home and also in offices to do various tasks. For example, in-home smart devices like bulbs, fans, television etc. can be controlled using voice assistants instead of us physically doing it. In offices AI voice-enabled bots can be added to address the visitor to the location they want to go to or to address any other queries they have.
- Removes the language barrier since the service providers are constantly increasing the languages supported by their voice assistants. This allows the customer to have a conversion with the customer support without worrying about whether customer support can understand their language or not.
- [14]Doesn't need as much effort typing requires and makes searching more convenient and precise.
- Helps to reduce screen-on time in smartphones and other devices which require staring at the screen. The hands-free mode of voice assistants comes in clutch during many situations where we are unable to take our hands-off from our work.
- More accessible to small children.

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3.2 Disadvantages

- [15]The cost of a smart speaker and other smart devices isn't cheap and also requires a WI-FI connection to work.
- Security has been a huge concern since the being. For example, the interaction with the Alexa gets stored in the cloud which can't be assured as completely hacker-proof.
- Even though results can be precise and accurate that is only if the query by the user is properly recognized by the voice assistant. We might need to repeat the question or command again which may cause frustration and make us think it would have been better if we would have just typed or done the task ourselves.
- An always-on microphone in the house could also make us worried since if the device is hacked, the hacker could potentially listen to all the conversations that happen within the range of the microphone. But the always-on microphone can be turned off in the privacy setting (Alexa). Even though the voice assistants can be used to make purchases it is safer to keep a PIN to confirm purchases before the amount is paid.

4. Opinion on Voice Assistant

Voice Assistants development has made life more convenient and easier. But we can't deny the fact that at present they are not completely safe since our data are stored by the service provider, which can be turned off in most cases to prevent them from storing our data but still there is some space for the hackers to exploit which causes us to have concerns about using a voice assistant. The service provider is constantly releasing security updates to assure their users that their voice assistants are secure which helps us to reduce the concern a little. Being a tech-enthusiast person, I hope for the development of voice assistant's features while always keeping on the security of user's data and making sure it's not used for any wrong purposes.

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CHAPTER – 48

VOICE ASSISTANTS- A DIGITAL PHENOMENA

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1.Introduction

1.1 What is Voice Assistant?

[1]Voice Assistant is a voice-activated software on a smartphone or a digital device that can supply information, data and perform particular tasks for the user. [2]They are new technology AI based digital assistants that gain new abilities every week. Voice Assistants can answer questions, interact with humans and applications, order things online and can perform many more functionalities.

1.2 History of Voice Assistant

[3]There were important voice assistant models in history which were the base for modern day advanced voice assistant technology. First possible invention of a voice-activated product was Radio Rex. It was an impressive voice model which had a spring activated dog coming from its dog house, whenever it heard a sound above 500Hz.It was established in 1920s but surprisingly, in the late 1980s it didn't really catch on unaccented English. [4]Then slowly the Audrey model was established which was an improved version. Audrey was the Automatic Digit Recognition machine which was made by Bell labs in 1952.Audrey could recognise the sound of a spoken digit-zero to nine with great accuracy. In 1990, Dragon Systems, launched the first consumer speech recognition product, then in 1997 an advanced version of speech recognition model was brought out, it was the first continuous speech recognition product, named as NaturallySpeaking. [5]From 1990s, the trend of chatbots had started to grow. Basically, it was a computer program designed to talk to a person in a conversational way. In 2001 Smarterchild was launched, it was a SMS network bot, which majorly interacted with messages. This became an important predecessor for the advanced voice assistant technology.

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1.3 Types of Voice Assistant

[6]First type is about Artificial Intelligence powered assistants. These assistants use three key technologies that are Artificial Intelligence, Robotic Process Automation, Natural language processor, and Machine learning. Using these technologies they combine information, core data and algorithms to create data models which recognise behavioural patterns that could adapt to additional data feeds. By these ways, the virtual assistants could be programmed to start realistic conversations, make recommendations, predict situations and perform many more functions. [7]Second type is about Grouped Voice Assistants. They are majorly useful for the fields of commerce, as this type would assist the future of digital commerce. Basically, different types of voice assistants will be grouped to answer the major search queries and to share knowledge about the fashion trends. This setup of technology will build an engagement in a quick time among customers therefore increasing the overall sales of the business. [8]Third type will be Generated Voice User Interfaces. It promotes personalisation and credibility. These interfaces employ speech recognition to transform user speech into text and meaning. In addition to this, they integrate natural communication methods and importantly save user's time as the typing inputs are replaced by voice

1.4 Popular Voice Assistants

[9]Popular Voice Assistants are Amazon Alexa, Google Assistant, Apple Siri, Samsung Bixby, and Microsoft Cortana. Amazon Alexa can perform many simple quick tasks like playing music, contacting a person, setting an alarm and many more. Alexa with the help of product integration can help in setting a smart home environment. It can perform functions like dimming the lights, locking the doors, adjusting the thermostat and controlling other smart home connected devices. Google Assistant is a dynamic and an advanced assistant. It offers voice-activated device control, voice commands and voice searching. Restaurant bookings to directions, music and timer control, reading notifications and opening applications from mobile are major tasks of the Google Assistant. Siri is Apple's voice assistant which has access to built-in applications of an Apple Device like Safari, Maps and Contacts. Bixby demands for a Samsung Account and data network. It can understand

natural conversational language with context and meaning. It is compatible with many languages like English U.S and U.K, French, German, Chinese, Korean, and Spanish. [10]Microsoft Cortana is a personal productivity assistant which was launched in 2014. It functions with enhanced security and privacy in Microsoft 365. Helps in scheduling calls, sending messages to teams, tracking user's day, adding a task and many more activities.

2. Application of Voice Assistant

2.1 Voice Assistant at Home

[11]With the help of voice assistants key technical purposes could be established to create a smart connected home. There will requirements like various accessories, products and digital applications to setup the smart home system. [12]The major basis of controls that are required to set a smart home will include Lighting control, home security control, Temperature and Air Control, TV Entertainment System Control, and Computer and Peripherals Control. For initiating the process of home automation, we can create a digital room in the particular application and add products like bedroom lights, kitchen lamps, thermostats and many more.

Enabling Cloud integration with security application can help us build door lock settings, this will be authenticated by mobile application connected to home wireless fidelity network. Popular entertainment developments like Netflix, SonyLiv, and Hotstar could be accessed via user's vocal request with the help of voice recognition component in Smart TV. With the help of our input, we can easily trigger run and key commands remotely in different computer systems. With the help of voice activated printing techniques we can save time by giving quick vocal inputs. [11]Hardware Units like Amazon's Alexa Echo Dot and Show or Google Assistant's Google Home and Android Smartphones or iPhones, iPads and Apple Watches for Apple's Siri will be a sole requirement for setting up this home network. Overall, with strong security, knowledge, wireless network and hardware units, a Smart home could be set.

2.2 Voice Assistant for Business

[13]Voice Assistants help in the enhancement of sales, marketing, brand strategy, and help in the process of providing descriptive and

crucial data analytics. They help to build business productivity in the work place. By the help of automated conversational solutions direct customer interaction with data collection will happen. Deep Analysis of voice data can help company brands get insights on their audience and could seek right recommendations.

[14]With the adoption of voice assistants in the workplace there is good amount efficiency build among employees. They fill the important part of the communication gap by creating crisp communication in multilingual teams. In terms of target completion task tracking becomes an important part that is to be fulfilled, which is done by the voice assistants in a short span of time maintaining the right time management. Voice Assistants slice the data by date ranges and departments for data visualisation with the help of vocal inputs. Quick IT, HR support will be provided from the old data stacks to help employees resume to their work during technical issues. Advanced Tool sets could be built from voice assistants to help in the process of writing meeting summaries, making planner updates and setting reminders. By the offer of fluent and fast foreign translations by the voice assistants, international businesses could be conducted smoothly. They overcome language barriers by eliminating the need of human translators. Voice assistants will be the only consistent device which would be having a huge knowledge base to fill any missing information or to highlight great detail about events. As a whole, Voice Assistant is a smart technology revolution, paving the way for ideal business.

2.3 Voice Assistant for Education

[15]Voice Assistants are revolutionising the education system, by lifting it to great advanced standards. There are many plus points for EdTechs and Learning companies. Voice technology will dominate and will be helpful for the students, educators and parents.

[16]Students and educators can develop a new level on campus experience by creating more time and building good resources. Professors could use the voice assistants to create innovative quiz sets for training the students on a regular basis. This quiz feature could be built without any coding inputs. Voice assistants can build smart campus experiences by creating innovative learning environments in libraries, classrooms and common areas. Noteworthy study space detection could be enabled in

campus with the help of voice assistants. All parts of navigation, like from the directions to the library, seat occupancies in a multipurpose hall and adjustment of different bus route connections would be in built in the software systems of voice assistants to promote strong engagement with the campus. [17]Edtechs could easily make content beyond classrooms with easy visualisations from voice assistants. By this way learning becomes fun and interesting. Many gamification elements like badges, leader-boards and competitions capture the full attention of a student which becomes a key factor to develop interest in a subject. Voice assistants will make the educators be more productive by automating the process of metrics maintenance like the student absentees, faculty present rates, registration numbers and many more data. Innovative recommendations for student grouping will be made, pattern revision techniques will be introduced to increase the depth of a subject. By these methodologies, student and educator could be well connected and will effortlessly benefit from complete learning.

3. Pros and cons of virtual assistant

3.1 Advantages

[6]Virtual assistants will be the right asset for the company and people as it improves efficiency in its surroundings. More digital services will be a routine in a consistent manner. In, this way employees can work in different areas which helps in increasing the company's money and also save a good amount of time.[18]General awareness of voice technology has become high. Young consumers have adopted to this technology in a faster rate for saving time, by this way the reach for audience has drastically improved.

[19]Virtual assistant is a must for managing several situations. With virtual assistants we get an opportunity to integrate multiple applications which will help the users to pull data, generate reports and perform submissions and approvals. AI supported voice commands form the base of this technology. Advanced virtual assistants have been introduced with industry-specific terminologies for providing team recommendations. One of most important tasks of a virtual assistant is to help in the automation of manual tasks. This action will be completely supported as the process is AI driven and error free. Support system of virtual assistants are phenomenal, they provide various interfaces to receive our

inputs like voice and text messages. In, addition to this there is multi language support for helping users across the world.

3.2 Disadvantages

[18]Majorly Virtual Assistants have been profitable and helpful to millions of users. In contrast to this, there are some slight disadvantages that are present. Without correction, the advanced voice technology model becomes incomplete. Firstly, there is some possibility of privacy issue due to minute data protection glitches. This in turn creates trust barrier for few consumers. [20]Secondly, as only the vocal input is considered, feeling of disconnected interaction comes in place. Finally, with the increase in model setup, there is an investment increase which creates some amount hesitation amongst the users, as most of them are concerned about the quality and longevity of the virtual assistant setup.

4. Opinion on Voice Assistant

Voice assistants have been of great support and help towards human users. People around the globe are being satisfied with new features of various voice assistants. I would like to support this idea of technology, as it is doing its level best to satisfy human requirements like calling, messaging, playing our favourite playlists of songs, updating news headlines from various languages, navigating to new places and many more activities are performed by these Advanced AI Voice Assistants. An efficient smart house with audio control features could be constructed. High Schools and Colleges will be educationally powered by usage of smart campus features like audio semester quizzes, quick bus route finders and study space locators. People with depression, anxiety and pain must be able to consult with one of the voice assistants for an immediate relief. The advantages are many, but in contrary, we have some negligent disadvantages that could be fixed in a step-wise manner. For data security issues, there must be a, built cyber security network for fixing small data leaks. People, must see this advanced setup of virtual assistants as a good return on investment as it helps in growing our money and saving our time. Added to this there must be a combined development of Artificial Intelligence, Natural Language Processing, Machine Learning and Automation for a new level transformation in the field of Voice Assistant Technology.

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CHAPTER – 49

VOICE ASSISTANT – COMMUNICATION BETWEEN HUMAN AND DEVICE

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1.Introduction

1.1 What is voice Assistant?

[1]Voice assistant is natural language recognition by the voice of the user. It recognizes our voice synthesis. It is also known as connected speaker. Voice assistant is the communication between the device and a human. Instead, of typing with their hand, we can research any information it by giving user voice to the google assistant or Alexa and it shows the relevant websites that we have given to it.

1.2 History of voice assistant

[2]To speak about history of voice assistant, it has a very long history before 100 years. In 1922, The first voice assistant called as "Radio Rex" Was introduced. It is a type of toy in which a dog is present inside the house. The dog will come outside the home when we call as "Rex".[3]This toy was introduced by "Paul Boersma" and "David weenink". It will work only when the male voice is called. The dog will not come outside for the female voice or small children's voice.

Radio rex

[4]In 1952, "bell labs" introduced a new voice assistant known as "Audrey". It was designed to synthesizing the high-level data while at the scene of emergency.

[2]In 1962, international business machines have launched a new type of voice assistance called "Shoebox". It recognizes the 10 spoken digits, in addition six command words like plus, total, subtotal. This machine recognizes only the voice of the inventor. The microphone is connected to three audio filters for high, middle and low pass.

Shoebox

In 1971, Darpa introduced a new system called "speech understanding research" (SUR). This can recognize about 1000 words. There were also parallel advancements in the technology, such as the development of a device by Bell Laboratories that could understand more than one person's voice.

[5]In 1990, nuance communication released "dragon dictation" device. This device is a natural speech recognition.it is commonly used in vehicles and in hospitals.it was updated after seven years in which dragon bought naturally speaking which is able to recognize the maximum of 100 words in a minute.

Dragon dictates device

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[6]For the first time ever in 1992 the smart google voice assistance was introduced.it was called as IBM Simon personal communicator (IBM Simon).it was a touchscreen device and this device was published to United States of America in 1995.In addition, it was the first device to include in telephones to make phone calls. But the battery consistent is only an hour.

IBM Simon

[7]As the years changing, the technology in voice assistants is upgrading. Later in 2011 google introduced "google assistant" which is available in android, chrome, OS, iPad, Kaios, Linux. Google assistant can recognize any kind of voice.it was launched using the voice of "Kiki Bassell for the American female voice.it will be responding by saying "OK GOOGLE". Google assistant supports both natural voice and the keyboard typing system.it will show all the information we wanted to research when we give user input and opens the applications in our mobile phones and also can set alarm, show events and adjust the hardware settings, in addition it suggests a song for us when we asked to play a song and even makes phone calls if we ask to call a particular contact name. Google assistant can also read our messages. Google assistant was published among 90 countries and in more than 30 languages.

1.3 Types of voice assistants

- [8]Artificial intelligence assistance
- Grouping voice assistants
- Informational voice assistance
- Rule based bots
- User generated VUIs
- Aromatic speech Recognition (ASR)
- Natural language processing (NLR)
- Natural language understanding (NLU)
- Natural language generation (NLG)
- Text-to-speech (TTS)
- Speech-to-text (STT)

1.4 Popular Voice assistant

- [9]Siri
- Google now
- Cortana
- Facebook M
- Black Berry Assistant
- Braina
- Teneo
- Speaktoit Assistant
- Hound
- Alexa

2. Application of voice assistant

2.1 Voice assistant at home

Smart speakers or voice assistants have transformed how we live our lives. Thousands of people worldwide now own Amazon's Alexa, Google Home, Apple's Siri or other models. They all use the Internet of Things (IoT) to allow us to browse the web, access the news, check weather and shop along with other tasks. However, these voice assistants come with a huge risk. Once they are activated, they hear and record everything without your permission.

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Home voice assistants

2.2 Voice assistant for Business

[10]Amazon's Alexa, google assistant, Microsoft's Cortana used in the business purpose. Voice assistant has more growth and potential in business. Google researched that the 72% of consumers use voice assistants daily and in addition, they were expecting to receive more information from the voice assistants. The potential of voice-assisted technology in the workplace is endless. You can put your voice assistant in the conference room to impress your partners and receive fast information about your company (e.g., the number of ongoing projects, company team size, availability of people on different days, budgets, etc.). You can set up meetings, create new projects and save contacts. You can also send out mass notifications via SMS or email. You can even implement the start of processes and connect it to your other side services. For example, you can connect lighting, timers, other devices to Alexa, you can also program Alexa to receive a command to generate a document and send it to the printer.

2.3 Voice assistant for education

[11]Voice search plays a significant role in education students ask the questions and get the answers immediately from the voice assistant. Voice assistant will be the learning experience for the students. Of course, Students have to spend the time for looking information on a particular topic they wanted to. Voice assistant is an advantage to the students instead of waiting for hours for the teacher. Some students lose their focus in the classroom.in this situation teachers should use the latest technology to make class room more fun. Student can build their own conversation with the voice assistant and improve their communication. Voice assistance access the online book when the teacher asked to read the stories.

3. Pros and cons of virtual assistant

3.1 Advantages

[12]To discuss on advantages of the voice assistants, there are lot of advantages we have. Simply by speaking the words instead of typing with the hand.it reduce the stress.it protects our eyes. It is more useful when we are driving, we can ask to call a person or play some music and ask to check location etc., voice assistant improves customer engagement. It gives the fast response when we search any question. Voice assistant can read our WhatsApp messages too.it will set the alarm automatically when we give a particular time to set the alarm.it can assists patients in booking rides and from the hospital via ride-sharing services. They allow to export and import the data and stores information. Provide services regarding your location. Helps to plan the whole day. Reminds us important things on accurate situations or locations. The voice assistant is protected by Bio-metric authentication process. It prevents any misuse of unidentified members.

Disadvantages

- [13]Voice assistant devices are very expensive to purchase
- It will not work without electricity
- The human level conservational abilities are still some way off for virtual assistant, and they will never be able to use facial expressions to improve natural, human communication.
- Lack of data security
- Others can access echo conversation
- Noisy environments and multiple speakers may degrade results

- It doesn't work on all operating systems
- Error and misinterpretation of words

Opinion on voice assistant

[14]Voice assistants is the trending right now across all over the world. During COVID-19, these voice assistants like Alexa, chatbots helped the patients by suggesting the health care apps. Only 10percent of surveyed respondents were not familiar with the voice assistants. Consumers see voice assistants as the smarter, faster, and easier way to perform every day activities. [15]Voice recognition works by taking the users voice and turning into a digital signal.it was developed by the artificial intelligence. Voice assistant creates a personal relation between the people.

It helps a person by doing online job not only for the machine. Over 100 million of people use the voice assistants. I think voice assistance is overrated sometimes.

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CHAPTER – 50

VOICE ASSISTANTS- NEXTGEN COMMUNICATION

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1. Introduction

1.1 What is Voice Assistant?

[1]A voice assistant is a software which works as a virtual assistant for people and uses language recognition algorithm and voice synthesis to recognize our demands and proceed with an answer accordingly. Based on the commands given by the user, the software filters the voice modulations and ambient noise in the background and gives relevant reactions to the demands we make. A voice assistant uses several technologies when being created and processing our requests. [2]Machine Learning, Artificial Intelligence, Voice Recognition, Natural language processing and Natural language understanding are the key technologies behind the Voice Assistant. By recognizing and analyzing the history of commands made by the user/users it can add the data to it's data algorithm and refine itself as time passes by. With time, based on the references and preferences of the person, it can provide you with what kind of music you would like, answer complex questions and undertake conversations.

1.2 History of Voice Assistants

[3]Before the introduction of smart voice assistants, which can process every request we make, play music for us, converse and crack bad jokes. A series of inventions were made before we advanced to the modern-day virtual auxiliary. [4]Phonograph was one of the earliest inventions in the line of attendants. Graphophone, Audrey and Shoebox are the ones which followed later. Phonograph was an instrument that would play notes on the basis of the vibrations of a stylus or a needle. A phonograph disc would store music inscriptions on its plate which would play when the needle rotates through the disc.[5]Graphophone uses wax cylinders to store and play music. Its design was enhanced with time but the base design was the same throughout its period. [4]Audrey made its debut in the 1950s, it was the first device that understood basic language

and could make out the numbers 0-9 if the output was slowed. [6]Shoebox was introduced by an IBM engineer, it was a voice activated calculator and could comprehend upto 16 words spoken. It could understand words like 'minus', 'plus' and 'multiply'.

1.3 Types of Voice Assistants

In general, there are 3 types of voice assistants- rule-based bots, artificial intelligence assistants and grouping voice assistants.

[7]Rule-based bots are basic assistant which answer questions like 'How can I retrieve my username?', most of the commands can be coded in the backend and is available in the database. When creating a rule-based bot, the developer has to figure out the mindset of the user and code the user interface accordingly. The person has to understand what are the problems a person generally faces while using a software, what is the thing which would irritate the user the most and the obstacles a third-person would face which would ruin their productivity.

Artificial Intelligence Assistants are the highly advanced auxiliaries which use complex algorithms and years of data training. In doesn't rely mostly on the backend but it tends to learn as it goes about. It can predict the user's choices and work in cohesion. These bots have the potential to imitate human voice, making it incredibly difficult for a rookie human to figure out the difference between artificial and real. Sundar Pichai once demonstrated how an AI bot could place an order at a restaurant using his Google Duplex.

Grouping Voice Assistants is more about a collection of voice assistants each specializing in its domain. Custom voices, user-generated VUIs are a fields where grouping voice assistants can be seen.

1.4 Popular Voice Assistants

[8]Amazon Alexa, Apple Siri, Google Assistant are the most popular voice assistants in the present-day scenario. Amazon Alexa has a huge lead on its competitors as its skill base has exceeded 100,000 skills. In the future, sentences like 'I am hungry' could identify which restaurant it should place an order to after learning your preferences. In terms of smartness, Google Assistant take the bait and Apple Siri is the posh alternative. Google Assistant is the smartness because of the extensive database it has, and the long list of search history of users. Researchers

feel that the reason for the slow development of Siri is because of how apple likes to keep the user's privacy in mind whereas its competitors are willing to do anything to advance their bots.

2. Application of Voice Assistant

2.1 Voice Assistant at Home

Voice Assistant at home such as alexa can handle tasks in our homes which makes our lives way easier and efficiently tackle tasks in a glamourous way. [9]Amazon Alexa can control the music in our homes, dim and brighten the lights, set alarms, read us the daily news, tell us if somebody is there at the door, talk to us in a humorous way and control our entertainment system. Using Alexa and voice assistants in general eliminates the need of having multiple remotes which control various sections of our homes. It can also call someone by using verbal language which maybe useful in distress calls and dials the sos number if needed. It also helps create a smart office, manage time and help increase productivity, keep a shopping list and entertain the kids. [10]It can also find our lost phones which is in sync with the device and can locate its whereabouts without much hassle.

One in every 4 car accidents is caused by the phone in America according to a recent survey. Having a virtual assistant can help you drive hands-free which eliminates the risk of diversion and in the end contributes to the society and lessens the damage done to struct**ures.**

2.2 Voice Assistant for Business

[8]Smooth Communication is essential to a business no matter how small or big the corporation is and the fact that it must be carried out in an efficient and quick manner. This is where virtual attendants come in. Task tracking and time management is applicable to them. Since the assistants use artificial intelligence, it can predict how much time we would take to complete a task, how long the document is and how much time we would take to read it based on our reading speed. It can create a timeline of tasks and when should the deadline be for it. Analytics can be taken care of by assistants like Microsoft's Cortona and Apple's Siri, just by using your voice you could display huge graphs and manage presentations without having to peep over your computer repeated times. HR and IT support, voice assistants give a massive advantage in these

fields. Because of the scarcity of people in the call-center at times, such auxiliaries can understand the basic problems faced by the user and direct them to the concerned desk.

It also plays a role in neural machine translation. Language barriers are often faced in big MNCs as it spans all over the world, due to this varied people meet each other and are expected to conduct business, assistants help overcome the barrier and supersedes the requirement of a translator. Often at times, accidents occur in the railway and transport business due to lack of knowledge or a specific person unable to convey the information he has, it aides in this by providing instant insights and mediating details within a blink of an eye. In meetings and daily life, we forget the meaning of words or the discrete word we know of but can't remember in that instance, one command and the assistant will recite it for us.

2.3 Voice Assistant for Education

[11]With alexa, students and teachers can record their upcoming events, get resources related to their subjects and make appointments with their teachers without much hassle.

Teachers can prepare for their lessons and can use smart boards with instant access. Administration can look up for enrolment statistics and the performance of their kids without having to go through individual records and have to undergo errors in the filing system. Artificial Intelligence can identify the common mistakes made by a student and guide them on it, analyse their writing and what improvements can be made. Give a graph chart of the student's progress in the recent times so that the kid is able to see what kind of progress he has made and can compete with himself rather than his classmates which may give him/her anxiety. Teacher can also see the graph reports of their students and gain better understanding and work upon the areas where software can't reach. [12]The voice technology allows for interactions without the use of a screen and controls the amount of time they spend on their phones. Much-needed life experience can be passed on using VAs. Illuminated by Cortana, Siri, Google Assistant and Alexa, hundreds of thousands of classes have been granted new experience and made learning fun for students who did not seem to have much interest in studying. The inclusion of Voice Assistants in classes have given new meaning to their lives and continues to do so.

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3. Pros and Cons of Virtual Assistant

3.1 Advantages

[13]Voice Assistants are less expensive than hiring a full-time personal assistant, they can handle multiple tasks at once without getting frustrated or a burnout. Voice Assistants have made remote working easier than ever because of the smoother access of internet and availability of gadgets. They have a report for every minute every second of the time, and can furnish the statistics according to your wish. No need to wait for someone to prepare a report and wait for the person to complete. They are competent enough for every job out there. Masters of the art of delegation, many people do not know how to use a personal attendant effectively, in such scenarios, virtual assistants take the premise.

VAs have a variety of skill sets, whereas a personal assistant may be only able to do tasks confined to their job. [14]One of the key features of virtual assistants is that they can change according to situation and shift with the financial situation of the company. If the company is facing a hard time, the employers and the administration staff can downgrade the package they have taken of the Virtual Assistance and in the financial uprise, the company can upgrade their package if the need arises. Virtual Assistants can help everyone be it a clerk or the Chief Executive Officer of the company. They get paid for being productive whereas employees in a company generally work for 8 hours a day but sometimes they may be unproductive or just wasting their time in the workplace, in comparison to this, the company which is responsible for the VAs only gets paid if they are working and can keep up with their demands. In offices, people need to make freshers welcome and acknowledged at the place, even though it is necessary and should be done, artificial auxiliaries do not require such activities as they have no emotions. Several Multinational Corporations have time zone problems in such cases, the employer can hire virtual assistants from different time zones and they also come with customer support so that is an added advantage.

3.2 Disadvantages

[15]Often, the voice assistants misinterpret our words and give us results based on the opposite of what we want. As voice commands are not end-to-end encrypted, the voice assistants can hear every word we say and store it in their database. This intrudes our privacy and reveal

identities and information about ourselves which we do not want the public and the community to know about. There have been reports of breach of privacy by companies providing the voice assistants. [16]In 2017, a former Amazon employee heard incomprehensible murmuring from his amazon echo dot, after investigations, it was found out that the device was listening to his conversations without his permission. [2]Dealing with a voice assistant can seem lonely and make the person feel devoid of human interaction. Investing in a virtual assistant can be expensive and maybe not up to the mark in cases of budget issues. The development of a good voice assistant takes a lot of time and effort and an enormous skillset has to be created for the assistant to be useful and popular within the community. If the skillset of the device is not standard norm, the chances of it being successful is very low as there are various high skillset VAs available in the market. Being a creator of a voice assistant, you are dependent on the device makers who provide the base of the software, without the proper device which can make use of the software, the entire model is useless. Having multiple personal digital assistants can be confusing as to which one should be used more and which questions should be asked to which device. Voice assistants take their voice into commands and type it in text form on their screen, for vision impaired people, they would not be able to read the text on the screen as their senses are based on speaking and hearing only, they might feel that the results they want are not available because of the device not being able to comprehend what they mean. Another drawback is that they require a good internet connection and is unactive in offline mode.

4. Opinion

Voice Assistants are going to even more essential in the coming future, with all the skills and the time it saves while increasing our productivity. But at the same time, it is cutting out job of people who are in dire need of a source of income, large scale of people are worried about their jobs and seem to be unclear of their work fields. Due to such concerning reasons, people seem distracted from their work and try to switch fields to someplace they may have a secure job rather than the job they love as they have families to attend to. Voice assistants also breach my privacy and gather up information I do no want out in the public. Voice assistants are in a way a boon and bane kind of structure. They

lessen our workload and help us enjoy our personal lives more but at the same time they are eating up jobs. Many at times, people start to rely too much on the devices and begin to get lazy and avoid basic confrontations which are necessary for people to grow as individuals. I feel that in the hands of a hardworking competent person, voice assistants are the saviours of their lives but at the same time, in areas where people are struggling, it continues to be the devil in the land. For people dealing with a stutter, voice assistants are basically useless, and if in the future, the usage of screens decrease with the implementation of voice assistants, people dealing with a stutter are going to be at a massive disadvantage. Investing time and money in voice assistants could be used to develop the weaker areas of the society and after that voice assistant advancement can be made. Advancement of society as a whole is more important as per me rather than a few people in the community advancing and soaring new heights while his companions struggle. Voice assistant is something which is in cohesion with the present but further advancement should be made with time in a sustainable manner as society might collapse if the situation moves too fast. People need to be educated with how things will progress in the future and how to cope with job loss and various methods of how money and currency can be made without their primary source of income.

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