Study of Voice Controlled Personal Assistant Device

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Study of Voice Controlled Personal Assistant Device

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Abstract *— In the Modern Era of fast moving technology we can do things which we never thought we could do before but, to achieve and accomplish these thoughts there is a need for a platform which can automate all our tasks with ease and comfort. Thus we need to develop a Personal Assistant having brilliant powers of deduction and the ability to interact with the surroundings just by one of the materialistic form of human interaction i.e. HUMAN VOICE. The Hardware device captures the audio request through microphone and processes the request so that the device can respond to the individual using in-built speaker module. For Example, if you ask the device 'what's the weather?' or 'how's traffic?' using its built-in skills, it looks up the weather and traffic status respectively and then returns the response to the customer through connected speaker.*

Keywords *— Artificial intelligence, Natural language processing, online Information Services, Distributed System, Personal Computing.*

I. INTRODUCTION

In 21st century, everything is leaning towards automation, may it be your home or car. There is an unbelievable change rather advancement in technology over the last few years. Believe it or not, in today's world you can interact with your machine. What is interacting with a machine? Obviously giving it some input, but what if the input is not in the conventional way of typing, rather it is your own Voice. What if you are talking to the machine, giving it commands and wanting the machine to interact with you like your assistant? What if the machine is not giving you answers just by showing you the best results but also by advising you with a better alternative. An easy access to machine with voice commands is the revolutionary way of human-system interaction. To achieve this, we need to use speech to text API for understanding the input. Many companies like Google, Amazon and Apple are trying to achieve this in generalized form. Isn't it amazing that you can set reminders by just saying remind me to.... Or set alarm with wake me up at .. Understanding the importance of this we have decided to make a system that can be placed anywhere in vicinity and you can ask it to help you do anything for you just by speaking with it. In addition to this, you can also connect two such devices through WiFi and make them communicated with each other in future. This device can be very handy for day to day use and it can help you function better by constantly giving you reminders and updates. Why would we need it? Because your own voice is turning into a best input device than a conventional enter key. The architecture of basic Voice Controlled Personal Assistant Device is shown in fig 1.

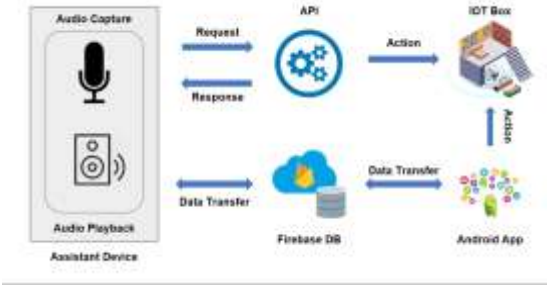

Fig 1. Basic architecture of Voice Controlled Personal Assistant

II. RELATED WORK

An Intelligent Voice Assistant system on android platform[4] was developed as an android application that demonstrate the use of natural language processing which helps to send messages and even use the in-build mobile application by using voice commands. This system was surveyed to use the mailing and calendar where user were able to mail and also create their event using voice command. Home Automation system[5] based on Internet of Things was proven to work satisfactorily by connecting simple appliances to it and the application appliances were successfully controlled remotely through internet. The designed system not only monitors the sensor data like temperature, gas, light, motion sensors but also actuates a process according to the requirement. For instance, switching on the lights when it gets dark. It also stores the sensor parameters in the cloud in a timely manner. This will help user to analyse the condition of various parameters in the home anytime anywhere.

Everyone must be familiar with Siri[4], Cortana, Google Now or Watson or with any of the countless fictional virtual assistant. These real-life virtual assistants aren't as smart as Ironman's Jarvis, but their intended function is largely the same, voice-activated computing powered by artificial intelligence. Ask a question, get an answer. Give a

command, get results. Here is the insight of some of the Personal Assistant devices.

Ivee Sleek is a voice-activated alarm clock by Interactive Voice that makes setting an alarm, changing an alarm sound, and turning an alarm on or off completely hands-free. Additionally, Ivee Sleek has a variety of possible voice commands ranging from the current date and time to uncategorizable inquiries.

Homey is a voice-activated home automation hub created by Netherlands-based startup Athom. It comes with multiplatform Smartphone app and it can still communicate with a bunch of differently-configured gadgets at once. It's multi-lingual and understands English, Dutch, Spanish, and French. It is compatible with a bunch of app-enabled smart home products.

Amazon's Alexa is a "Virtual-Assistant" manages to set itself apart. Unlike mobile-based virtual assistants like Siri, Alexa is centralized within dedicated, in-home Amazon devices -- most notably the Amazon Echo, an always-on, always-listening Internet-connected speaker. Here are some features of Alexa.

- **Stream music**: Ask Alexa to play a song and it will stream it from the Amazon Prime Music Library.
- **Read the headlines**: Alexa can read out headlines from the news outlets of your choice on the topics you care about.
- **Keep tabs on traffic and the weather**: Alexa will happily read off the forecast, or let you know if there's an accident jamming up your morning commute.
- **Set timers and alarms**: You can tell Alexa to wake you up every weekday morning at 7 a.m. or ask it to set a timer.
- **Answer your questions**: Alexa can search for basic facts, solve mathematical problems, or even tell you a joke.

Alexa, Sleek, Homey aren't one of the first home automation systems that responds to voice commands, though. CastleOS has been around since late 2012, but its central hub and Kinect voice control app can only operate on a Windows computer. House Logix's VoicePad is another such voice-activated hub.

III.METHODOLOGY

A. System Architecture-

The overall system design consists of following phases:

(a) Data collection in the form of speech.
(b) Voice analysis and conversion to text
(c) Data storage and processing
(d) Generating speech from the processed text output

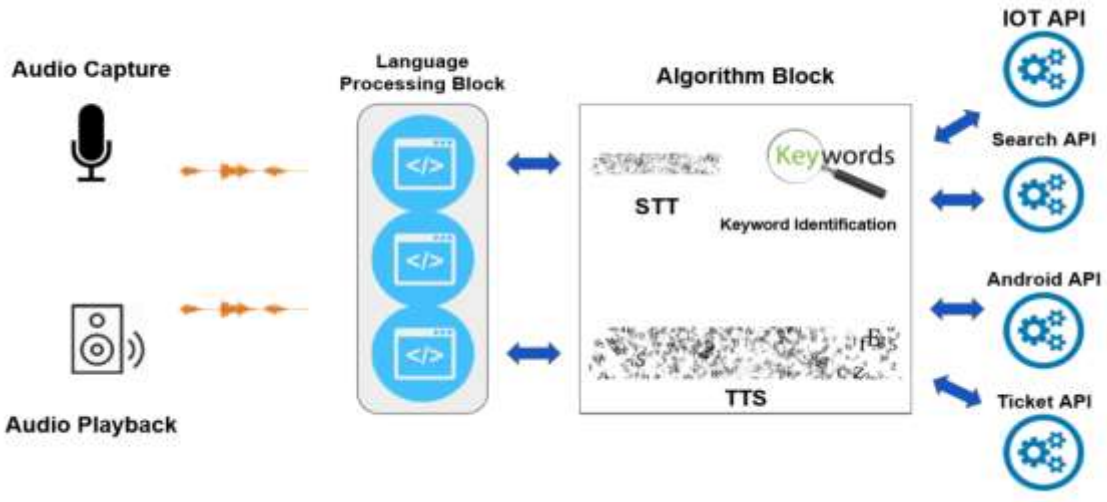

Fig 2. System Architecture of Voice Controlled Personal Assistant

In first phase, the data is collected in the form of speech and stored as an input for the next phase for processing. In second phase, the input voice is continuously processed and converted to text using STT[1]. In next phase the converted text is analysed and processed using Python Script to identify the response to be taken against the command. Finally once the response is identified, output is generated from simple text to speech conversion using TTS[2].

The basic architecture of the personal assistant is shown in figure 2.

B. System Components

i. IoT Box

The IoT box is used to perform operations for connecting smart devices[6]. The data transmission takes place over WiFi network;

Task modules used in IoT box are:

• Servo Motor for mechanical movement for objects such as curtains. Here we are using this module to show how the curtain opens and closes itself; controlled by voice.
• We are using Neo-Pixel ring as lights to show the change of state of light and controlling brightness of light.
• LED display(acting as a screen) that displays the data.
IoT box architecture is shown in figure 3.

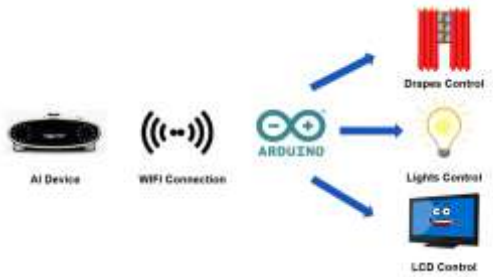

Fig 3. IoT Box Architecture.

ii. **Firebase cloud server**

Android application helps the user to share his personalized data through android application with ease from anywhere. The data transfer and processing is done through network adapter inbuilt APIs. This data generated is stored in firebase cloud storage[5] and is available for the main system to access. All these tasks are being done in parallel to each other. All the data stored in Firebase cloud server is accessible to main system and can be retrieved and process as per required. The need of given data is also processed in parallel to continuous fetching of data from the server. Firebase cloud server architecture is shown in figure 4.

Fig 4. Firebase cloud system architecture

C. Data Flow Sequence

a. Initialize device*:* Initialize the device by calling its name.

b. Task Manager*:* Conversion of Speech-to-Text and Text-to-Speech is performed by task manager.

c. Service Manager*:* Analysis of commands and matching them with web service adapter and cloud server.

d. Execute Command*:* After finding the match for the given command, run the respective python script.

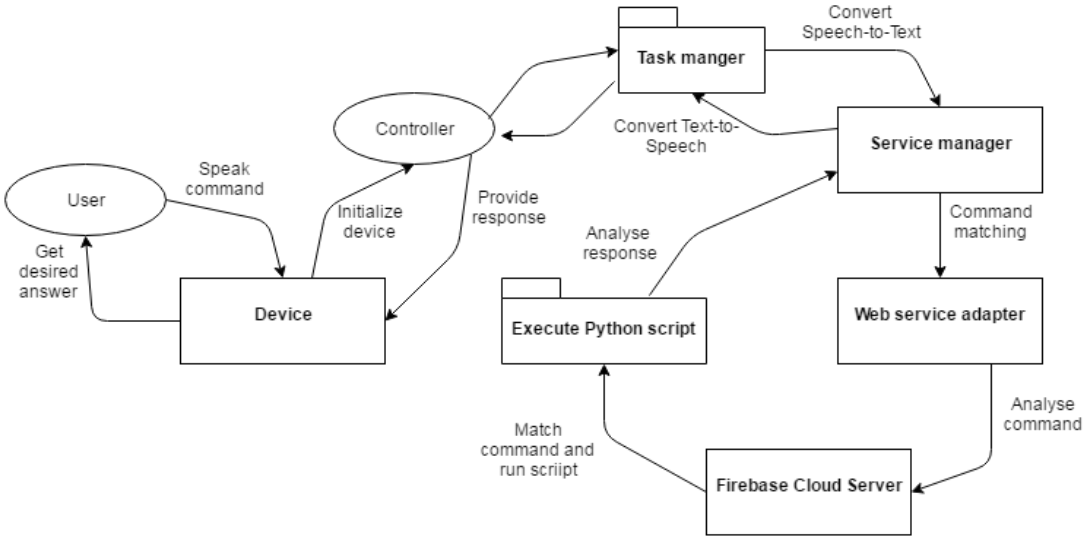

Fig 5. Data flow diagram

IV. Proposed System

The proposed system will provide following features:
1) It always keeps listing for its name and wakes up to response upon calling with the assigned functionality.
2) It keeps learning the sequence of questions asked to it related to its context which it remembers for the future. So when the same context is mentioned, it starts a conversation with you asking relevant questions.
3) Performing Arithmetic calculations based on voice commands and giving back the computed solution through a voice.
4) Searching Internet based on user's voice input and giving back the reply through a voice with further interactive questions by machine.
5) Auto synchronization will keep itself updated by the data on its cloud server.
6) Firebase cloud server to update the data on cloud.
7) IoT architecture will help user to connect smart devices with the personal assistant and performing tasks such as switching ON and OFF lights, connect Smartphone, notify user by using push notifications such as email, etc.
8) Other features such as playing music, setting an alarm, checking weather conditions of device's location. Setting reminders, spell-correct, etc can be performed by an input from user's voice.

V. Conclusion

Voice Controlled Personal Assistant System will use the Natural language processing and can be integrated with artificial intelligence techniques to achieve a smart assistant that can control IoT applications and even solve user queries using web searches.. It can be designed to minimize the human efforts to interact with many other subsystems, which would otherwise have to be performed manually. By achieving this, the system will make human life comfortable. More specifically, this system is designed to interact with other subsystems intelligently and control these devices, this includes IoT devices or getting news from Internet, providing other information, getting personalized data saved previously on the system, etc. The android application should let the user add data such as calendar entries, set alarm, or even reminders. The software will facilitate ease of access to various other devices and platforms.

The system will have the following phases: Data collection in the form of voice; Voice analysis and conversion to text; Data storage and processing; generating speech from the processed text output. The data generated at every phase can further be used to find patterns and suggest user later. This can be a major base for artificial intelligence machines that learns and understand users. Thus, on the basis of literature survey and by analysing the existing system, we have come to a conclusion that the proposed system will not only ease to interact with the other systems and modules but also keeps us organised. There is still a lot of ground to be covered up in the world of automation but the skills of the device can help to build a new generation of voice controlled devices and bring a new sustaining change in the field of automation. This paper can also act as a prototype for many advanced applications.

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REFERENCES

[1] DOUGLAS O'SHAUGHNESSY, SENIOR MEMBER, IEEE, "Interacting With Computers by Voice: Automatic Speech Recognition and Synthesis" proceedings of THE IEEE, VOL. 91, NO. 9, SEPTEMBER 2003

[2] Kei Hashimoto1, Junichi Yamagishi2, William Byrne3, Simon King2, Keiichi Tokuda, "An analysis of machine translation and speech synthesis in speech-to-speech translation system" proceedings of 5108978-1-4577-0539-7/11/$26.00 ©2011 IEEE.

[3] Nil Goksel-Canbek2 Mehmet Emin Mutlu, "On the track of Artificial Intelligence: Learning with Intelligent Personal Assistant" International Journal of Human Sciences, 13(1), 592-601. doi:10.14687/ijhs.v13i1.3549.

[4] Harshita Phatnani, Mr. Jyotiprakash Patra and Ankit Sharma' "CHATBOT ASSISTING: SIRI" Proceedings of BITCON-2015 Innovations For National Development National Conference on : Research and Development in Computer Science and Applications, E-ISSN2249–8974.

[5] Sutar Shekhar, Pophali Sameer, Kamad Neha, Prof. Devkate Laxman, " An Intelligent Voice Assistant Using Android Platform" , March 2015, IJARCSMS, ISSN: 232 7782

[6] VINAY SAGAR, KUSUMA SM, "Home Automation Using Internet of Things", June-2015, IRJET, e-ISSN: 2395 -0056

[7] https://www.cnet.com/products/ivee-sleek/reviews/

[8] https://www.cnet.com/products/athom-homey/preview/