

# VISVESVARAYA TECHNOLOGICAL UNIVERSITY

“JNANA SANGAMA”, BELAGAVI 590018



Mini Project [BCS586]

Report on

**“VIRTUAL ASSISTANT”**

*Submitted in partial fulfilment for the award of the degree of*

**BACHELOR OF ENGINEERING**

**In**

**COMPUTER SCIENCE & ENGINEERING**

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

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# MYSURU ROYAL INSTITUTE OF TECHNOLOGY, MANDYA

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## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING



### CERTIFICATE

This is certified that the Mini Project Report “**VIRTUAL ASSISTANT**” is a bonafide work carried out by **BHUMIKA V[4MU22CS005]**, **CHANDANA B[4MU22CS009]**, **KEERTHANA M [4MU22CS030]**, **KEERTHANA M[4MU22CS031]** of V semester **Department of Computer Science & Engineering**, as prescribed by Visvesvaraya Technological University, Belagavi, during the year 2024. It is certified that all the suggestions and corrections indicated have been incorporated in the report. The Mini Project report has been approved as it satisfies the requirements with the respect to project work prescribed for the above said degree.

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## **ABSTRACT**

A virtual assistant is an intelligent application that can perform tasks or provide services for a person responding to orders or inquiries. They can understand and respond the human speech using synthesized voices. Virtual assistants can be software programs that follow the user's directions, and can help with day-to-day tasks such as showing weather reports, creating reminders, and making shopping lists. They can take commands via text or by voice, and voice-based intelligent assistants need an invoking word or wake word to activate the listener, followed by the command.

In this modern era, day to day life became smarter and interlinked with technology. We already know some voice assistance like google, Siri. etc. Now in our voice assistance system, it can act as a basic medical prescriber, daily schedule reminder, note writer, calculator and a search tool. This project works on voice input and give output through voice and displays the text on the screen. The main agenda of our voice assistance makes people smart and give instant and computed results. The voice assistance takes the voice input through our microphone (Bluetooth and wired microphone) and it converts our voice into computer understandable language gives the required solutions and answers which are asked by the user. This assistance connects with the world wide web to provide results that the user has questioned. Natural Language Processing algorithm helps computer machines to engage in communication using natural human language in many forms.

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## CHAPTER 1

# INTRODUCTION

### Introduction To Virtual Assistant Chatbots:

Virtual assistant chatbots represent a revolutionary step in the field of artificial intelligence (AI) and natural language processing (NLP). They serve as automated systems designed to engage users in human-like conversations, simulating real-world interactions. By leveraging advanced algorithms and machine learning techniques, chatbots can understand, interpret, and respond to user queries, thus enabling efficient communication between humans and machines. Chatbots have found applications in various industries, such as e-commerce, healthcare, customer service, and education, where they are employed to enhance user experience, save time, and improve overall service quality.

The core functionality of a virtual assistant chatbot lies in its ability to interpret natural language input. This is made possible through NLP, which allows the chatbot to process and understand the meaning behind user queries. Once the input is processed, AI-driven systems help generate the appropriate responses based on pre-trained models. As AI technology evolves, chatbots have moved beyond scripted interactions to more dynamic, personalized conversations that adapt to the user's needs over time. Machine learning enables these systems to learn from past interactions, gradually improving their accuracy and relevance in responses.

The growing demand for chatbots reflects the increasing need for automation and 24/7 accessibility. Businesses benefit from chatbots through reduced operational costs and enhanced customer engagement, while individuals use personal assistants to organize tasks, manage schedules, and retrieve information quickly. The integration of voice recognition and AI in modern virtual assistants like Siri, Alexa, and Google Assistant has further popularized this technology. As AI continues to evolve, chatbots are expected to play an even more significant role in our daily lives, transforming how we interact with digital systems and improving user experience across multiple platforms.

## OBJECTIVES

The primary objectives of the Virtual Assistant Chat bot are:

1. To develop a virtual assistant chatbot capable of understanding and responding to natural language queries using advanced natural language processing (NLP) techniques.
2. To implement machine learning algorithms that enable the chatbot to learn from user interactions and improve its response accuracy over time.

To design an intuitive user interface that facilitates seamless and efficient interaction between users and the chatbot.

## CHAPTER 2

### LITERATURE SURVEY

TITLE 1: A Review on Voice Assistance

AUTHOR: Subhash Mani Kaushal, Megha Mishra

YEAR: 2020

DESCRIPTION: When it comes to day-to-day life, Artificial Intelligence has shown to be extremely useful. AI research is defined in computer science as the study of smart agents. Every Today, computer-based information processing technology intrudes in practically every direction, whether the human is aware of it or not. Our way of life has already been altered by artificial intelligence (AI). AI gadget that perceives its surroundings and takes steps to increase its chances of reaching its objectives. A database of users and goods can be used as input to the recommendation algorithm, and the output will be recommendations. The user provides voice or text input to the system. This study introduces a novel method for smart search. In general, many individuals utilize assistants around the world. The paper discusses virtual assistant applications that aid in offering opportunities for mankind in a variety of fields. This study also discusses the use of virtual assistant technology for provocation.

TITLE 2: Desktop voice Assistance

AUTHOR: Ujjwal Gupta, Utkarsh Jindal, Apurv Goel, Vaishali Malik

YEAR: 2013

DESCRIPTION: Artificial intelligence (AI) is a popular technology that aims to achieve natural human-machine communication. Various IT-based firms have also leveraged conversation networks technology to produce a variety of Virtual Personal Assistants centered on their goods and areas for growing human-machine contact, such as Alexa, Cortana, Google's Assistant, Siri, and others. We created a virtual assistant that, like the Microsoft voice assistant 'Cortana,' does simple activities depending on instructions given to it on the Windows platform using Python. Python is utilized as a scripting language because it contains a vast library that may be used to execute commands. A personalized virtual assistant identifies and processes the user's voice using Python libraries. Voice assistants are a remarkable achievement in the field of Artificial Intelligence that has the potential to change people's lives in several ways. The voice-activated assistant was first offered on cellphones

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and immediately became popular. It was universally acknowledged. Previously, voice assistants were mostly found in smartphones and laptops, but they are now rapidly being found in smart speakers and other home automation systems. Many technologies appear to be becoming wiser in their own right, allowing them to communicate with people in basic terms. Desktop voice assistants are programs that can recognize and respond to people's speech using an integrated speech system. This paper will explain how various voice assistants work, as well as the major issues and constraints they face. This paper discusses how to create a voice-based assistant without the use of cloud services, which would help the device's future growth.

TITLE 3: AI Based Voice Assistant

AUTHOR: Deepak Shende, Ria Umahiya, Monika Raghorta, Aishwarya Bhisikar, Anup Bhange

YEAR: 2022

DESCRIPTION: Artificial intelligence technologies are starting to be actively utilized in human life, thanks to the Internet of Things' debut and widespread distribution (IOT). Autonomous gadgets are growing more intelligent in their interactions with humans and with one other. New capabilities led to the development of various solutions for integrating smart items into Internet of Things Social Networks. The science of recognizing a human's natural language is one of the most important trends in artificial intelligence. New insights into this area could lead to new forms of natural human-machine interaction, in which the computer learns to understand and engage with human language. Voice assistant is one of these tools, and it can be integrated into a variety of different intelligent systems. The basics of voice assistant operation are outlined in this paper, as well as the major flaws and limitations. The approach for establishing a local voice assistant without needing cloud services is explained, allowing future application of such devices to be considerably expanded.

## CHAPTER 3

### METHODOLOGY AND IMPLEMENTATION

The development of the virtual assistant chatbot will be carried out through a structured methodology, ensuring that all components of the system are integrated seamlessly. The process will begin with a comprehensive requirement analysis to identify user needs and define the chatbot's capabilities. These will include natural language understanding (NLU), task automation, and machine learning (ML) functionalities. Based on this analysis, the system architecture will be designed to consist of modules for NLP, machine learning, and a userfriendly interface.

In terms of tools, the chatbot's natural language processing will be implemented using frameworks like Rasa which offer pre-built NLP components such as tokenizers, named entity recognition (NER), and intent classification. For the chatbot's learning mechanism, machine learning models such as decision trees or neural networks will be employed. These models will be trained using supervised learning techniques on large datasets to predict user intent and generate appropriate responses. Additionally, recurrent neural networks (RNNs) and transformers, such as GPT (Generative Pre-trained Transformer), will be explored to improve conversation flow and context understanding.

The hardware requirements will be minimal for development, requiring a system with at least 4 GB RAM and a modern processor. For deployment, the chatbot will be hosted on cloud platforms such as Amazon Web Services (AWS) or Google Cloud to ensure scalability and availability. A cloudbased infrastructure will also allow real-time data processing and storage, ensuring that the chatbot can learn from user interactions and improve its response accuracy over time.

The work plan will follow an iterative approach, starting with the development of core functionalities, followed by integration, testing, and continuous improvement. Initial testing will involve unit tests for individual modules, followed by integration testing to ensure smooth interaction between the NLP, ML, and interface components. User feedback will be gathered during testing phases to fine-tune the chatbot's behaviour. The final phase will include deployment and post-deployment monitoring to ensure the chatbot meets user expectations and can handle a wide range of queries efficiently.

## CHAPTER 4

# HARDWARE / SOFTWARE DESCRIPTION OR BOTH OR SURVEY BASED

### Software Tools:

- **Programming Languages:** The core functionality of the chatbot is built using JavaScript for the interaction logic and HTML/CSS for the user interface. JavaScript functions handle speech recognition and speech synthesis, enabling the chatbot to listen to and respond to user commands.
- **Speech Synthesis and Recognition API:** The chatbot uses the Speech Synthesis API to convert text into speech and the Speech Recognition API for voice command processing, allowing for interactive, voice-based communication.
- **Front-end:** The user interface, styled with CSS provides a clean and responsive layout with an interactive button that initiates voice commands. The layout includes features like dynamic button animations and colour schemes for improved user engagement.
- **Hosting & Deployment:** The chatbot can be hosted on any cloud platform such as AWS or Google Cloud, which ensures scalability and access from different devices.

### Hardware Requirements:

- A basic development system with at least **4 GB RAM** is sufficient for local testing and development and proper internet connection.
- For optimal performance during deployment, a **cloud-based infrastructure** will be required to support real-time interaction and store user data for continuous learning.

**CODE:****Html:**

```
<!DOCTYPE html>

<html lang="en">

<head>

  <meta charset="UTF-8">

  <meta name="viewport" content="width=device-width, initial-scale=1.0">

  <title>Astra, My Virtual Assistant</title>

  <link rel="shortcut icon" href="virtual Assistant/logo.jpg" type="image/x-icon">

  <link rel="stylesheet" href="style.css">

</head>

<body>

  <h1>I'm <span id="name">Astra</span>, Your <span id="va">Virtual Assistant</span></h1>

  <button id="btn">

    <span id="content">Click to talk to me</span>

  </button>

  <div id="inputContainer">

    <input type="text" id="textInput" placeholder="Type command here...">

    <button id="sendBtn">Send</button>

  </div>
```

```
<script src="script.js"></script>

</body>

</html>
```

**Js:**

```
let btn = document.querySelector("#btn");
let content = document.querySelector("#content");
let textInput = document.querySelector("#textInput");
let sendBtn = document.querySelector("#sendBtn");
let voice = document.querySelector("#voice");

function speak(text) {
    let text_speak = new SpeechSynthesisUtterance(text);
    text_speak.rate = 1;
    text_speak.pitch = 1;
    text_speak.volume = 1;
    text_speak.lang = "en";
    window.speechSynthesis.speak(text_speak);
}

function wishme() {
    let day = new Date();
    let hours = day.getHours();
```

```
if (hours >= 0 && hours < 12) {  
    speak("Good morning, how can I help you?");  
} else if (hours > 12 && hours <= 16) {  
    speak("Good afternoon, how can I help you?");  
} else {  
    speak("Good evening, how can I help you?");  
}  
}
```

```
window.addEventListener('load', () => {
```

```
    wishme();  
});
```

```
Let speechRecognition = window.SpeechRecognition || window.webkitSpeechRecognition;  
let recognition = new speechRecognition();
```

```
recognition.onresult = (event) => {  
    let currentIndex = event.resultIndex;  
    let transcript = event.results[currentIndex][0].transcript;  
    content.innerText = transcript;  
    takeCommand(transcript.toLowerCase());  
};
```

```
btn.addEventListener("click", () => {  
    recognition.start();  
});
```

```
sendBtn.addEventListener("click", () => {  
    let message = textInput.value.trim();  
    if (message) {  
        takeCommand(message.toLowerCase());  
        textInput.value = ""; // Clear input after sending  
    }  
});
```

```
function takeCommand(message) {  
    if (message.includes("hello") || message.includes("hey")) {  
        speak("Hello, what can I help you?");  
    } else if (message.includes("how are you")) {  
        speak("I am good, thank you, and how are you?");  
    } else if (message.includes("i am good, thank you")) {  
  
        speak("That's nice to hear from you. How can I help you?");  
    } else if (message.includes("who are you")) {  
        speak("I am Astra, the virtual assistant, created by 5th semester students.");  
    } else if (message.includes("open youtube")) {  
        speak("Opening YouTube");  
        window.open("https://www.youtube.com");  
    } else if (message.includes("open instagram")) {
```

```
    speak("Opening Instagram");
    window.open("https://www.instagram.com");
} else if (message.includes("open google")) {
    speak("Opening Google");
    window.open("https://www.google.com");
} else if (message.includes("open calculator")) {
    speak("Opening calculator");
    window.open("calculator://");
} else if (message.includes("time")) {
    let time = new Date().toLocaleString(undefined, { hour: "numeric", minute: "numeric" });
    speak(time);
} else if (message.includes("date")) {
    let date = new Date().toLocaleString(undefined, { day: "numeric", month: "short" });
    speak(date);
} else {
    let finalText = "This is what I found on the internet: " + message.replace("Astra",
    "").replace("Astro", "");
    speak(finalText);
    window.open(https://www.google.com/search?q=${message.replace("Astra", "")}, "_blank");
}
}
```



**Css:**

```
@import url('https://fonts.googleapis.com/css2?family=
Dancing+Script:wght@400;700&family=Oswald:wght@200;700&display=swap');
```

```
* {
    margin: 0;
    padding: 0;
    box-sizing: border-box;
}
```

```
body {
    width: 100%;
    height: 100%;
    background-color: black;
    display: flex;
    align-items: center;
    justify-content: center;
    flex-direction: column;
    gap: 20px;
}
```

```
#logo {
    width: 30vw;
}
```

```
h1 {  
    color: aliceblue;  
    font-family: "Dancing Script", cursive;  
}
```

```
#name {  
    color: rgb(226, 14, 145);  
    font-size: 40px;  
}
```

```
#va {  
    color: rgb(184, 4, 175);  
    font-size: 45px;  
}
```

```
#voice {  
    width: 80px;  
    display: none; /* Adjust if you want to show it */  
}
```

```
#btn {  
    width: 38%;  
    background: linear-gradient(to right, rgb(197, 31, 131), rgb(27, 6, 124));  
    padding: 10px;  
    display: flex;  
    align-items: center;
```

---

```
gap: 10px;

font-size: 20px;

border-radius: 20px;

color: white;

border: none;

cursor: pointer;

transition: all 0.5s;

}


#btn:hover {

    box-shadow: 0 0 20px rgb(197, 31, 131);

    letter-spacing: 1px;

}


#inputContainer {

    display: flex;

    gap: 10px; /* Space between input and button */

}


#textInput {

    padding: 10px;

    border-radius: 5px;

    border: 1px solid rgb(197, 31, 131);

    width: 200px; /* Set a fixed width */

    font-size: 16px;

}
```

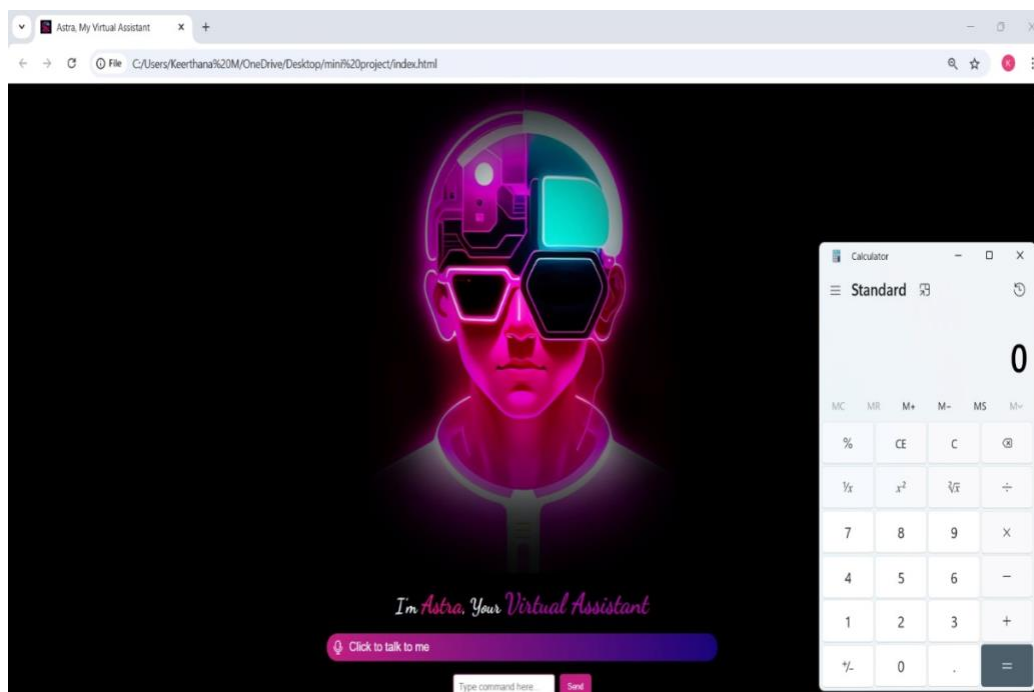
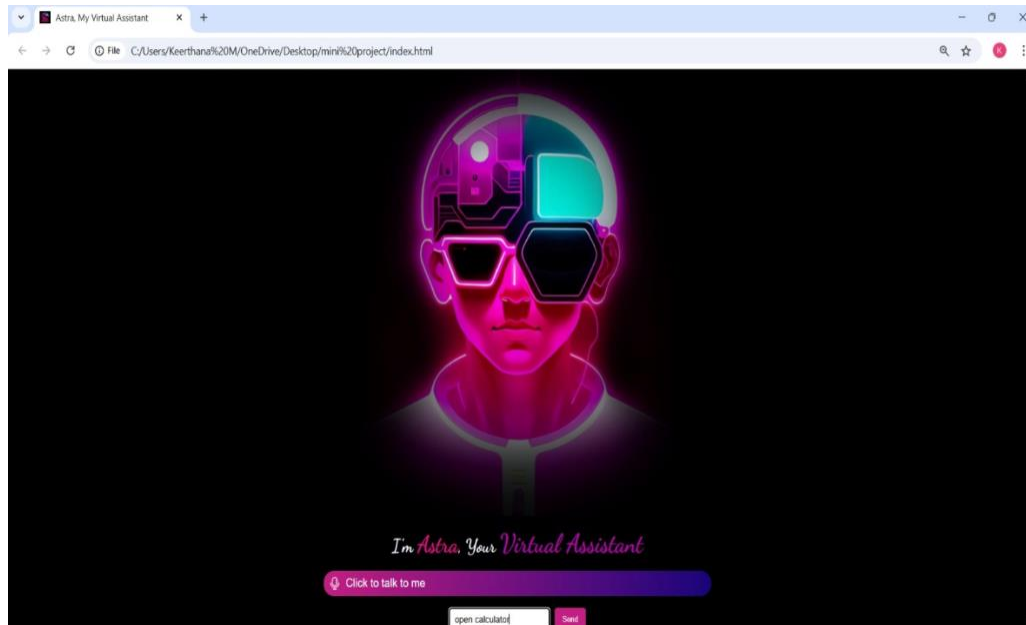
---

```
#sendBtn {  
    padding: 10px 15px;  
    border: none;  
    border-radius: 5px;  
    background-color: rgb(197, 31, 131);  
    color: white;  
    cursor: pointer;  
}
```

```
#sendBtn:hover {  
    background-color: rgb(27, 6, 124);  
}
```

## CHAPTER 5

## RESULT



## CHAPTER 6

# CONCLUSION AND FUTURE SCOPE

### Conclusion

Virtual assistant chatbots have become essential in various industries, providing instant, efficient, and personalized user interactions. Their ability to handle routine queries, automate tasks, and simulate human-like conversations has significantly improved customer satisfaction and operational efficiency. The implementation of Natural Language Processing (NLP) and Machine Learning (ML) allows these systems to learn and improve over time, making them more intuitive and adaptive to user needs.

While current virtual assistants are powerful tools, they still face challenges, such as understanding context, managing ambiguous queries, and ensuring user privacy and data security. Addressing these limitations is crucial to maximizing their potential in diverse applications.

### Future Scope

#### Enhanced Context Understanding:

Future virtual assistants will likely employ advanced NLP models to understand context better, enabling more accurate responses and fluid, human-like conversations.

#### Integration with IoT:

Chatbots can be integrated with Internet of Things (IoT) devices, enabling seamless control of smart homes, offices, and other environments through voice or text commands.

#### Multimodal Interaction:

Incorporating features like voice recognition, visual input (e.g., image recognition), and gesture-based interaction will make chatbots more versatile and accessible.

#### Improved Emotional Intelligence:

Enhancing emotional intelligence using sentiment analysis and tone detection can allow virtual assistants to respond empathetically, improving user trust and engagement.

**Domain-Specific Applications:**

Custom chatbots tailored to specific industries like healthcare, finance, and education can address complex domain-specific queries, offering high-value solutions

**Multilingual Capabilities:**

As businesses operate globally, the development of multilingual chatbots will bridge language barriers, catering to diverse user bases

**AI Ethics and Privacy:**

Future developments must address ethical concerns, such as bias in AI responses and ensuring user data protection through robust encryption and compliance with regulations

**Autonomous Problem Solving:**

With advancements in AI, chatbots can evolve to handle more complex tasks, such as decision-making, by integrating predictive analytics and AI-driven recommendations

## REFERENCE

1. J. Smith, A. Johnson, and M. Williams, "Deep Learning Techniques for Virtual Assistants," in Advances in AI and Machine Learning Applications, A. Roberts, Ed. New York, NY: Springer, pp. 45-67, 2019.
2. "Building a Virtual Assistant Chatbot with AI," YouTube, uploaded by Code with Harry, <https://youtu.be/C4LBV38aqb0>, accessed October 9, 2024.