



Home Automation Using Smart AI Assistant

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 30 Nov 2023	<p>Artificial intelligence is taking over all the platforms and applications and making them more and more user friendly and intelligent and gives the application a human like behaviour and thinking. AI is being used everywhere now-a-days because applications that use AI are able to learn and improve and require less maintenance. This paper "Home automation using smart AI assistant" is a voice command-based AI assistant coded using python and Natural Language Processing NLP that can respond to user queries and responds to voice-based commands of the user. Using this AI Assistant users can send emails to anyone just by speaking the receiver's name, subject of email and the email body. The users can send WhatsApp messages to any of their contacts just speak the message and to whom you want to send it, users can do google searches and open google tabs by voice search, users can do Wikipedia searches and can also open any YouTube video they want to watch. With this AI Assistant we can also get weather updates and news updates, just speak what news updates you want and the Assistant will read it for you. We can also check the computer performance, add remainders and to-dos. We can open our documents, play our favourite music or watch our favourite movie and do many more things just by a simple voice command. This assistant is also used for voice-controlled home automation. Using this Assistant, we can control our home electrical appliances with simple voice commands like turn on the room lights, fans, AC etc.</p>
CC License CC-BY-NC-SA 4.0	Keywords: Home Automation, Artificial Intelligence, Voice Command, NLP

1. Introduction

Artificial intelligence and machine learning based smart assistants are now used by almost everyone. Different platforms have their own assistants like Google, Apple, Windows etc. Many developers are working on applications that can interact with the users like an artificial human, hence looking at the popularity of smart assistants across all the platforms we decided to make such a smart assistant for our computers/laptops. This assistant will hear whatever the user says or asks to do and using its database and intelligence will give the user the best possible result of his/her query. It can be used for searching anything on the internet. It can be used for asking questions, it can be used to open any application in your computer using voice commands, you can use it to play your favorite music from your library just name the song and enjoy. As AI is used in almost everything now-a-days, today we have smart watches, smart cars and bikes, smart phones, even smart shoes. The scope is very large and this technology is developing and learning every day. Hence, we are using our assistant as a home automation tool as well. Ease of living projects are the need of the future and can help many people to do their tasks quickly and can also be very useful for our elders, people who are disabled and many others and hence we decided to make this project [1-15].

Problem Definition

For making this AI assistant there are three main stages. Firstly, finding and implementing all the features we want in our AI Assistant like sending mails, messages, getting news updates, google searches etc. All the different packages and libraries for these features were implemented in our project.

Secondly, we need proper testing of all the features of our AI Assistant, whether it responds properly for all the voice commands the user gives and Lastly implementing the Home automation feature in our AI assistant and testing the inputs of the Arduino UNO board for our voice commands.

2. Materials And Methods

The process of the Home Automation and designing the AI Assistant consists of four main stages that are: -

1. Adding the different functions for different voice commands.

The AI Assistant has different functions like sending mail function, getting news updates function etc. The first stage was to add all these functions to our Assistant using different Python libraries, packages and APIs like text to speech conversion, Wikipedia library, News and Weather API and many more such functions.

2. Testing the AI features with different user inputs and voice commands.

The second stage was to test all our functions for different user voice inputs that we did using Natural Language Processing library for python call NLTK. We divided the voice input of the user into different sub strings and matched the main keyword to the function like if the user says “Play Shar Tank on YouTube”, using NLP we extract the two keywords that are “YouTube” and “Shark Tank” and then we pass the keyword of what video we want to watch to our YouTube function.

3. Coding the Arduino UNO board for home automation features.

For this stage use connected different home electrical appliances to the different ports of the Arduino board and tested manually if they work or not.

4. Connecting the Arduino Uno board with our AI Assistant.

Finally, we connected the Arduino Uno Board to our AI Assistant and tested the working of the electrical appliances with voice commands.

Proposed System

This project “Home automation using AI assistant” is coded using python language and runs on any python IDE. The project has many different python functions that together make up the AI assistant. The main function is the python speech to text convertor that takes the user voice commands and converts it into a String using NLP and then the string contents are matched with the different assistant functions and if the string matches the program runs that function and the task that the user wants is completed like sending a mail, doing a Google search etc. The home automation is done using an Arduino Uno board and the serial inputs of the board are controlled using the python. So, when the user wants to turn on of off any home electrical appliance the serial input of “on” or “off” is sent to the Arduino board and the request is completed

Hardware Requirements: -

- i. Arduino Uno
- ii. Computer/Laptop – any OS

Software Requirements: -

- i. Arduino IDE
- ii. Python

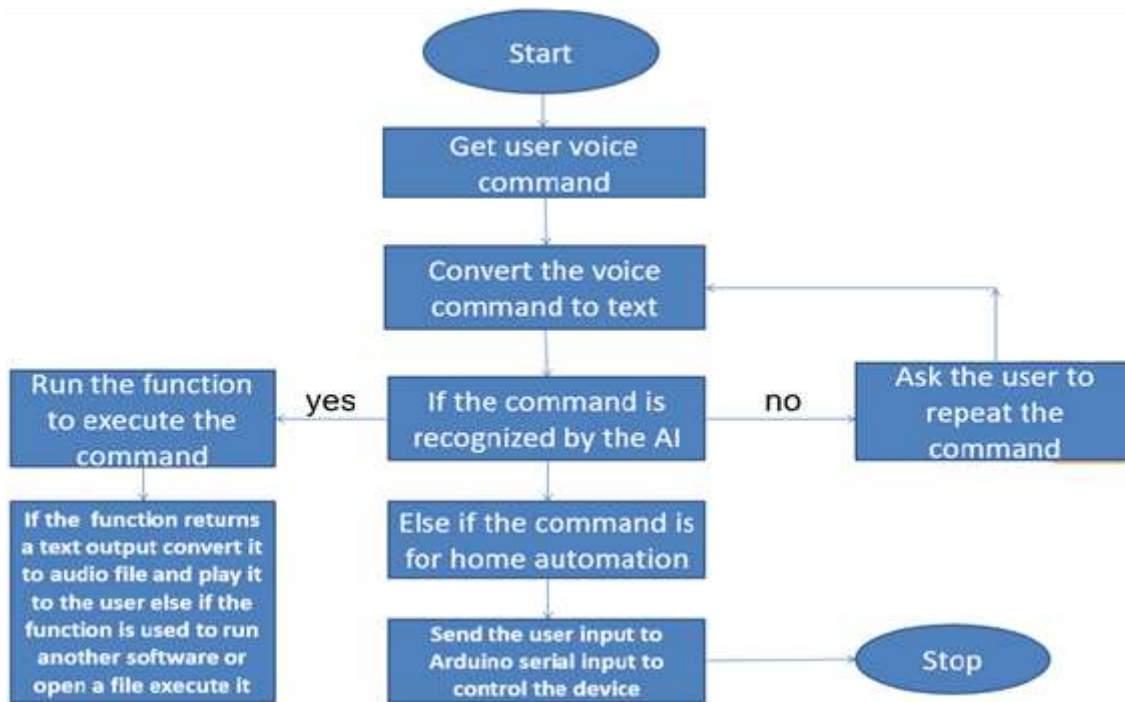


Fig. 1 Flow chart of the proposed system

Applications

- Google and Wikipedia searches
- Opening files and applications
- Text to speech conversion
- Speech to text conversion
- Playing music and YouTube videos
- Sending WhatsApp messages
- Sending Emails
- Getting weather updates
- Getting latest news and Covid-19 updates
- Adding reminders
- Checking computer performance
- Reading documents and web pages
- Controlling home electrical appliances

VI. OUTPUT IMAGES

Sending Emails

```
I'm Listning...
Almost done ...
moon send an email
I'm Listning...
Almost done ...
Gaurav
gauravsuhag7ds@gmail.com
I'm Listning...
Almost done ...
business meeting
I'm Listning...
Almost done ...
I have a meeting at 6:00 a.m. tomorrow
Email is successfullly sent
```

Fig. 2. How to send emails

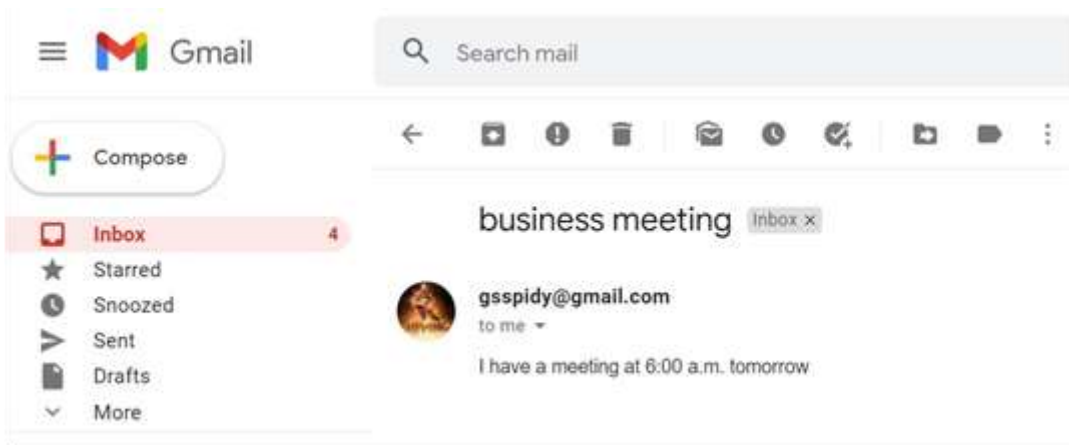


Fig. 3 Gmail Box

Wikipedia Searches

```
Gaurav@DESKTOP-DSARI1UI MINGW64 /g/python AI/AI Assistant
$ python assistant.py
I'm listning...
Almost done ...
do a Wikipedia search moon
I'm Listning...
Almost done ...
basketball
Basketball is a team sport in which two teams, most comonly of five players each, opposing one another on a rectangular court, compete with the primary objective of shooting a basketball (approximately 9.4 inches (24 cm) in diameter) through the defender's hoop (a bask et 18 inches (46 cm) in diameter mounted 10 feet (3.048 m) high to a backboard at each end of the court) while preventing the opposing team from shooting through their own hoop. A field goal is worth two points, unless made from behind the three-point line, when it is worth three.
I'm listning...
Almost done ...
moon go offline
```

Fig. 4 AI assitant

Google Search

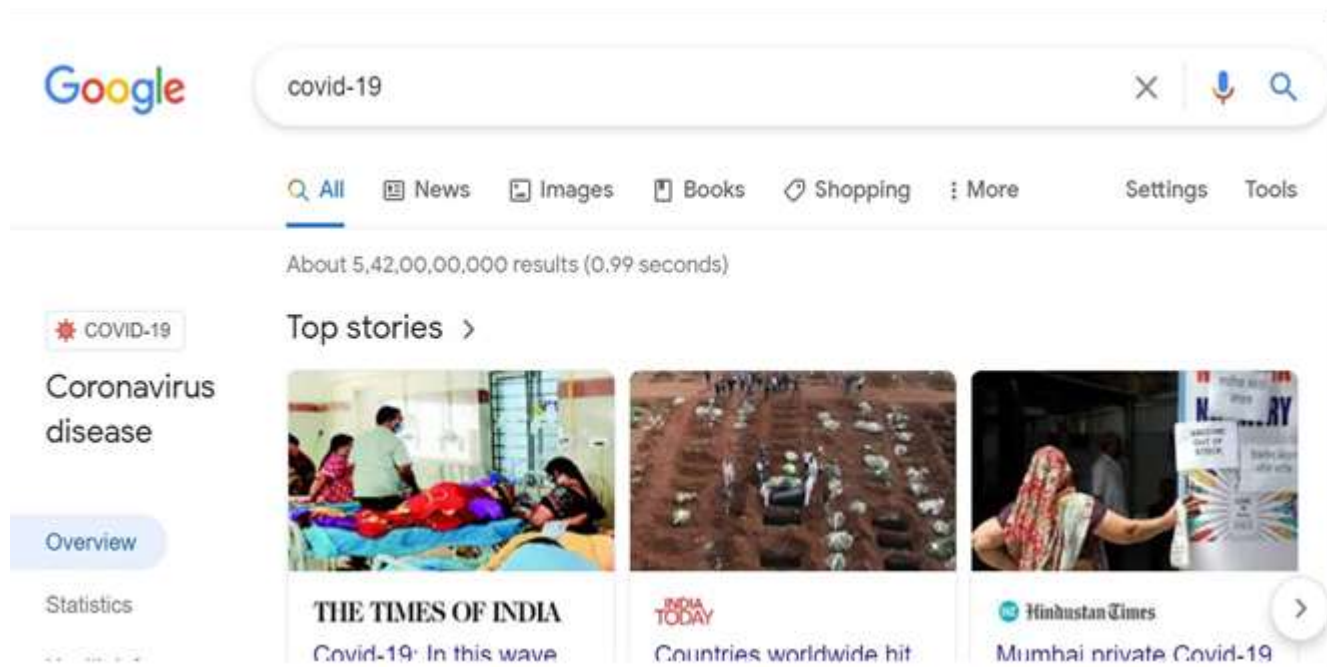


Fig. 5. Google Search Results

1. Sending WhatsApp messages



Fig. 6. Sending inputs for whatsapp

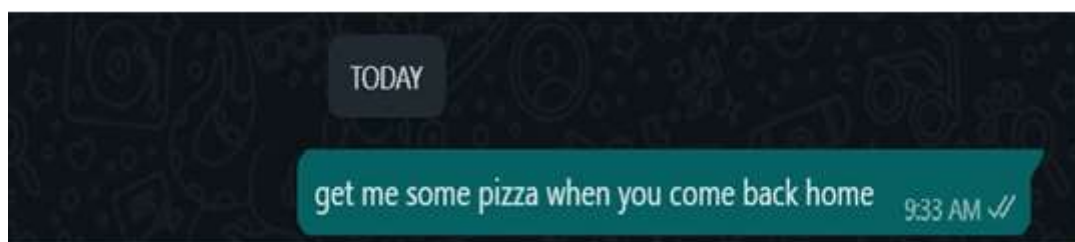


Fig. 7. Whatsapp Message

1. News Updates

```
Gaurav@DESKTOP-DSARIUI MINGW64 /g/python AI/AI Assistant
$ python assistant.py
I'm Listning...
Almost done ....
Moon tell me some news
I'm Listning...
Almost done ....
covid-19 in India
0The new wave will hurt global efforts and vaccine supplies, experts say. Researchers are scrambling to assess whether new coronavirus variants are playing a role in India.
1Nearly 47% of the active cases have been added to the country's tally in the past 10 days. If this period is narrowed down to the past week, then the country has added more than 55,205 active cases to its tally every single day on average, another all-time re..
2India News: Rahul Gandhi, in his letter to the Prime Minister, demanded an immediate moratorium on Covid-19 vaccine exports and opening up of vaccination to "ever
3NEW DELHI: India reported another record number of new COVID-19 infections on Friday (Apr 9) with daily deaths also hitting their highest in more than five months as the country battles a second wave of infections and states complain of a persistent vaccine s..
4India News: In other serious adverse events too, the overwhelming majority took place in the three-day window. Even as AEFI deaths are reported daily, causality
```

Fig. 8. News Update

Literature Survey

Sustainable Smart Home and Home Automation-Big Data Analytics Approach published by Man Li, Cho Mak, Tony Tang, Herru Li in 2016. This paper talks about technologies that can be used in home automation and can help in sustainable development and saving energy. They used Bluetooth technology and AI for smart home and focused it to save energy and water. Their analysis also shows that people from Bangalore and Chennai have searched the keyword “smart home” the most in South Asia and the demand is increasing. The main focus is to save energy, like using natural light more and dim the electrical lights in presence of natural lights saving electricity and also can detect room temperature and surrounding temperature and control the AC accordingly, main focus is to not use any electrical appliance when it is not required.

2. IoT Based Home Automation and Analysis Using Machine Learning. Published by Sakshi P, Shanu Jaiswal, Nitin Yadav and Jayashree S in 2019. This is a research paper that talks about the use of machine learning and data analysis in smart home automation. This paper survey shows home automation is mostly used for helping old age and handicapped people. Machine learning helps in understanding how the user uses the different home appliances and over time learn their behaviour and predict what the user wants for example if the user works in a office on weekdays and comes home by 6 P.M the smart assistant can learn the users behaviour and accordingly can pre cool the room 15 minutes before he reaches and if the user watches news every day at 8 P.M the smart home can turn on the T.V at that time automatically and give the user a notification. The scope of machine learning with home automation is very large.

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Arduino Uno documentations <https://www.arduino.cc/en/Tutorial/HomePage>
JARVIS – An interpretation of AIML with Python <https://ieeexplore.ieee.org/document/8993344>
Artificial Intelligence based voice-assistant <https://ieeexplore.ieee.org/document/9210344>
A step towards Home Automation using IOT <https://ieeexplore.ieee.org/abstract/document/8844945>
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