BRIAN: Basic Response Interaction and Assistance Network

Dharini U[a], U Prjwal[b], Jayanth N[c], Vishal NV[d], Suman Jayakumar[e]

a Student, Dept. of Information Science and Engineering, Vidya Vikas Institute of Engineering and Technology, Mysore, Karnataka, Pin Code 570028. Affiliated to Visvesvaraya Technological University, Belagavi, Karnataka, Pin Code 590018

b Student, Dept. of Information Science and Engineering, Vidya Vikas Institute of Engineering and Technology, Mysore, Karnataka, Pin Code 570028. Affiliated to Visvesvaraya Technological University, Belagavi, Karnataka, Pin Code 590018

c Student, Dept. of Information Science and Engineering, Vidya Vikas Institute of Engineering and Technology, Mysore, Karnataka, Pin Code 570028. Affiliated to Visvesvaraya Technological University, Belagavi, Karnataka, Pin Code 590018

d Student, Dept. of Information Science and Engineering, Vidya Vikas Institute of Engineering and Technology, Mysore, Karnataka, Pin Code 570028. Affiliated to Visvesvaraya Technological University, Belagavi, Karnataka, Pin Code 590018

e Assistant Professor, Dept. of Information Science and Engineering, Vidya Vikas Institute of Engineering and Technology, Mysore, Karnataka, Pin Code 570028. Affiliated to Visvesvaraya Technological University, Belagavi, Karnataka, Pin Code 590018

ABSTRACT

In the beginning of 1910's, the concept of talking to machines technically known as "virtual assistant" started. Radio Rex was the voice activated toy dog would come out of the house when its name was called released in 1911 that led to major step to the development of Bell Labs' "Audrey", the Automatic Digit Recognition machine in 1952. The project is a software agent that has both natural language and artificial intelligence. The natural language is a technology that involves the combined form of automatic speech recognition while artificial intelligence is the intelligence demonstrated by the machine. As they say, "To move mountains" the virtual assistance has more evolved from a 6 foot tall "Audrey" to a 9.25 inch "Amazon Echo". The core idea behind this initiative is to create an intelligent voice assistant system that can interact with people in their local language so that the system can help them to make their day to day life simpler. The system is designed while taking the rural life in consideration as well as their basic needs. This paper also tends to explore some new possibilities.

Keywords: Virtual Assistant, Software Agent, Artificial Intelligence, Natural language.

1. Introduction

An intelligent virtual assistant (IVA) or intelligentpersonal assistant (IPA) is a software agent thatcan perform tasks or services for an individualbased on commands or questions. In 1990s digitalrecognition technology became a feature of the PCwith IBM and Philips and Lernout & Hauspiefighting for customers. Later, in 1994 the firstsmartphone IBM Simon was launched that laid tothe foundation of smart virtual assistants. Virtualassistants work via Text, Voice and images. Theseassistants use NPL that is Natural ProcessingLanguage to match text or voice input toexecutable commands, AI Artificial Intelligenceand techniques including ML Machine Learningand sometimes Image Processing too. The deviceand the objects that use virtual assistants are smartspeakers like Google Home, Amazon Alexa andAppleHomePod, instant messaging apps, mobileoperating system, appliances, cars etc. They canprovide wide range of services like provinginformation, broadcasting weather reports, playingmusic and videos and also it can be a remainder toyou as well.

* *Corresponding author..*

E-mail address: umeshdharini006@gmail.com

2. Literature Survey

- Speech recognition software has come along, long way to where we are today.Echo is slimmer than a cool drink glass,but the first speech recognition machinesdeveloped during the middle of the 20thCentury nearly took up an entire room.
- In 1773, Russian scientist ChristianKratzenstein, a professor of physiology inCopenhagen, built a peculiar device thatproduced sounds similar to human vowelsusing resonance tubes connected to organpipes.
- A decade later, Wolfgang von Kempelenin Vienna created a similar Acoustic-Mechanical Speech Machine.
- Then in 1881, Alexander Graham Bell, hiscousin Chichester Bell and CharlesSumner Tainter built a rotating cylinderwith a wax coating that used to respond toincoming sound pressure. The inventionpaved the way for the first recordingmachine, the "Dictaphone", patented in1907.
- In 1952 Bell Labs came along "Audrey"the Automatic Digit Recognition machine.
- Audrey was not the only kid on the block,though. In the 1960s, several Japaneseteams worked on speech recognition, withthe most notable ones a vowel recognizerfrom the Radio Research Lab in Tokyo, aphoneme recogniser from Kyoto University, and a spoken-digit recognizer from NEC Laboratories.
- All the way from Acoustic-Mechanical Speech Machine by Wolfgang von Kempelen till today we have come a long way. Today we have many advanced Virtual Assistants like Google Assistant, Amazon's Alexa, Apple's Siri, Samsung's Sam, etc.

3. System Analysis

3.1 Proposed System

- Subroutines may be defined within programs, or separately in libraries that can be used by many programs. BRIAN is a program that will run as a subroutines. This subroutine will responds to the user's voice.
- This subroutine uses python's speech recognition module for recognising the user's voice.
- Subroutine uses google text-to-speech module for the conversion of text to voice.
- Our project provides hands free usage of the system, it responds to the voice, and performs basic functionality like file search, file opening, give details about date, time and system performance etc.

4. System Design
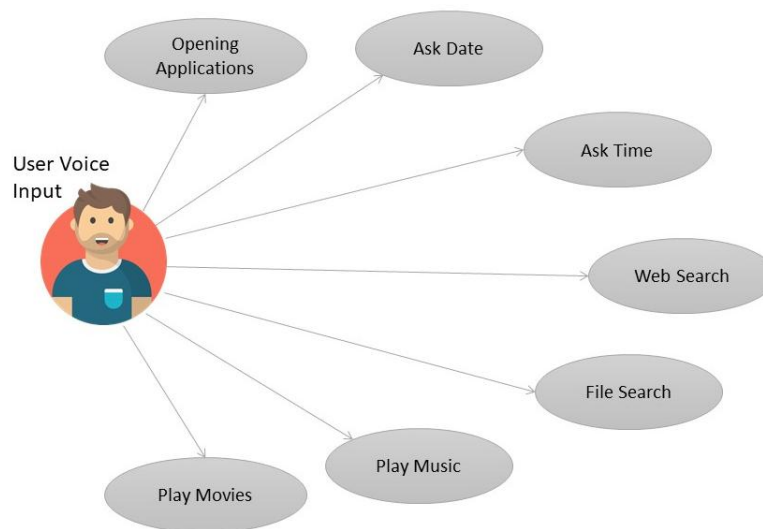
Block Diagram:

Fig 1: Block diagram of BRIAN

Fig 1 represents the functionalities of BRIAN. Based on the user inputs, BRIAN can do the following tasks:

- Open applications
- File search
- Open files
- Play music and movies
- Wikipedia search

5. Algorithm

In this system, skills such as greet, date time, CPU utilization statistics, local file search, web search and opening local files. All these commands are processed in English language only.

Step 1: GREET

The command "Hello" or even the wake word "Brian" would activate this function. As soon the wake word is used the system greets the users.

Step 2: Voice Input

After the system greets, the system takes the voice input given by the user.

Step 3: Conversion

Once the input is received in the form of voice command, the system uses the Python Text-to-Speech to convert the voice input to text.

Step 4: Launch Action Manager

Once the voice command is converted into text, the resultant text is used as input for the Launch Action Manager. Based on the input given by the user, system performs the following tasks:

- **Command "Date" and "Time":** The "Date" and "Time" commands respectively can be used to get the date and time of the running system. The system informs the user on the date and time of the system while the system interacts with the user.
- **Command "CPU stats":** "CPU stats" is the command used to get CPU utilization statistics of the user's system. This skill comes in handy to the user by just commanding the system to get CPU utilization statistics instead of manually checking for it.
- **Command "Search":** The assistant would search for the file through the command "Search" followed by the file name. As the assistant focusses on local lightweight usage, a local file search through voice commands would prove more time efficient than manually searching for it.
- **Command "Wikisearch":** The assistant would search for the file through the command "Wikisearch" followed by the search name. The assistant is capable of searching the user requirements through the internet too instead of just looking for them in local system only. Through this the assistant would return a brief summary of the search carried on by the user.
- **Command "Open":** Any local files stored on the system could be opened/run through the command "Open" followed by the filename. The assistant can open/run any sort of file irrespective of the file type though vocal command of the user.
- **Command "Sleep":** The command "Sleep" is used to close the program temporarily. BRIAN goes to sleep mode if the BRIAN doesn't receives any command from the user for 1 minute (or 60 seconds). The BRIAN program becomes active if it is called by using the command "Hello".
- **Command "Exit":** The command "Exit" is used to bring the program completely out of execution. This command terminates the execution completely. To restart this program, we have to start the BRIAN program manually.

Step 5: Repeat step 4 until the user gives the "Sleep" command or "Exit" command.

Step 6: Exit Program

Once the user gives the command as "Exit", the program closes permanently or by turning off the computer, the program closes by stopping its execution.

6. Conclusion

Today, there are many virtual assistants in the market. Few of them are Amazon's Alexa, Google's Assistant, Apple's Siri, Samsung's Sam, etc. All these virtual assistants are developed in foreign countries. BRIAN (Basic Response Interaction and Assistance Network) supports the "Make in India" Initiative as it is developed by us, Indian students.

Data is the new gold. The major problem in today's world is the data privacy. We can see many companies that produce these virtual assistants use user's data to provide the service. Some collect minimum data to provide the service whereas some companies collect user's data which are not needed for providing the service. These data are used for many purposes like personalized ads, improving the service, influencing local elections, etc. Companies earn billions of dollars out of these data. This threat doesn't stops here. In today's world we are seeing many cyber threats. Many black hat hackers hack into these company's data centers, servers, etc., and ask ransom from the companies or they will leak those data in the dark web for money. This is a major threat to the users and the company. When it comes to BRIAN, it doesn't collects user's data at all. Majority of the process takes place within the local machine itself. So when there's no data collection from the users, there's no problem of data privacy. Hence the problem of data privacy doesn't arises here.

BRIAN (Basic Response Interaction and Assistance Network) supports Windows laptops which can be integrated in other operating systems like Linux based operating systems, Mac OS, etc., in future. It can be incorporated in hand held devices like smartphones with different operating systems. In future, it can also be integrated in voice assistant devices which can be used for controlling IoT devices which has a promising future in the market. For more convenient use, BRIAN can be implemented with regional language feature as future enhancements.

Acknowledgements

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