VOICE ASSISTANT FAVA

Project report in partial fulfilment of the requirement for the

award of the degree of Bachelor of Technology

In

COMPUTER SCIENCE & ENGINEERING

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CERTIFICATE

This is to certify that the project titled VOICE ASSISTANT- FAVA submitted by **SANJIB HALDAR (University Roll No. 3312016009001722), BISHAL SONAR(University Roll No. 3312016009001815)**, **DIBBENDU CHAR(University Roll No.3312016009001799), AHSAN RAZA(University Roll No.3312016009001784)** and **BIKASH KUMAR YADAV(University Roll No. 3312016009001726).**

Students of UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA, in fulfilment of requirement for the degree of Bachelor of Computer Science & Engineering is a bona fide work carried out by them under the supervision and guidance of **Prof. MOUMITA BASU** during 8th Semester of academic session of 2018-2019. The content of this report has not been submitted to any other university or institute for the award of any other degree.

I am glad to inform that the work is entirely original and its performance is found to be quite satisfactory.

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ABSTRACT

This project includes an implementation of an intelligent voice recognition assistant for Desktop where functionality on current existing applications on other platforms is compared. Until this day, there has not been any good alternative for Desktop, so this project aims to implement a voice assistant for the Desktop platform while describing the difficulties and challenges that lies in this task.

Language: English

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CHAPTER 1. INTRODUCTION

Who doesn't want to have the luxury to own an assistant who always listens for your call, anticipates your every need, and takes action when necessary? That luxury is now available thanks to artificial intelligence-based voice assistants.

Voice assistants come in somewhat small packages and can perform a variety of actions after hearing your command. They can turn on lights, answer questions, play music, place online orders and do all kinds of AI-based stuff.

Voice assistants are not to be confused with virtual assistants, which are people who work remotely and can, therefore, handle all kinds of tasks. Rather, voice assistants are technology based. As voice assistants become more robust, their utility in both the personal and business realms will grow as well.

1.1 AIM AND PURPOSE

According to the overall description in the context, the purpose of the project is to develop an Desktop application that provides an intelligent voice assistant with the functionalities as calling services, message transformation, mail exchange, alarm, event handler, location services, music play service, checking weather, searching engine (Google, Wikipedia), camera, Bing translator, Bluetooth headset support, help menu and Windows azure cloud computing.

Many years ago, software programs were developed and run on the computer. Nowadays, smart phones are widely used by all people. About 35 percent of the Americans have some sort of Smartphone. This shows that the market is increasing fast and there are also more capabilities for Smartphone because of this wide use.

1.2 CONTEXT

This project is based on Desktop application development and provide personal assistant using voice recognition or text mode operation. This program includes the functions and services of: calling services, text message transformation, mail exchange, alarm, event handler, location services, music player service, checking weather, Google searching engine, Wikipedia searching engine, robot chat, email, danger alerts. As it integrates most of the mobile phone or desktop services for daily use, it could be useful for getting a more convenient life and it will be helpful for those people who have disabilities for manual operations. This is also part of the reason why it has been chosen as the degree project. This project is originated from a popular application from Apple called "Siri" or say as in Microsoft called "Cortana". This software based project is very interesting, easy going and convenient, with wide real world usage and large developing potential.

This application is not limited by different generations and occupations, and can be applied to many industries that we have in the real world. For instance, the voice assistance is very useful for personal assistants, direction guides or driving, helps among the disabled community, and so on. This is a short description about "Siri" from Wikipedia to illustrate the voice product: "Siri" an intelligent personal assistant and knowledge navigator which works as an application for Apple's iOS.[1] The application uses a natural language user interface to answer questions, make recommendations, and perform actions by delegating requests to a set of web services. Apple claims that the software adapts to the user's individual preferences over time and personalizes results, and performing tasks such as finding recommendations for nearby restaurants or getting directions.

CHAPTER 2. Literature Survey:

To illustrate the relative difficulty of SI recognition, Lenvison (Levinson et al. 1977) reported that recognition accuracy degraded from 88.3% for SD to 65.1% for SI. Lowerre (Lowerre 1977) reported that a SD recognition rate of 98% degrades to 93% in SI mode. Finally, Shikano (Shikano et al. 1986) reported 48% accuracy for using one speaker's templates to recognize another speaker's speech, while 90% accuracy is possible for SD recognition. Many researchers have used a rule of thumb that states: for the same task, SI systems will have three to five times the error rate of SD ones.[2]

In isolated word recognition, the assumption is that the speech to be recognized comprised a single word of phrase and was to be recognized as a complete entity with no explicit knowledge or regard for the phonetic content of the word of phrase. Another implicit assumption is that each spoken utterance has a clearly defined beginning and the ending point that could be found using some type of endpoint detector. This system works well and entirely appropriate in certain application such as "command and control" application, in which user is required to speak the command words at once a time.

The database for speech recognition task also can be small vocabulary based and large vocabulary based. Large vocabulary typically means a vocabulary of about 1000 words or more such as news broadcast speech database. Examples of small-to-moderate based database include digit strings, spelled letter sequence, combination of alphanumeric and etc.

2.1 HISTORY OF VOICE ASSISTANT

In recent times, Voice assistants got the major platform after Apple integrated the most astonishing Virtual Assistant — Siri which is officially a part of Apple Inc. But the timeline of greatest evolution began with the year 1962 event at the Seattle World Fair where IBM displayed a unique apparatus called Shoebox. It was the actual size of a shoebox and could perform scientific functions and can perceive 16 words and also speak them in the human recognizable voice with 0 to 9 numerical digits.
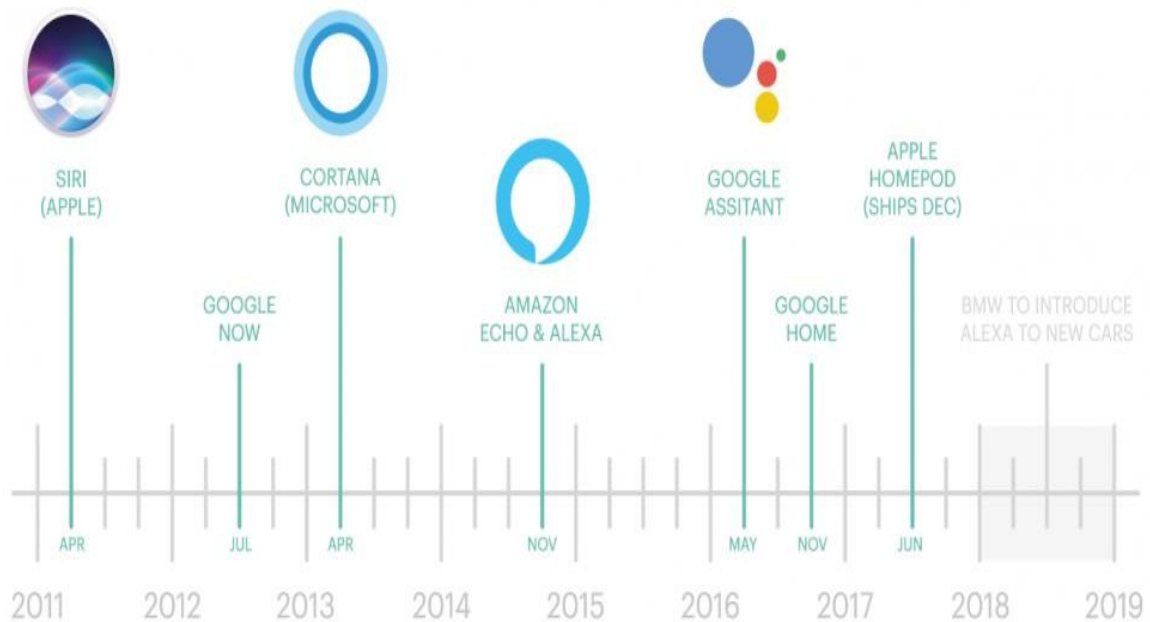
During the period of the 1970s, researchers at Carnegie Mellon University in Pittsburgh, Pennsylvania — with the considerable help of the U.S Department of Defence and its Defence Advanced Research Projects Agency (DARPA) — made Harpy. It could understand almost 1,000 words, which is approximately the vocabulary of a three-year-old child.[3]

CHAPTER 3. PROBLEM STATEMENT & DISCUSSION

3.1 WHAT IS FAVA

FAVA (FULLY AUTOMATED VOICE ASSISTANT) A voice assistant is a digital assistant that uses voice recognition, natural language processing and speech synthesis to provide aid to users through phones and voice recognition applications.

Voice assistants are used in help and service phone lines, smartphones and other places to assist users with tasks, including:

- Requesting information, similarly to inputting a search query.

- Performing mathematical calculations.

- Playing music.

- Sends danger alert if required through email & sms.

Voice assistants are built on artificial intelligence (AI),machine learning and voice recognition technology. As the end user interacts with the digital assistant, the AI programming uses sophisticated algorithms to learn from data input and better itself at predicting the user's needs. Some assistants are built with more advanced cognitive computing technologies which will allow a digital assistant to understand and carry out multi-step requests with numerous interactions and perform more complex tasks, such as booking seats at a movie theatre.

Digital assistants can be contrasted with another application of consumer-facing AI called smart advisors. Smart advisor programs are knowledge-oriented, while digital assistants are task-oriented, although some perform both roles. Popular voice assistants currently include Apple's Siri, Amazon's, Alexa, Google Now, Google Assistant and Microsoft's Cortana.

3.1.a   METHODS AND RESOURCES

This project mainly concerns the work on Software development; request calling between different applications, human-mobile phone interaction, database creation and management, the program will reference a lot of APIs from Google, Wikipedia, and Software development skills.

3.2   ANALYSIS

3.2.a INFORMATION RETRIEVAL

As this program includes the functions and services of: calling services, text message transformation, mail exchange, alarm, event handler, location services, music player service, checking weather, Google searching engine, Wikipedia searching engine, robot chat and help menu. The list below indicates the information and the requirements of each individual function. The program has two modes to well fetch the services and functions. The program will start with voice mode as its primary mode to provide the voice assistant, but the user can

select switching to the text mode if he or she is not well working with the voice mode or the surrounds don't support the voice recognition well.

- Calling service, the application should allow the users to give a call to the person in the contacts. By giving a correct command with the calling request to a stored person, the Android phone should successfully direct to the number of the person requested.

- Text Message transformation, customers are able to send the SMS to a specific person in the contacts. By giving a correct command contains the messaging request keyword together with the destination person, the message should be sent to the destination immediately.

- Mail exchange, customers are able to send the mail to the person with mail address in the contacts. By giving a correct command contains the mail request keyword together with the destination person; the mail should be received by the recipient after it has been sent.

- Alarm, as a basic function on the mobile phone, it is frequently that users need to set the alarm to a specific time. The user could set the alarm through the request with the given time.

- Event handler, the application should allow the user to set as many events as they want. Customers with the event content should be stored and available for the user to check, modify and delete

- Location services, location services provide the functions for the user to check the current location or find the direction to a destination. The user should get an easy to understand map with the locations or routes depending on the category of the request

- Music player service, the music player offers the services to the user to play a named or a randomly picked song in the pre-stored song list on the mobile phone. And it could be stopped when the user wants to terminate it.

- Checking weather, the user could check the weather in any place. In addition, the weather is returned with the temperature and humidity; the user could also check the weather for current day, tomorrow or in next four days.

- Google searching engine, the search engine enable the user to search anything on Google. The search engine will give result list back and displayed on the browser.

- Wikipedia searching engine, the search engine enable the user to search anything on Wikipedia. The result is given back on the web browser with the searched content on Wikipedia

- Help menu, the user can choose the help menu if the user doesn't know how to work with the functions. The help menu gives the list of functions with the examples and explanation of how to work with different functions as well.

3.3 OUR OBJECTIVE

Providing information and entertainment, to otherwise solitary people, hence acts as a personal assistant. People with disabilities can benefit from speech recognition programs. For individuals that are Deaf or Hard of Hearing, speech recognition software is used to automatically generate a closed-captioning of conversations such as discussions in conference rooms, classroom lectures, and/or religious services. Speech recognition is also very useful for people who have difficulty using their hands, ranging from mild repetitive stress injuries to involved disabilities that preclude using conventional computer input devices. In fact, people who used the keyboard a lot and developed RSI became an urgent early market for speech recognition. Speech recognition is used in deaf telephony, such as voicemail to text, relay services, and captioned telephone. Individuals with learning disabilities who have problems with thought-to-paper communication (essentially they think of an idea but it is processed incorrectly causing it to end up differently on paper) can possibly benefit from the software but the technology is not bug proof. Also the whole idea of speak to text can be hard for intellectually disabled person's due to the fact that it is rare that anyone tries to learn the technology to teach the person with the disability. Being bedridden can be very difficult for many patients to adjust to and it can also cause other health problems as well.

It is important for family caregivers to know what to expect so that they can manage or avoid the health risks that bedridden patients are prone to.

In this article we would like to offer some information about common health risks of the bedridden patient and some tips for family caregivers to follow in order to try and prevent those health risks. Depression is also a very common health risk for those that are bedridden because they are unable to care for themselves and maintain the social life that they used to have. Many seniors begin to feel hopeless when they become bedridden but this can be prevented with proper care. Family caregivers should make sure that they are caring for their loved one's social and emotional needs as well as their physical needs. Many family caregivers focus only on the physical needs of their loved ones and forget that they have emotional and social needs as well. Family caregivers can help their loved ones by providing them with regular social activities and arranging times for friends and other family members to come over so that they will not feel lonely and forgotten. Family caregivers can also remind their loved ones that being bedridden does not necessarily mean that they have to give up everything they used to enjoy. But since family members won't always be available at home , the above mentioned problems are still prevalent in these patients , hence our interactive

system will provide them with entertainment (music , movies), and voice responses to general questions. Therefore it behaves as an electronic companion.

3.4   SOFTWARE REQUIREMENTS

To use all of the functionality of the library, you should have:

- **Python** 2.6, 2.7, or 3.3+ (required)
- **PyAudio** 0.2.11+ (required only if you need to use microphone input, Microphone)
- **Google API Client Library for Python** (required only if you need to use the Google Cloud Speech API, recognizer_instance.recognize_google_cloud)

The following requirements are optional, but can improve or extend functionality in some situations:

- On Python 2, and only on Python 2, some functions (like recognizer_instance.recognize_bing) will run slower if you do not have **Monotonic for Python 2** installed.

The following sections go over the details of each requirement.

3.4.a   Python

The first software requirement is Python 2.6, 2.7 or Python3.3+ This is required to use the library.

PyAudio (for microphone users)

PyAudio is required if and only if you want to use microphone input (Microphone). PyAudio version 0.2.11+ is required, as earlier versions have known memory management bugs when recording from microphones in certain situations.
If not installed, everything in the library will still work, except attempting to instantiate a Microphone object will raise an AttributeError.
The installation instructions on the PyAudio website are quite good - for convenience, they are summarized below:

- On Windows, install PyAudio using Pip: execute `pip install pyaudio` in a terminal.
-

- On Debian-derived Linux distributions (like Ubuntu and Mint), install PyAudio using APT: execute sudo apt-get install python-pyaudio python3-pyaudio in a terminal.
- If the version in the repositories is too old, install the latest release using Pip: execute sudo apt-get install portaudio19-dev python-all-dev python3-all-dev && sudo pip install pyaudio (replace pip with pip3 if using Python 3).
- On OS X, install PortAudio using Homebrew : brew install portaudio. Then, install PyAudio using Pip : pip install pyaudio.
- On other POSIX-based systems, install the portaudio19-dev and python-all-dev (or python3-all-dev if using Python 3) packages (or their closest equivalents) using a package manager of your choice, and then install PyAudio using Pip : pip install pyaudio (replace pip with pip3 if using Python 3).

PyAudio wheel packages for common 64-bit Python versions on Windows and Linux are included for convenience, under the third-party/ directory in the repository root. To install, simply run pip install wheel followed by pip install ./third-party/WHEEL_FILENAME (replace pip with pip3 if using Python 3) in the repository root directory. [4]

3.4.b MODULES USED IN THE ASSISTANT

PYAUDIO - PyAudio provides Python bindings for PortAudio, the cross-platform audio I/O library. With PyAudio, you can easily use Python to play and record audio on a variety of platforms.

PYTTSX3 - Pyttsx3 lets you synthesize text in to audio you can hear. It uses native speech drivers when available and works completely offline.

SPEECH_RECOGNITION - Speech recognition is the process of converting spoken words to text. Python supports many speech recognition engines and APIs, including Google Speech Engine

DATETIME - datetime class provides a number of functions to deal with dates, times and time intervals. Date and datetime are an object in Python, so when you manipulate them, you are actually manipulating objects and not string or timestamps. Whenever you manipulate dates or time, you need to import datetime function.

WIKIPEDIA - Wikipedia is a Python library that makes it easy to access and parse data from Wikipedia.

WEBBROWSER - webbrowser module provides a high-level interface which allows displaying Web- based documents to users.
The webbrowser module can be used to launch a browser in a platform- independent manner.

OS - The OS module in python provides functions for interacting with the operating system. OS, comes under Python's standard utility modules. This module provides a portable way of using operating system dependent functionality. The os and os.path modules include many functions to interact with the file system.

SMTP - The smtplib module defines an SMTP client session object that can be used to send mail to any Internet machine with an SMTP or ESMTP listener daemon. SMTP stands for Simple Mail Transfer Protocol.

RANDOM - This module implements pseudo-random number generators for various distributions.

Sys - The sys module provides information about constants, functions and methods of the Python interpreter. dir system gives a summary of the available constants, functions and methods. [5]

3.5   APPLICATIONS

Usage in education and daily life

For language learning, speech recognition can be useful for learning a second language. It can teach proper pronunciation, in addition to helping a person develop fluency with their speaking skills. Students who are blind (see Blindness and education) or have very low vision can benefit from using the technology to convey words and then hear the computer recite them, as well as use a computer by commanding with their voice, instead of having to look at the screen and keyboard.
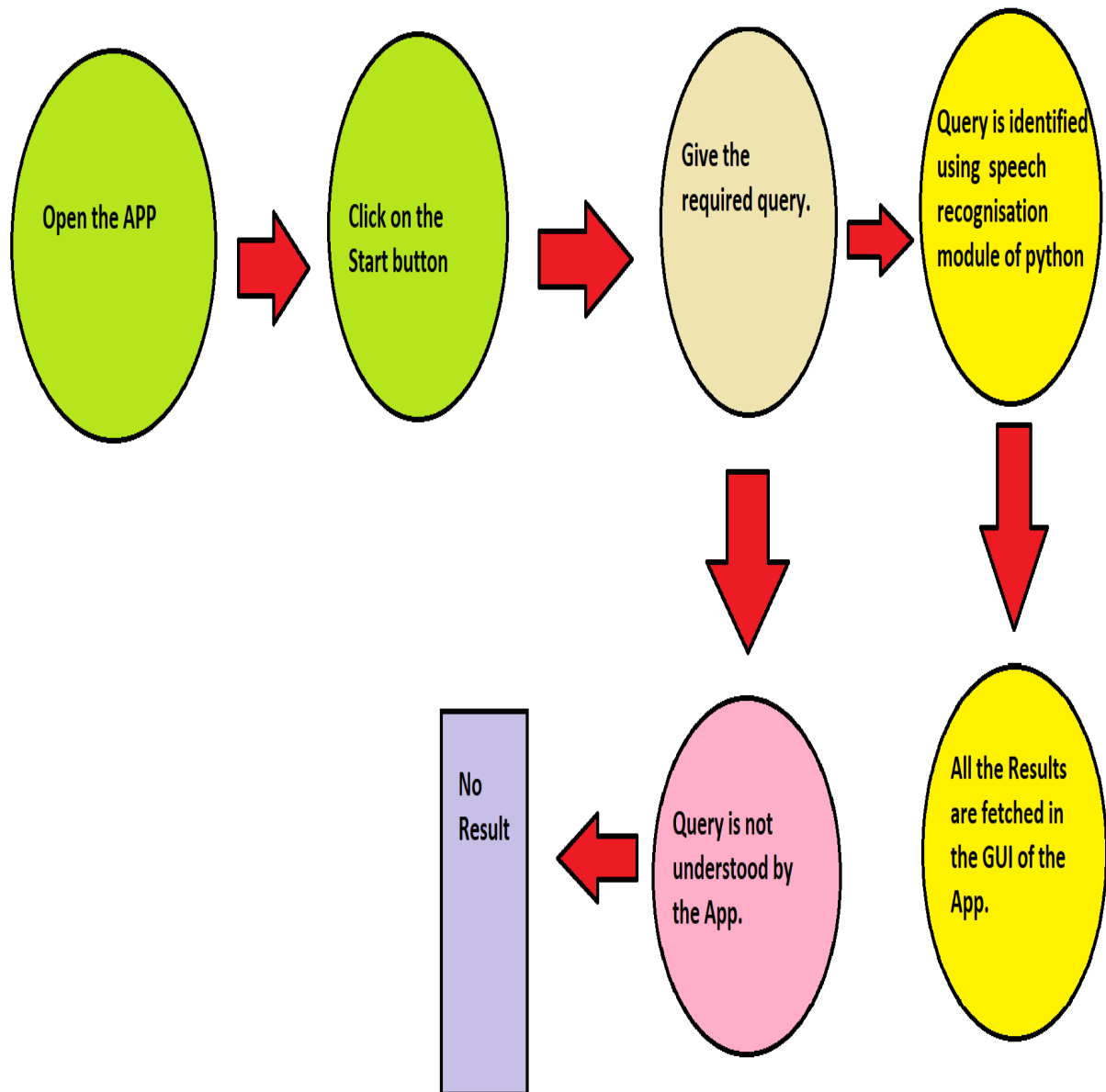
Aerospace (e.g. space exploration, spacecraft, etc.) NASA's Mars Polar Lander used speech recognition from technology Sensory, Inc. in the Mars Microphone on the Lander Automatic subtitling with speech recognition Automatic translation Court reporting (Realtime Speech Writing)

Telephony and other domains

ASR in the field of telephony is now commonplace and in the field of computer gaming and simulation is becoming more widespread. Despite the high level of integration with word processing in general personal computing. However, ASR in the field of document production has not seen the expected [by whom?] increases in use. The improvement of mobile processor speeds made feasible the speech-enabled Symbian and Windows Mobile smartphones. Speech is used mostly as a part of a user interface, for creating predefined or custom speech commands. Leading software vendors in this field are: Google, Microsoft Corporation (Microsoft Voice Command), Digital Syphon (Sonic Extractor), Lumen Vox, Nuance Communications (Nuance Voice Control), Voice Box Technology, Speech Technology Center, Vito Technologies (VITO Voice2Go), Speereo Software (Speereo Voice Translator), Verbyx VRX and SVOX.
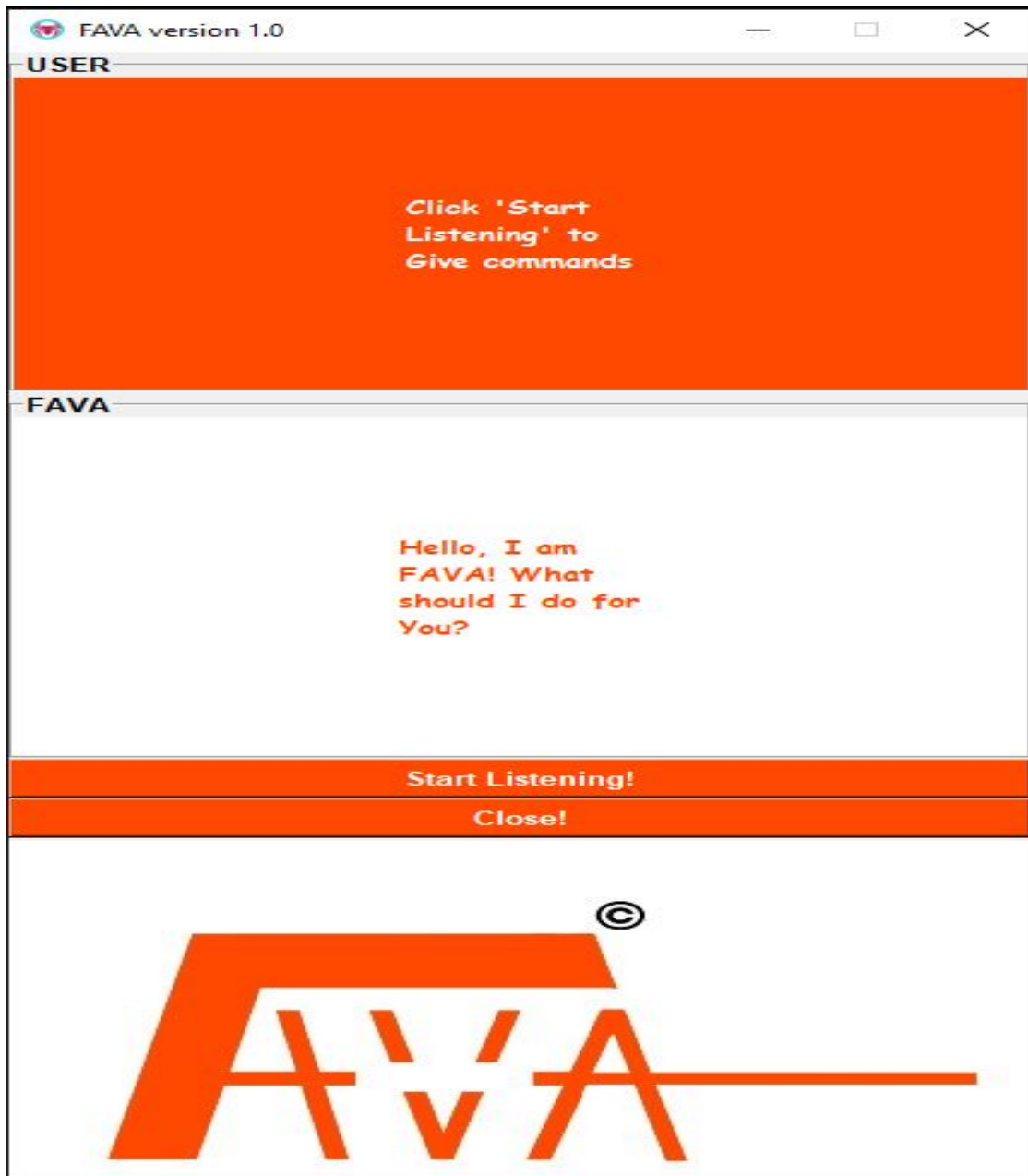
- Sending Email

- Search in any browser using Google Search engine.

- Time in Voice

- Play Music

- Danger or SOS Alert to particular Mobile/Email Address

- Greetings

- Copy - Paste Operation using Voice Commands

- Open other Applications in O

3.6   METHODOLOGY: FLOW CHART

Open the APP → Click on the Start button → Give the required query. → Query is identified using speech recognisation module of python

Query is not understood by the App. → No Result

All the Results are fetched in the GUI of the App.

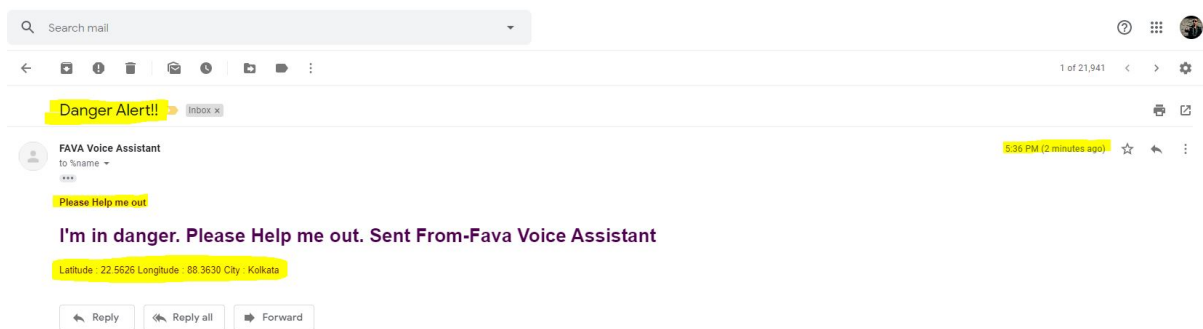# CHAPTER 4. PROPOSED SOLUTION & RESULT ANALYSIS

1.3 RESULTS

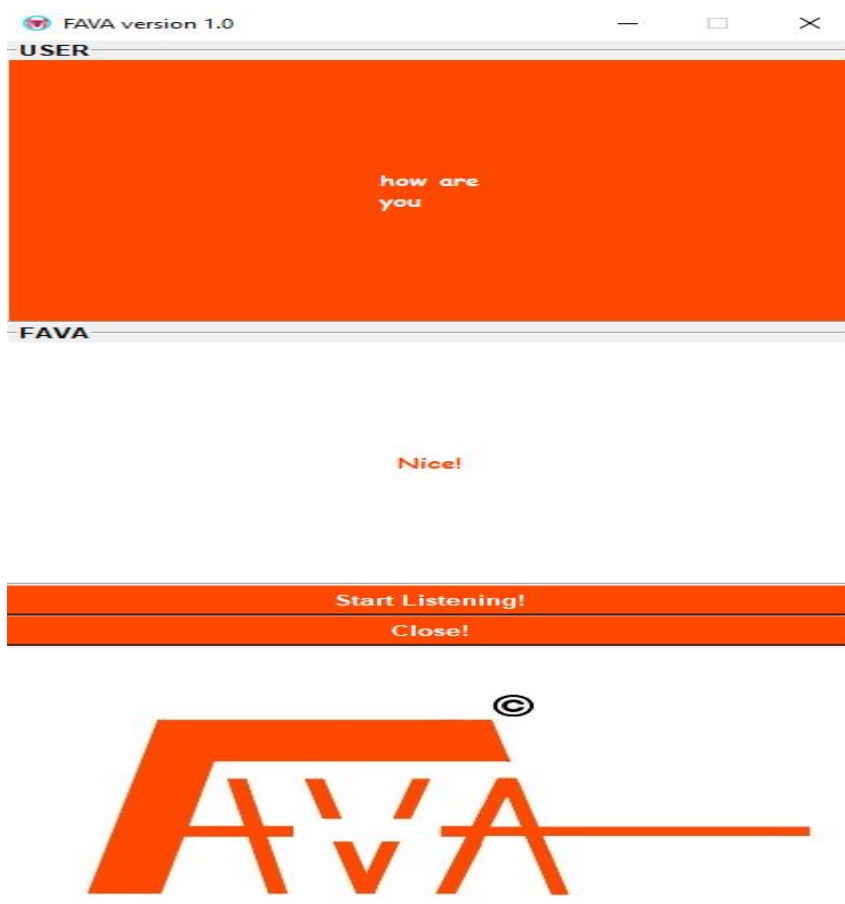**This is the GUI of the application when we open it.**

FAVA
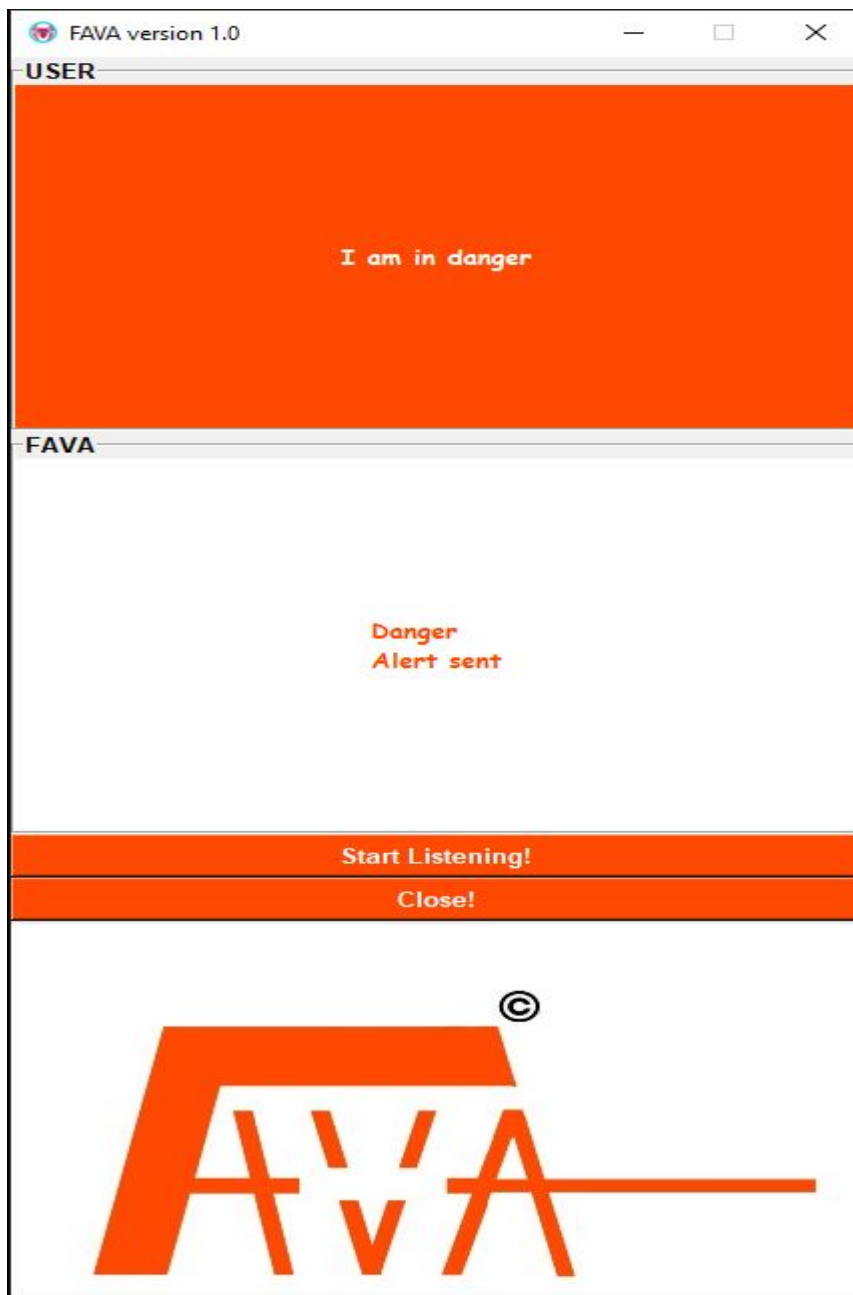
This is the query of the user to send alert email to the required sender.
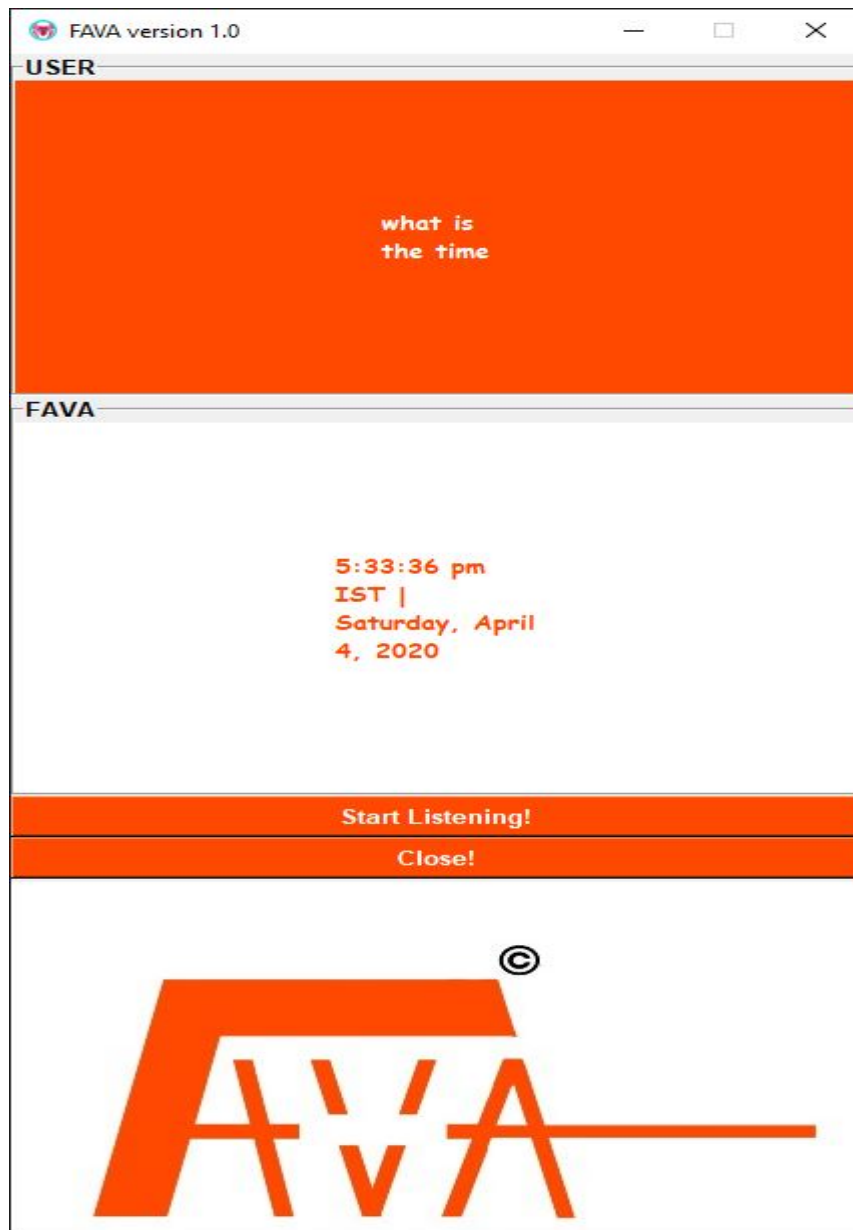
This is email " danger alert" received by the user to the preferred email address by FAVA.

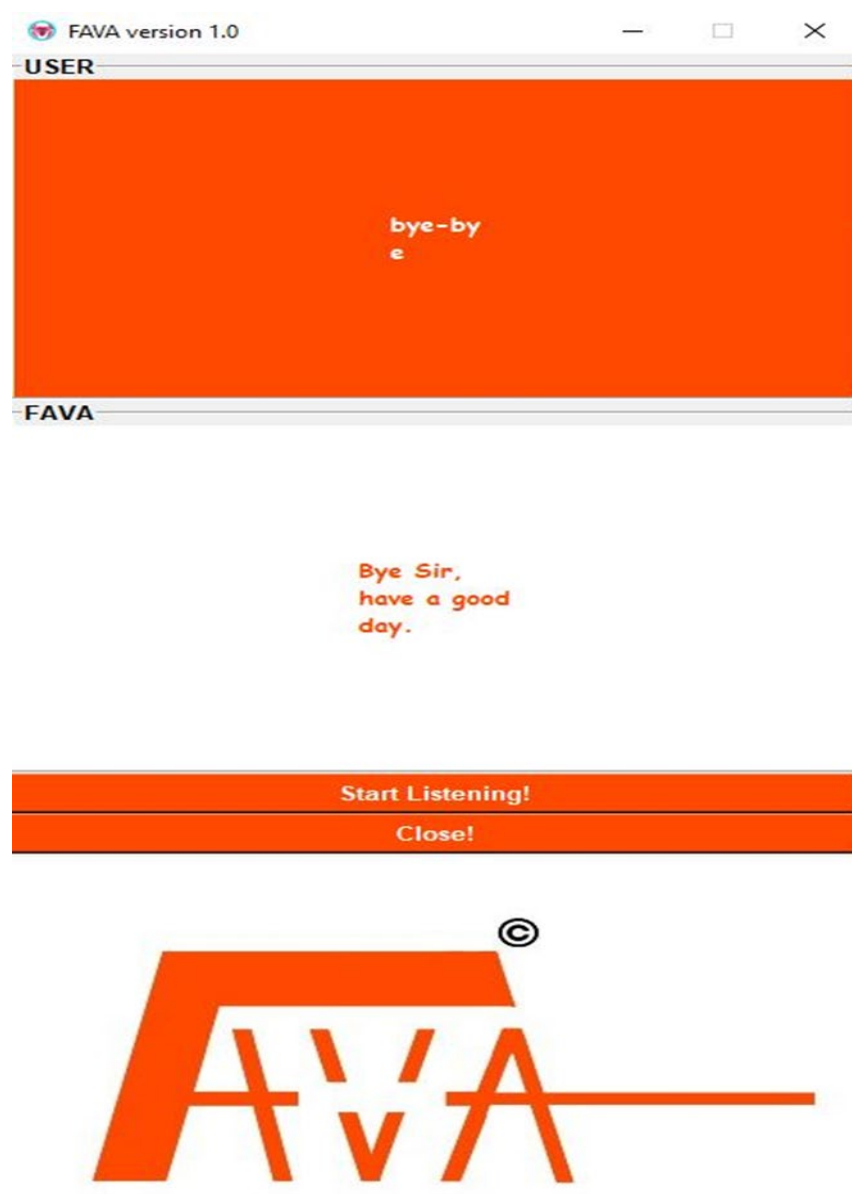**This is the query for asking causal questions to FAVA.**

FAVA

This is query to fetch the current time and date .

FAVA

FAVA version 1.0

USER

who is
Sundar
Pichai

FAVA

Pichai Sundararajan (born June 10,
1972), also known as Sundar Pichai
(), is an Indian American business
executive, the chief executive
officer (CEO) of Alphabet Inc. and
its subsidiary Google LLC. Pichai
began his career as a materials
engineer and joined Google as a
management executive in 2004.

Start Listening!

Close!

This is query to search about a particular information.
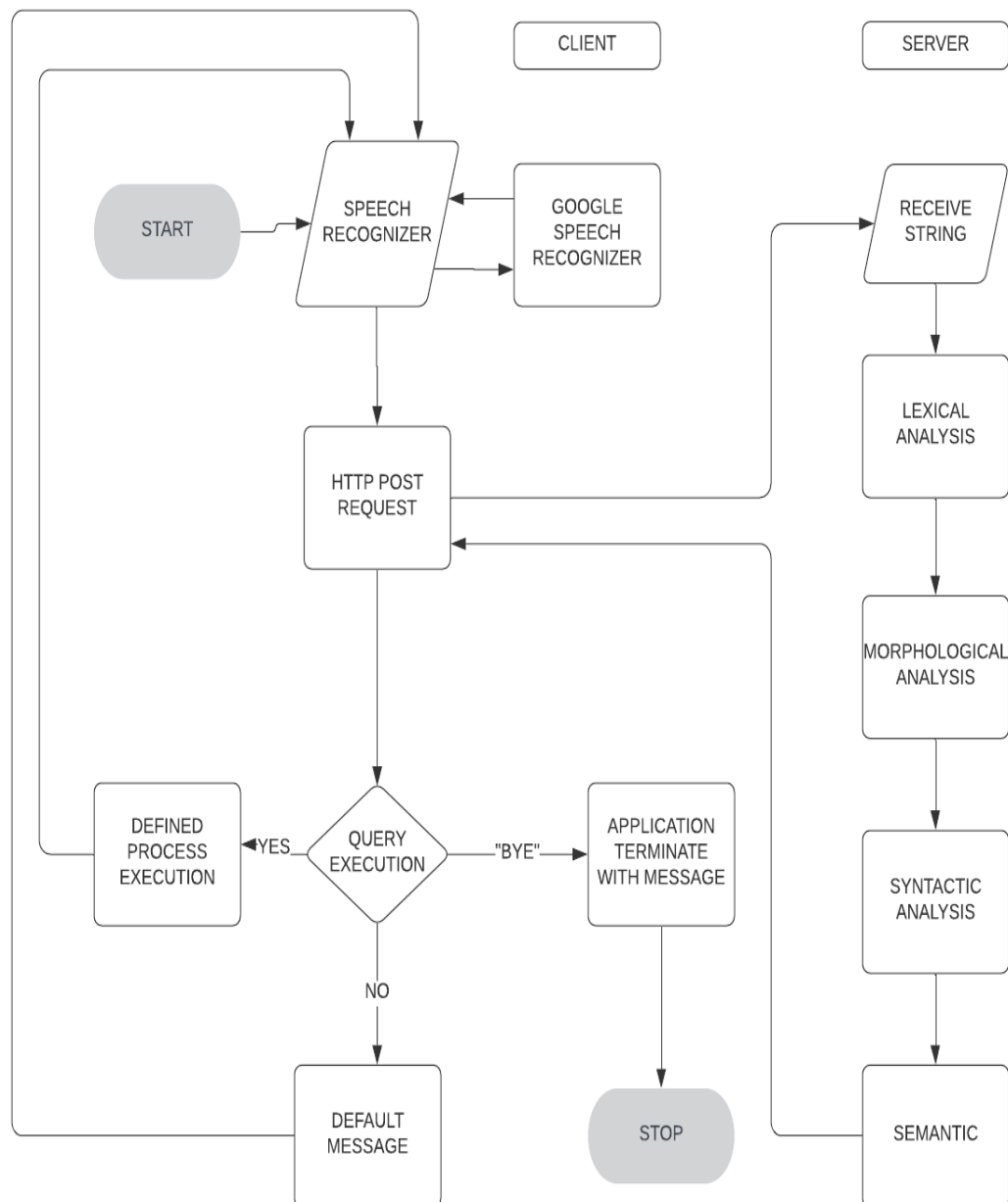
This is query to FAVA to terminate.

4.2   FUNCTIONING :

FAVA VOICE ASSISTANT FLOWCHART

4.3   OPERATIONS AND MAINTANANCE

1.operation

"open ccleaner" **,**helps to open the app which helps to maintain the computer memory.

"open google chrome", helps to open chrome browser to search or navigate any query.

"open powerpoint", helps to open the power point which is used for any presentation of information and many more other features.

"open youtube", helps to open the youtube to get the relevant videos to be played by the user.

"open gmail ", directs the user to their gmail account.

"shutdown", helps to shut down the computer.

"email", helps to send email to other .

"Abort", helps to terminate the app.

"nothing", does nothing only shows system generated message.

"play music", helps to play music from the stored file in computer.

"I am in danger" , helps to send email to the required person for any kind of help.

2.Maintanance

After the program is completed, the program still needs long term maintenance to make it available and stable to execute. The program will be test after a certain period of time and debug each of the function and possible bugs, whenever a potential bug is detected; the program needs to be refined to a better design. Depending on the new keywords, responses, relevant data found that could be applied in this program; the database will always be improved and can handle more and more cases.

4.4 Problems and Solutions

1.Problem

The query is fetched slowly due to the following reason:

a. The query sometimes shows different result if not pronounced correctly .

b. Poor internet connectivity does not fetch any required query correctly or has delayed result.

c. Internet connectivity and microphone connectivity is necessary for the working of the application.

d. If date and time is not set correctly in computer it will throw error.

2.Solutions

a. Better microphone results in better optimized solution.

b. Good internet connectivity helps to gives better and fast results .

c. Good hardware will make the application more efficient.

CHAPTER 5. CONCLUSION & FUTURE SCOPE

5.1 CONCLUSIONS

Project development and implementation

As it has been previous stated, the program is mainly concerning with the techniques of Software development, Python programming, Database management, different APIs for Google products, and etc. The program is developed by developers and follows the extreme programming model. During the eight weeks development, the developers did the same cycle in each phase of analyse requirements, construct design, implement the solutions in pair programming mode and test the result. The development is carried out as its primary planning which guide the work process of how to work with the program, how much time should the each of the developers spent in every week, the resources needed for developing and how to handle the problems while it came up. The project was efficiently completed under the development model and the resources we found in early time were really useful when implementing the program.

Project usage & prospect potential

The project is very useful and owns a large potential use in different industries. Although the program primary concerns more about how to do the personal voice assistant on Desktop using the voice, the concept of voice recognition can be applied in different industries as in many situations it will be more convenient, save a lot of time and helpful especially for those who have difficulty in working with manual operations. Thus, the concept is only for programming the Software application. The user can enjoy different services within this platform.

Therefore, it is easy to use with simple operation compared with the traditional working strategies which the user should well know how to work with the Desktop. In addition, the program which works using the voice is helpful for those who prefer voice operation and those who have difficulty /disability with the manual operations. The primary objective of the program is to provide services using the voice, and it enables more people who can enjoy this

program. The prospect of the program can be more applications or products developed using the voice control, and it could in some sense change the working forms that is totally different from the traditional form. As people can easily operate and have a lot of fun from it, it owns an enlightened prospect as SIRI succeed in attracting people in the market.

Project experience & teamwork

Apart from the program, we as the developers have improved a lot from the degree project. It is quite different from what we previously experienced in the working model, volume of tasks, and the problems we have encountered. In conclusion, we have been improved a lot from the project development, and gained development experience as well as programming skills; the most important is work as a team for a long term, challenge development.

5.2 Recommendations for Further Work

Design Improvements

No program has a perfect design without any flaws; it is the same here in this program. Even though the program is completed with all the primary functions implemented and work properly, there are still many things that can be done with this program. As the future improvement, the potential work that can be implemented ranging from adding more functions to offering the user a more comprehensive, convenient program, refining the logic to make the program more humanized and easy to use, increase the database capacity and add more possible keywords, responses and data in this program, interface optimization and etc.

Additional Functions

Add more functions: although there have been 15 normal functions that are used really often with the mobile phone, there can be more functions which simplify our daily life and make it convenient to use. Functions as playing movies, checking stocks, exchange rate, downloading

and uploading, installing APPs and etc, these can be the potential functions that make the program more comprehensive and people can enjoy more services in this program.

Database Capacity

Add database capacity and more humanized logical design; the program has a predefined logic to make it work with the corresponding commands. Thus, the user needs to follow the structure of the commands, contain the dedicated keywords and well formalize the commands to work with each of the functions. In other words, the program is limited by the database capacity and no solution will be found if the user gives commands that are not readable by the program. Even if two commands have the same meaning and should get exactly same result set, the result might be that of one is working and the other one fails. Hence, the program is to some extent limited by the vocabulary and can be further optimized.

Improved Interface

Interface optimization, the interface can be further improved to make it nice to the users. Currently the interface design meets the basic requirement to present everything for this program, and the users are able to interact with the program through this interface, but the interface can always be optimized and more suitable constructed.

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