VISVESVARAYA TECHNOLOGICAL UNIVERSITY

BELAGAVI – 590018, Karnataka

INTERNSHIP REPORT

ON

"Virtual Assistant for Visually Impaired"
Submitted in partial fulfilment for the award of degree(18CSI85)

BACHELOR OF ENGINEERING IN
CSE

Submitted

Chitra M

1BY19CS038

Conducted at

VARCONS TECHNOLOGIES PVT LTD

BMS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF CSE
ACCREDITED BY NBA, BENGALURU

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CERTIFICATE

This is to certify that the Internship titled **"Virtual Assistant For Visually Impaired"** carried out by **Ms. Chitra M,** a bonafide student of BMS Institute of Technology, in partial fulfillment for the award of **Bachelor of Engineering**, in **CSE** under Visvesvaraya Technological University,Belagavi, during the year 2022-2023. It is certified that all corrections/suggestions indicated have been incorporated in the report.

The project report has been approved as it satisfies the academic requirements in respect of Internship prescribed for the course Internship / Professional Practice (18CSI85)

Signature of Guide   **Signature of HOD**   **Signature of Principal**

External Viva:

Name of the Examiner   Signature with Date

1)_____

_____

2)_____

_____

D E C L A R A T I O N

I **Chita M**, final year student of Computer Science, of BMS Institute of Technology - 560064, declare that the Internship has been successfully completed, in **VARCONS TECHNOLOGIES PVT LTD**. This report is submitted in partial fulfillment of the requirements for award of Bachelor Degree in Branch name, during the academic year 2022-2023.

Date :25-09-2022

Place : Bengaluru

USN : 1BY19CS038

NAME : Chitra M

OFFER LETTER

INTERNSHIP OFFER LETTER

Date: **23rd August, 2022**

Name: **Chitra M**
USN: **1by19cs038**

Dear Student,

We would like to congratulate you on being selected for the **Machine Learning With Python(Research Based)** Internship position with **Varcons Technologies Pvt Ltd**, effective Start Date **23rd August, 2022**, All of us are excited about this opportunity provided to you!

This internship is viewed as being an educational opportunity for you, rather than a part-time job. As such, your internship will include training/orientation and focus primarily on learning and developing new skills and gaining a deeper understanding of concepts of **Machine Learning With Python(Research Based)** through hands-on application of the knowledge you learn while you train with the senior developers. You will be bound to follow the rules and regulations of the company during your internship duration.

Again, congratulations and we look forward to working with you!

Sincerely,

Spoorthi H C
Director
VARCONS TECHNOLOGIES PVT LTD
213, 2st Floor,
18 M G Road, Ulsoor,
Bangalore-560001

A C K N O W L E D G E M E N T

This Internship is a result of accumulated guidance, direction and support of several important persons. I take this opportunity to express our gratitude to all who have helped me to complete the Internship.

I express my sincere thanks to my Principal Dr Mohan Babu B N, for providing me adequate facilities to undertake this Internship.

I would like to thank our Head of Dept Dr Tippeswamy G, for providing me an opportunity to carry out Internship and for his valuable guidance and support.

I express my deep and profound gratitude to our guide, Guide name, Assistant/Associate Prof, for her keen interest and encouragement at every step in completing the Internship.

I would like to thank all the faculty members of our department for the support extended during the course of Internship.

I would like to thank the non-teaching members of our dept, forhelping us during the Internship.

Last but not the least, I would like to thank our parents and friends without whose constant help, the completion of Internship would have not been possible.

Name: Chitra M

USN : 1BY19CS038

ABSTRACT

The field of artificial intelligence has led to various virtual assistants such as Siri in iPhone, Google Allo, Microsoft Cortana, and so on. Even after such progression, very little has been done to implement these technologies to assist the visually impaired community. Recognizing a person or distinguishing an object, these tasks are straightforward for common people but can be very difficult for people that are partly or completely blind. Their lives can be made smoother by assisting them to detect what is present in front of them at that instant. We aim to develop a system/assistant that will serve to guide a visually impaired person and will indicate the person by speaking through the earpiece. The system will help the person recognize people, add new faces and detect objects that are in their vicinity. We will have a mobile application which will consist of numerous deep learning models that will help applications increase its administration. The primary working of the system will consist of the camera continuously feeding images for inputs, the core system processing this input information and the earpiece acting as the output device to provide this output to the user.

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COMPANY PROFILE

A Brief History of Varcons Technologies

Varcons Technologies, was incorporated with a goal "To provide high quality and optimal Technological Solutions to business requirements of our clients". Every business is a different and has a unique business model and so are the technological requirements. They understand this and hence the solutions provided to these requirements are different as well. They focus on clients requirements and provide them with tailor made technological solutions. They also understand that Reach of their Product to its targeted market or the automation of the existing process into e-client and simple process are the key features that our clients desire from Technological Solution they are looking for and these are the features that we focus on while designing the solutions for their clients.

Sarvamoola Software Services. is a Technology Organization providing solutions for all web design and development, MYSQL, PYTHON Programming, HTML, CSS, ASP.NET and LINQ. Meeting the ever increasing automation requirements, Sarvamoola Software Services. specialize in ERP, Connectivity, SEO Services, Conference Management, effective web promotion and tailor-made software products, designing solutions best suiting clients requirements.

Varcons Technologies, strive to be the front runner in creativity and innovation in software development through their well-researched expertise and establish it as an out of the box software development company in Bangalore, India. As a software development company, they translate this software development expertise into value for their customers through their professional solutions.

They understand that the best desired output can be achieved only by understanding the clients demand better. Varcons Technologies work with their clients and help them todefiine their exact solution requirement. Sometimes even they wonder that they have completely redefined their solution or new application requirement during the brainstormingsession, and here they position themselves as an IT solutions consulting group comprising of high caliber consultants.

They believe that Technology when used properly can help any business to scale and achieve new heights of success. It helps Improve its efficiency, profitability, reliability; to put itin one sentence " Technology helps you to Delight your Customers" and that is what we wantto achieve.

CHAPTER 2

ABOUT THE COMPANY
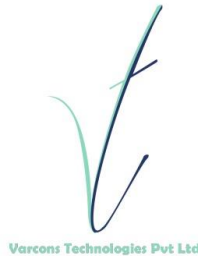
Varcons Technologies is a leading provider of cutting-edge technologies and services, offering scalable solutions for businesses of all sizes. Founded by a group of friends who started by scribbling their ideas on a piece of paper, today we offer smart, innovative services to dozens of clients. We develop SaaS products, provide Corporate Seminars, Industrial trainings and much more.

Products of Varcons Technologies.

Android Apps

It is the process by which new applications are created for devices running the Android operating system. Applications are usually developed in Java (and/or Kotlin; or other such option) programming language using the Android software development kit (SDK), but other development environments are also available, some such as Kotlin support the exact same Android APIs (and bytecode), while others such as Go have restricted API access.

The Android software development kit includes a comprehensive set of development tools. These include a debugger, libraries, a handset emulator based on QEMU, documentation, sample code, and zutorials. Currently supported development platforms include computers running Linux (any modern desktop Linux distribution), Mac OS X 10.5.8 or later, and Windows 7 or later. As of March 2015, the SDK is not available on Android itself, but softwaredevelopment is possible by using specialized Android applications.

Web Application

It is a client–server computer program in which the client (including the user interface and client- side logic) runs in a web browser. Common web applications include web mail, online retail sales, online auctions, wikis, instant messaging services and many other functions. web applications use web documents written in a standard format such as HTML and JavaScript,which are supported by a variety of web browsers. Web applications can be considered as a specifific variant of client–server software where the client software is

downloaded to the client machine when visiting the relevant web page, using standard procedures such as HTTP. The Client web software updates may happen each time the web page is visited. During the session, the web browser interprets and displays the pages, and acts as the universal client for any web application. The use of web application frameworks can often reduce the number of errors in a program, both by making the code simpler, and by allowing one team to concentrate on the framework while another focuses on a specifified use case. In applications which are exposed to constant hacking attempts on the Internet, security-related problems can be caused by errors in the program.

Frameworks can also promote the use of best practices such as GET after POST. There are some who view a web application as a two-tier architecture. This can be a "smart" client that performs all the work and queries a "dumb" server, or a "dumb" client that relies on a "smart" server. The client would handle the presentation tier, the server would have the database (storage tier), and the business logic (application tier) would be on one of them or on both. While this increases the scalability of the applications and separates the display and the database, it still doesn"t allow for true specialization of layers, so most applications will outgrow this model. An emerging strategy for application software companies is to provide web access to software previously distributed as local applications. Depending on the type of application, it may require the development of an entirely different browser-based interface, or merely adapting an existing application to use different presentation technology. These programs allow the user to pay a monthly or yearly fee for use of a software application without having to install it on a local hard drive. A company which follows this strategy is known as an application service provider (ASP), and ASPs are currently receiving much attention in the software industry.

Security breaches on these kinds of applications are a major concern because it can involve both enterprise information and private customer data. Protecting these assets is an important part of any web application and there are some key operational areas that must be included in the development process. This includes processes for authentication, authorization, asset handling, input, and logging and auditing. Building security into the applications from the beginning can be more effective and less disruptive in the long run.

Web design

It is encompasses many different skills and disciplines in the production and maintenance of websites. The different areas of web design include web graphic design; interface design; authoring, including standardized code and proprietary software; user experience design; and search engine optimization. The term web design is normally used to describe the design process relating to the front-end (client side) design of a website including writing mark up. Web design partially overlaps web engineering in the broader scope of web development. Web designers are expected to have an awareness of usability and if their role involves creating mark

up then they are also expected to be up to date with web accessibility guidelines. Web design partially overlaps web engineering in the broader scope of web development.

Departments and services offered

VarconsTechnologies plays an essential role as an institute, the level of education, development of student's skills are based on their trainers. If you do not have a good mentor then you may lag in many things from others and that is why we at Varcons Technologies gives you the facility of skilled employees so that you do not feel unsecured aboutthe academics. Personality development and academic status are some of those things which lie on mentor's hands. If you are trained well then you can do well in your future and knowing its importance of Compsoft Technologies always tries to give you the best.

They have a great team of skilled mentors who are always ready to direct their trainees in the best possible way they can and to ensure the skills of mentors we held many skill development programs as well so that each and every mentor can develop their own skills with the demands of the companies so that they can prepare a complete packaged trainee.

Services provided by Varcons Technologies.

• Core Java and Advanced Java

• Web services and development

• Dot Net Framework

• Python

• Selenium Testing

• Conference / Event Management Service

• Academic Project Guidance

• On The Job Training

• Software Training

CHAPTER-3

INTRODUCTION

Nowadays, humans rely on other humans for help or services. The world's digitalization ensured that human reliance on the system could be switched to the system, allowing for far more efficient and reliable employment, as well as a device that could take care of their daily needs. Computers, cell phones, laptop computers, and other electronic devices have become an indispensable part of our daily lives. They can perform simple calculations as well as complex programs, reducing monotonous work and personnel waste. To solve problems quickly, Virtual Personal Assistants have practically become a must-have feature in all electronic devices. Virtual assistance can help the user in a variety of ways. Speech recognition is a relatively new addition to the virtual world. However, despite being reasonably effective, it is not particularly useful and, as a result of the high rate of error, is not used by the user. Despite the fact that the future virtual assistant has an error rate of about 5%, it is not yet ready to become a routine part of the user's life. As a result, the project's goal is to develop a virtual assistant with low error rate speech recognition. We developed a voice assistant that allows users to accomplish any task on the system without having to use a keyboard, decreasing the number of input devices.

"Virtual Assistant for visually impaired", the said project applies the concept of Deep learning i.e. Neural networks. The models employed for our project are - Face Detection and Object Detection. The system comprises a camera that acquires images and sends them to the application, where a powerful processor derives information from them and explains them to the user through a distinct audible message. The device will continuously detect all the faces in front of the person and verify them against all the faces of the people who have been previously taught to the device.The elderly, the visually and physically handicapped, children, and others benefit from virtual assistants since engaging with machines is no longer a challenge. Even blind people who can't see the computer can communicate with it simply by speaking to it. Some of the basic tasks that a voice assistant can assist you with are listed below. 1) Reading Newspaper 2) Getting updates on mail 3) Search on the web 4) Play music or video 5) Setting a reminder and alarm 6) Run any program or application 7) Getting weather updates These are some of the examples, we can do many more things according to our requirements

CHAPTER-4
PROPOSED SYSTEM

In the system level, we could say that the novelty lies in the real-time web application. The already existing system comprises modules such as Image processing, Speech processing, etc, therefore the problems faced by blind people are often reduced to a particular extent. But neither are these modules enough nor are they implemented purposefully such that they assist the visually impaired. Taking these limitations into consideration, the system we have developed overcomes these drawbacks and helps build a system that assists the needful in a better and more appropriate manner. Modules focused upon by us:-

A. Text-to-Speech:

This module comprises text and speech processing. The main purpose of this module is to take into consideration all the text provided and convert these into the appropriate audio output using speech processing. We have implemented a dynamic system that makes use of Google API (Gttx) for the conversion of Text to Speech dynamically provided that good internet connectivity is present.

B. Object Recognition :

Object Recognition is a process in which Real-world objects are identified using Image processing. It is an important operation that will aid visually impaired to locate their frequently used day to day objects. The system that we have developed provides support in visual aid by assisting to dynamically locate and identify the objects in an image and providing the text output for the same.

C. Face recognition :

Some face recognition algorithms identify countenance by extracting landmarks, or features, from a picture of the subject's face that includes the features shape of the jaw, nose, cheek, facial hair and other such characteristics. The features of the image in consideration are then compared with other images having similar features. The algorithm normalizes a dataset of face embeddings then compresses these embeddings, only saving the information within the image that's useful for face recognition. Eventually what we will be obtaining is a bounding box surrounding the face in the live monitoring having the name of the person and the confidence attached to the bounding box.
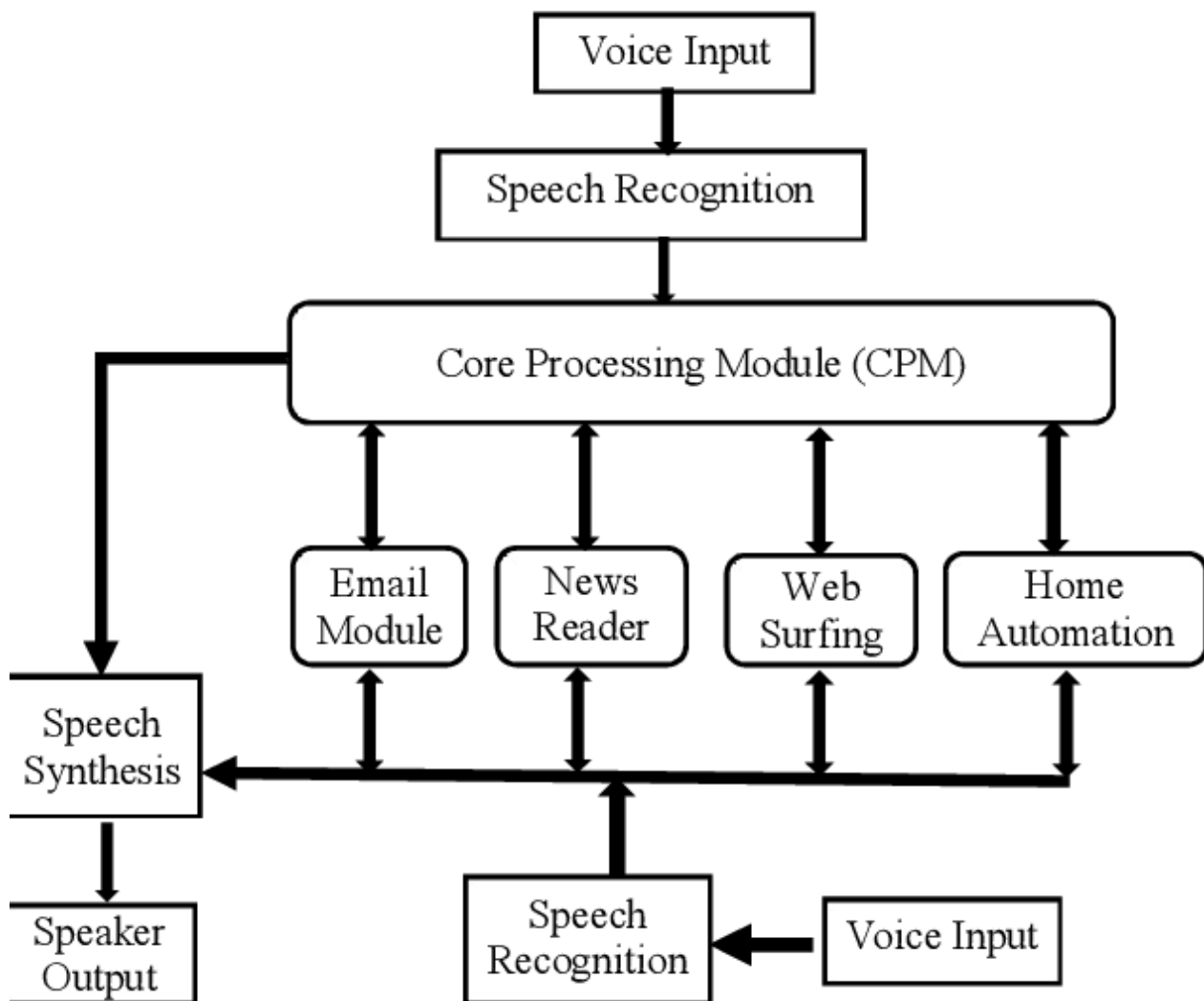
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                    ┌─────────────────┐
                    │   Voice Input   │
                    └─────────────────┘
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                    ┌─────────────────────┐
                    │ Speech Recognition  │
                    └─────────────────────┘
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        ┌──────────────────────────────────────────────┐
        │        Core Processing Module (CPM)          │
        └──────────────────────────────────────────────┘
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The following features will be included in the proposed system:

1) The system will continue to listen for commands, and the length of time it spends listening is adjustable to meet the needs of the user.

2) If the system is unable to extract information from the user's input, it will prompt the user to repeat the process until the desired number of times has been reached.

3) The system will be voiced by a woman.

4) Playing music, sending emails, sending texts, searching Wikipedia, accessing system-installed applications, opening anything in the web browser, and so on are all supported in the present edition

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SYSTEM AND REQUIREMENT ANALYSIS

System Analysis is about complete understanding of existing systems and finding where the existing system fails. The solution is determined to resolve issues in the proposed system. It defines the system. The system is divided into smaller parts. Their functions and inter relation of these modules are studied in system analysis. The complete analysis is followed below.

Problem definition:

Usually, user needs to manually manage multiple sets of applications to complete one task. For example, a user trying to make a travel plan needs to check for airport codes for nearby airports and then check travel sites for tickets between combinations of airports to reach the destination. There is need of a system that can manage tasks effortlessly.We already have multiple virtual assistants. But we hardly use it. There are number of people who have issues in voice recognition. These systems can understand English phrases but they fail to recognize in our accent. Our way of pronunciation is way distinct from theirs. Also, they are easy to use on mobile devices than desktop systems. There is need of a virtual assistant that can understand English in Indian accent and work on desktop system.When a virtual assistant is not able to answer questions accurately, it's because it lacks the proper context or doesn't understand the intent of the question. Its ability to answer questions relevantly only happens with rigorous optimization, involving both humans and machine learning. Continuously ensuring solid quality control strategies will also help manage the risk of the virtual assistant learning undesired bad behaviors. They require large amount of information to be fed in order for it to work efficiently. Virtual assistant should be able to model complex task dependencies and use these models to recommend optimized plans for the user. It needs to be tested for finding optimum paths when a task has multiple sub-tasks and each sub-task can have its own sub-tasks. In such a case there can be multiple solutions to paths, and the it should be able to consider userpreferences, other active tasks, priorities in order to recommend a particular plan.

Personal assistant software is required to act as an interface into the digital world by

understanding user requests or commands and then translating into actions or recommendations based on agent's understanding of the world. JIA focuses on relieving the user of entering text input and using voice as primary means of user input. Agent then applies voice recognition algorithms to this input and records the input. It then use this input to call one of the personal information management applications such as task list or calendar to record a new entry or to search about it on search engines like Google, Bing or Yahoo etc. Focus is on capturing the user input through voice, recognizing the input and then executing the tasks if the agent understands the task. Software takes this input in natural language, and so makes it easier for the user to input what he or she desires to be done. Voice recognition software enables hands free use of the applications, lets users to query or command the agent through voice interface. This helps users to have access to the agent while performing other tasks and thus enhances value of the system itself. JIA also have ubiquitous connectivity through Wi-Fi or LAN connection, enabling distributed applications that can leverage other APIs exposed on the web without a need to store them locally.

Virtual assistants must provide a wide variety of services. These include:
• Providing information such as weather, facts from e.g. Wikipedia etc.
• Set an alarm or make to-do lists and shopping lists.
• Remind you of birthdays and meetings.
• Play music from streaming services such as Saavn and Gaana.
• Play videos, TV shows or movies on televisions, streaming from e.g. Netflix or Hotstar.
• Book tickets for shows, travel and movies.

Feasibility Study:

Feasibility study can help you determine whether or not you should proceed with your project. It

is essential to evaluate cost and benefit. It is essential to evaluate cost and benefit of the proposed system. Five types of feasibility study are taken into consideration.

1. Technical feasibility: It includes finding out technologies for the project, both hardware and software. For virtual assistant, user must have microphone to convey their message and a speaker to listen when system speaks. These are very cheap now a days and everyone generally possess them. Besides, system needs internet connection. While using JIA, make sure you have a steady internet connection. It is also not an issue in this era where almost every home or office has Wi-Fi.

2. Operational feasibility: It is the ease and simplicity of operation of proposed system. System does not require any special skill set for users to operate it. In fact, it is designed to be used by almost everyone. Kids who still don't know to write can read out problems for system and get answers.

3. Economical feasibility: Here, we find the total cost and benefit of the proposed system over current system. For this project, the main cost is documentation cost. User also would have to pay for microphone and speakers. Again, they are cheap and available. As far as maintenance is concerned, JIA won't cost too much.

4. Organizational feasibility: This shows the management and organizational structure of the project. This project is not built by a team. The management tasks are all to be carried out by a single person. That won't create any management issues and will
increase the feasibility of the project.

5. Cultural feasibility: It deals with compatibility of the project with cultural environment. Virtual assistant is built in accordance with the general culture. The project is named JIA so as to represent Indian culture without undermining local
beliefs.

HARDWARE AND SOFTWARE REQUIREMENTS:

The software is designed to be light-weighted so that it doesn't be a burden on the machine running

it. This system is being build keeping in mind the generally available hardware and software compatibility. Here are the minimum hardware and software

requirement for virtual assistant.

Hardware:
• Pentium-pro processor or later.
• RAM 512MB or more.

Software:
• Windows 7(32-bit) or above.
• Python 2.7 or later
• Chrome Driver
• Selenium Web Automation
• SQLite

This project is technically feasible with no external hardware requirements. Also it is simple in operation and does not cost training or repairs. Overall feasibility study of the project reveals that the goals of the proposed system are achievable. Decision is taken to proceed with the project.

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DESIGN ANALYSIS

The system is deployed as a web application which, when opened on any mobile browser, gives us the landing page shown below. Along with the landing page, we have two additional pages that play an important role in our system and play a fundamental role in its deployment. When the user presses any of these buttons, the command will be addressed to the user via earpiece/speaker. All these buttons are large in size and are separated properly, so that it is convenient for the visually impaired user to distinguish between them.

This page consists of two buttons- one at the top and the other at the bottom of the page. We have a block in the center of the page which provides a continuous live stream that is displayed through the phone. Above the block is the "SWITCH TO FACE RECOGNITION" button which, when clicked, deploys the Face recognition model and directs the user to that page. The other button is named "STOP" and resides below the live stream block. When clicked, this button will stop the current processing model and redirect the user to the page having the "START" button

A click on the "SWITCH TO FACE RECOGNITION" button, the system is directed to a new page where the face recognition functionality begins its execution. Similar to the landing page, this page consists of two buttons- one at the top and the other at the bottom of the page. The button at the top is named "ADD FACE" whilst the button at the bottom of the page is named "STOP". If an unknown face is encountered, we can click on the "ADD FACE' button at the top of the page to add the unknown face into the Facial database. The "STOP" button executes the same functionality as before and will stop the current processing model and redirect the user to the page where the "START" button resides. The block in the center of the page separates the two buttons and continues to provide the live stream and displays it through the phone's browser window. All the faces recognized in the live stream are addressed to the user via earpiece/speaker. This page consists of a single large button named "START". When the "STOP" button on either of the Face Recognition page or the Object Detection page is clicked, the user is redirected to this page where the "START" button resides.This enables the user to start the system anew after it has been stopped. Hence, allowing the user to begin the system according to their convenience and usability

CHAPTER-7

IMPLEMENTATION

The system developed is deployed on the web as a website. The website is built on the backbone of flask, which serves the purpose of providing connectivity between the python code and the HTML.
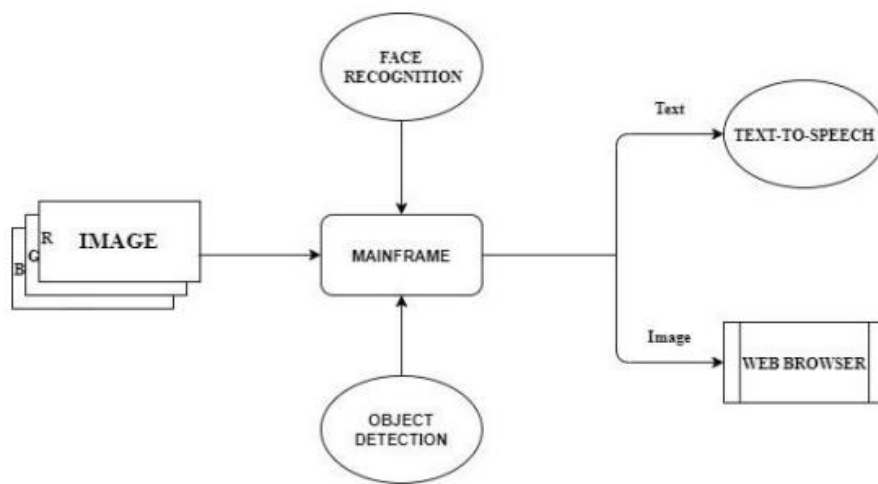

Fig 1. Implementation flow.

When the website is loaded, the object detection module starts its processing and the objects detected by this module are displayed on the page as well as delivered to the user via an earpiece/speaker. Along with this, we also have two buttons ('Switch to Face' and 'Stop') on the landing page that are well separated to be easily accessible. Clicking on 'Stop' results in pausing the Livestream until the 'Start' button is clicked. The 'Switch to Face' button on click will switch to the page where the Face Recognition processing begins. We have also included the buffer which can only contain a maximum of five entities (objects/people) at a time. Each entity will be converted to speech in every 20 seconds if it still exists in the frame. The 'Face Detection' module is implemented similarly as the 'Object Detection' module using the same layout for the buttons. Here, the clicking of the 'Stop' button will have the same function as mentioned above whereas a click on the 'Add Face' button will capture the current frame and prompt the user to speak out the name of the person whose face is being added. The name is spoken into the microphone by the user and the speech-to-text model converts this audio into the text and stores the text with the captured frame into the database. All the processing is carried out in the python engine and is displayed

using HTML to the user. Thus implementing all these, we obtain a system that is more relevant and more assistive to the user.

voice recognitionbased intelligent wheelchair system for physically handicapped people who are unable to drive the wheelchair by hand. So this system works like this: the patient can operate the wheelchair using voice commands and the location of the patient can be tracked using a GPS module in the wheelchair that tracks and sends the information to a smartphone application (app) via Firebase. The Voice Module V3 is used to record a patient's voice and recognize that voice to follow the instructions of the patient.

Speech Emotion Recognition (SER) is a technique that uses Neural Networks to classify emotions from a given speech. It is based on the fact that the voice often reflects underlying emotion through tone and pitch. Speech Emotion Recognition helps to classify and elicit specific types of emotions. The MLP-Classifier is used to classify the emotions from the given wave signal, which makes the choice of learning rate adaptive. The dataset used will be RAVDESS (Ryerson Audio-Visual Database of Emotional Speech and Song dataset).
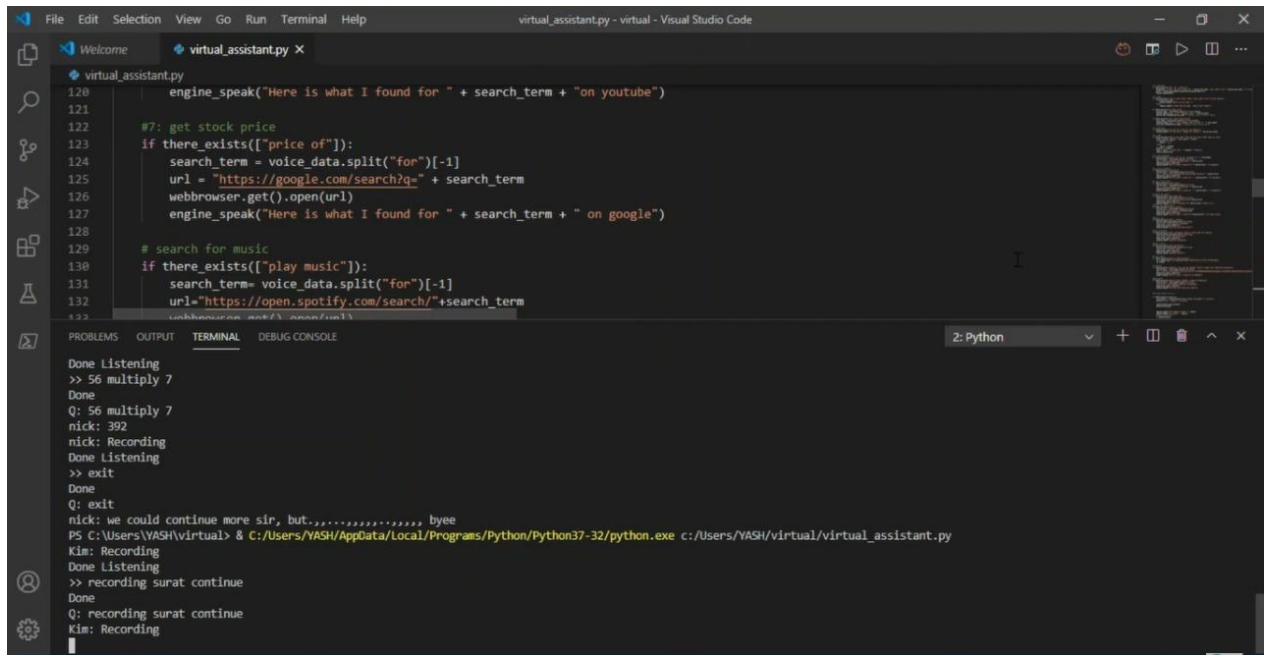
This Voice Assistant is the first mobile phone application developed for the Serbian language, allowing faster and more natural communication between the phone and the user, even under noisy conditions. The results were highly improved by incorporating the noise itself within the acoustic model.

The following features will be included in the proposed system:

1) The system will continue to listen for commands, and the length of time it spends listening is adjustable to meet the needs of the user.

2) If the system is unable to extract information from the user's input, it will prompt the user to repeat the process until the desired number of times has been reached.

3) The system will be voiced by a woman.

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SNAPSHOTS

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CONCLUSION

The **virtual assistant** we have created is able to do almost everything that the user commands it to do from opening a particular file on the system to web surfing to gather or collect information on the required topic. We kept a simple approach to our problem using python. Some main Python packages used in our product are this are speech Recognition, Python PyAudio, and Python TTS. We have successfully made a working virtual assistant which can be activated by the user using the wake keyword "SARA", and can manipulate the system using verbal commands. It eases most of the tasks of the user like searching the web, accessing youtube videos, sending mail through voice, etc. Different systems have different ways of implementation along with some limitations and restrictions. These types of systems are very critical for multiple reasons and the occurrence of an error in such a system/device may cause catastrophic damage and loss. The system we are achieving overcomes the limitations of the already implemented systems. Our system consists of a basic UI on a web-based application and comprises several Deep learning models; some of them are object detection, face recognition, speech recognition and so on. These modules will work together and assist in vital activities like object detection as well as face detection and recognition for the visually impaired.

In the future, we hope to incorporate more Artificial Intelligence into our project, such as Machine Learning, Neural networks, and so on, as well as the Internet of Things. With the addition of these elements, we will be able to improve our voice assistant by adding new features to it.

CHAPTER-10

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