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
YOUR BRANCH

Submitted by:
1. SAHANA.D
1GD20ECO22

Conducted at
COMPSOFT TECHNOLOGIES

GOPALAN COLLEGE OF ENGINNERING OF MANAGEMENT
Department of Electronics and communication
Approved by AICTIE, New Delhi& Affiliated to VTU, Belagavi.

Behind SAP Labs, Seetharam Palya , Basavanagar, Hoodi,Bangalore-560048

CERTIFICATE

This is to certify that the Internship titled **"Virtual Assistant for Visually impaired"** carried out by Mrs. Sahana**.D, a bodefide student of Gopalan college of Enginnering and management , in partial fulfillment for the award of Bachelor of Engineering, in ECE 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, **Sahana.D** final year student of ECE, Gopalan college of enginnering and management, bangalore - 560 082, declare that the Internship has been successfully completed, in **COMPSOFT TECHNOLOGIES**. 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 : 12/10/2023   :

Place : Bangalore

USN : 1GD20EC022

NAME : Sahana.D

OFFER LETTER

INTERNSHIP OFFER LETTER

Date: 24th August, 2023

Name: **Sahana.D**
USN: **1GD20EC022**
Placement ID: **2208ML072**

Dear Student,

We would like to congratulate you on being selected for the **Machine Learning with Python (Research Based)** Internship position with **Compsoft Technologies**, effective Start Date **24th August, 2023**, 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,

Nithin K. S
Project Manager
COMPSOFT TECHNOLOGIES
No. 363, 19th main road,
1st Block Rajajinagar
Bangalore - 560010

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. We take this opportunity to express our gratitude to all who have helped us to complete the Internship.

We express our sincere thanks to our Principal, for providing us adequate facilities to undertake this Internship.

We would like to thank our Head of Dept – ECE, for providing us an opportunity to carry out Internship and for his valuable guidance and support.

We would like to thank our Software Services for guiding us during the period of internship.

We express our 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.

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

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

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

SAHANA.D

1GD20EC022

ABSTRACT

Research shows that people with visual impairments are 31% less likely to access the internet than individuals without disabilities. This paper illustrates the implementation of software that provides assistance to the visually impaired for accessing the internet. The software shall prove instrumental in the way we access the internet and will increase the ease of use drastically.

Although technology has grown leaps and bounds, the internet - especially websites are still inaccessible by the visually impaired. The software provides a way to interact with these websites with much ease. With the use of voice commands instead of the traditional keyboard and mouse, our software provides a new dimension to access and provide commands to any website. The software will read out the content of the website and then using speech to text and text to speech modules along with selenium, our software can automate any website. The user is free from remembering complex braille keyboard commands or the hassle of typing, he/she can simply voice out his/her command and the software will execute it. The system also has the functionality of providing a summary of the content on the website and answering questions asked by the user with reference to the summary using a BERT model trained on the Stanford Question Answer Dataset.

This software will revolutionize the internet and pave the way for Web3.0.

Table of contents

CHAPTER 1

COMPANY PROFILE

1. <u>COMPANY PROFILE</u>

A Brief History of Company

Compsoft 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.

Company 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.

we 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. At our Company we work with them clients and help them to defiine 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 want to achieve.

CHAPTER 2

ABOUT THE COMPANY

2. <u>__ABOUT THE COMPANY__</u>

Compsoft technologies is a Technology Organization providing solutions for all web design and development, Researching and Publishing Papers to ensure the quality of most used ML Models, MYSQL, PYTHON Programming, HTML, CSS, ASP.NET and LINQ. Meeting the ever increasing automation requirements, Compsoft Technologies specialize in ERP, Connectivity, SEO Services, Conference Management, effective web promotion and tailor-made software products, designing solutions best suiting clients requirements. The organization where they have a right mix of professionals as a stakeholders to help us serve our clients with best of our capability and with at par industry standards. They have young, enthusiastic, passionate and creative Professionals to develop technological innovations in the field of Mobile technologies, Web applications as well as Business and Enterprise solution. Motto of our organization is to "Collaborate with our clients to provide them with best Technological solution hence creating Good Present and Better Future for our client which will bring a cascading a positive effect in their business shape as well". Providing a Complete suite of technical solutions is not just our tag line, it is Our Vision for Our Clients and for Us, We strive hard to achieve it.

Services provided by Compsoft Technologies.

• Core Java and Advanced Java

• Research and Development/Improvise of ML Models

• 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

3. <u>INTRODUCTION</u>

Introduction to ML

Today there are nearly 285 million people in the world that are visually impaired [12]. Although technology has grown redos ana pounas, internet for differently-abled people is still far-fetched. In this modern world, more and more things can be performed online.
From shopping, ordering to booking train tickets everything can go done online. For almost al these online facilities a person has to use a website. Using a website can be a trivial task for most people but it is very difficult for visually impaired people.

The internet is a highly visual form of communication, different "accessibility blockers" can hinder different types of websites, unlike brick and mortar businesses where accessibility can be made by including a ramp for wheelchairs or braille interfaces.

For example, researchers found that 80% of news sites "had significant accessibility issues," while 70% of respondents said they were "unable to access information and services through government websites."
Thus, we wanted to come up with a unique way of allowing visually impaired people to access the internet. Although the W3C has a set of recommendations that stipulate the rules to be followed when designing a website for the visually impaired, not all websites necessarily stick to the high standards in terms of accessibility.
The major challenge in developing a stable software is to end experience with the help of voice alone. The inclusion of multiple languages and setting the right pace of the speech when played back to the user are important factors to consider.
To support the widespread usage of the software, a crucial parameter is the dependency of the software on the locall environment and operating systems. While the tech has evolved greatly, the wheelchairs or braille interfaces. accessibility, especially the internet for the differently abled is still stagnant.

Assistive technologies such as a screen reader or magnifiers can enable visually impaired individuals to access the internet.
Unfortunately, these
There are the following two common themes visible in most websites:
1. Web pages are partially accessible. Some parts are usable for the visually impaired, while others are not.
2. The accessibility of some web pages regressed due to updates on the web site.
 Both of the themes lead to an inconsistent state with regards to its accessibility. The American Foundation for the Blind [10] determined that people with visual impairments are more than 31% less likely to report to connect to the Internet and more than 35% less likely to use a desktop computer than people without disabilities.

CHAPTER 4

SYSTEM ANALYSIS

4. <u>SYSTEM ANALYSIS</u>

1. Existing System

2. Proposed System

3. Objective of the System

The system comprises a modular client server distributed architecture. The system consists of the main menu which first runs on the startup of the software and the website modules. The client communicates with the server and back with the use of REST APIs, thus the website modules are not local to the client.

Throughout the system, the user communicates with the software via speech-to-text interface. The Google library of speech-to-text (Speech Recognition) for Python is used for this purpose. For communicating the system's output to the user as well as for confirming the user input, the recognized input is played back to the user using the Python text-to-speech library (pytssx3). The modules are written in Python and make use of Selenium for automation of the respective module and Beautiful Soup for scraping the contents of the web page. The "Script" component of each module consists of the customized code that entails the features of the website contained in the module. For instance, the Wikipedia module consists of a Question and Answer and Summary feature along with the traditional feature of reading out the

entire article. The former is implemented by training a BERT model on the Stanford Question Answering Dataset (SQuaD). The APIs that hold the system together are written in Flask. The software is operating system independent to support hassle free application and usage of the system.

CHAPTER 5

REQUIREMENT ANALYSIS

5. <u>REQUIREMENT ANALYSIS</u>

Hardware and software Requirement Specification

    A.   Main menu
    B.   Google module
    C.   Gmail module
    D.   Wikipedia module

A. Main Menu

The main menu runs when the software is first opened.

Using the pytts (Python text-to-speech) module, the initial set of instructions illustrating the options provided to the user. The system takes the user input after the beep using Google speech-to-text python module. The keywords from the voice are then extracted and appropriate response is executed. The user is also free to change the voice tempo and accent that suits him/her the best.

B. Google Module

This module consists ofa python script that automates the website using Selenium and BeautifulSoup. The user can search for any query through the speech-to-text and text-to-speech interfaces and the recognized query is searched with the help of

Selenium. The resulting search results are read back to the user by scraping the web page contents using the Beautiful Soup module of python. The search results are indexed which enables quick accessing of the web page according to the user's desire, thus saving time, as opposed to the user reading out the whole search result that he wishes to select.

C. Gmail module

This module consists of a python script that starts up Gmail, logs the user into his/her mailbox and provides the support for the user to send or read mails. For sending a new mail, the system prompts the user to provide relevant details and after filtering out noise, through selenium the input fields are filled respectively, and then sent with the user's confirmation. At each stage, the user is free to edit and undo any of his inputs. The system repeats the recognized user input and the input is finalized only if it's confirmed by the user.

D. Wikipedia module

The Wikipedia module presents the user novel options such as summarizing and reading out the article, and provides intelligent answers to queries using NLP and Machine Reading Comprehension. Once the web page is loaded, the user enters the search query, followed by the confirmation, after which the user is provided with 3 options-reading out the entire article, reading out the summary of the article, a question and answer session.

The entire article is read by scraping the web page, cleaning the text, and using the text-to-speech module.

Summarization of the text is performed using the summary method provided by the Wikipedia python(SQuaD) is used. It consists of 100,000 questions with over 50,000 unanswerable questions. BERT is used for Question Answering on SQuAD dataset by:

• applying two linear transformations to BERT outputs for each sub token.

• First/second linear transformation for prediction of probability that current sub token is start/end position of an answer

The user can then ask any question relevant to the topic of the article searched for, and the model returns the most suitable answer to the user through text-to-speech.
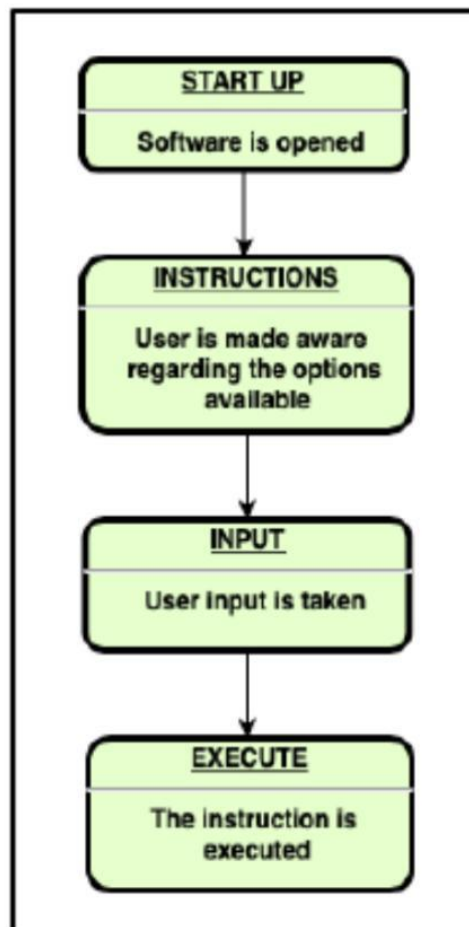
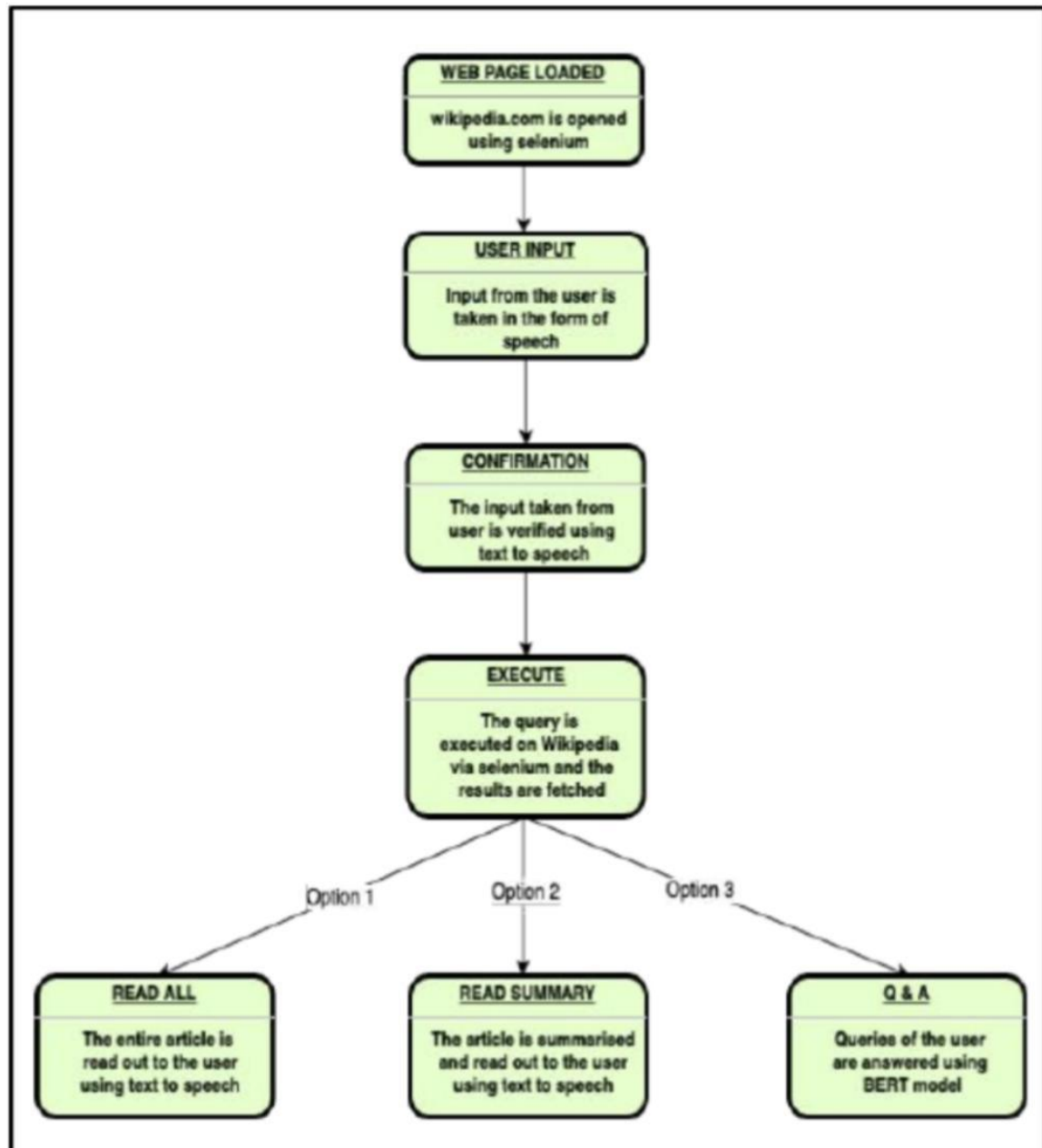Figure 4: Flow diagram for main menu
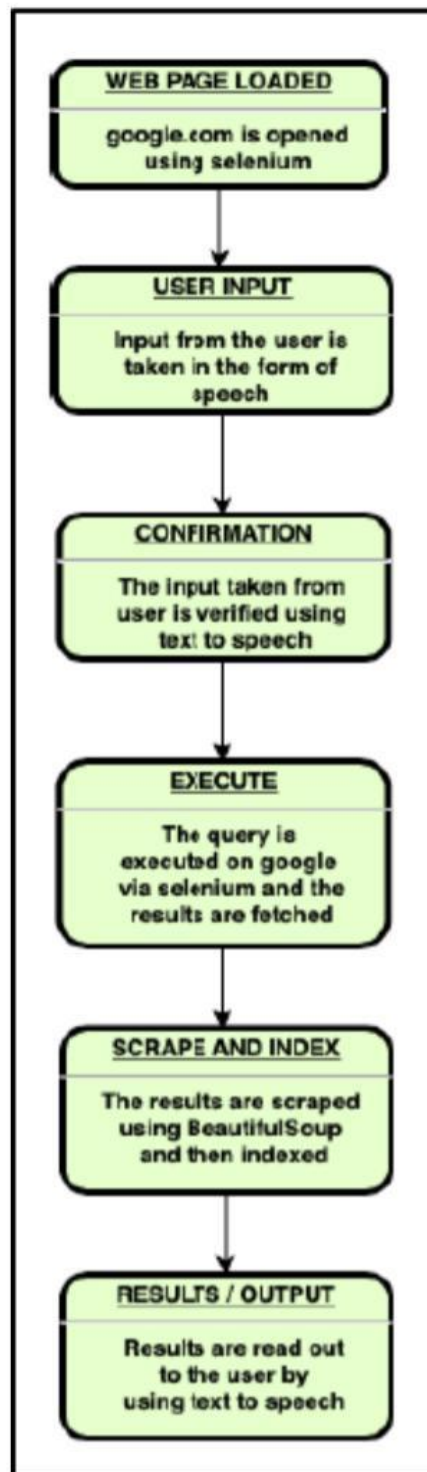
Figure 7: Flow diagram for Wikipedia
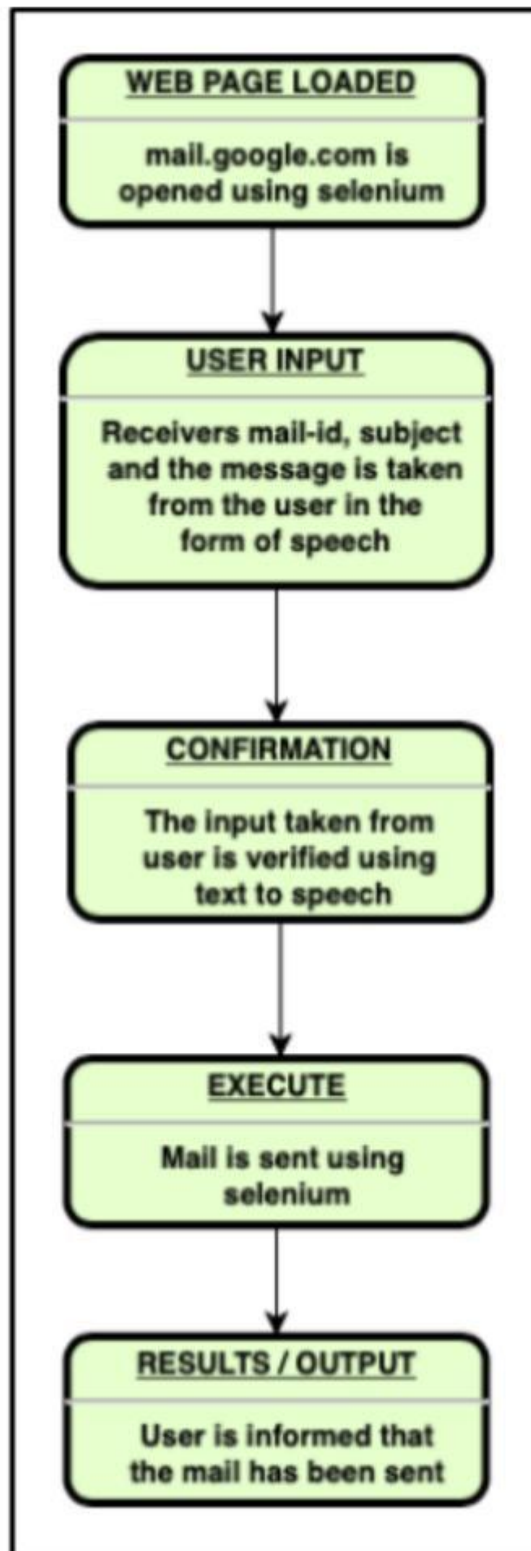
Figure 5: Flow diagram for Google

Figure 6: Flow diagram for Gmail

CHAPTER 6

DESIGN ANALYSIS

6. DESIGN & ANALYSIS

Figure 2 :

System architecture is a representation of the system architecture of our software. The user accesses the software using the web interface where the speech to text (STT) module converts the voice input to text. The user is then presented with the main menu where they have three options to choose from and decide which website they want to browse. Accordingly, the module is invoked with its corresponding speech to text modules, web driver and machine learning module. The output is played to the user using text to speech (TTS) module. This is the overview of the software.
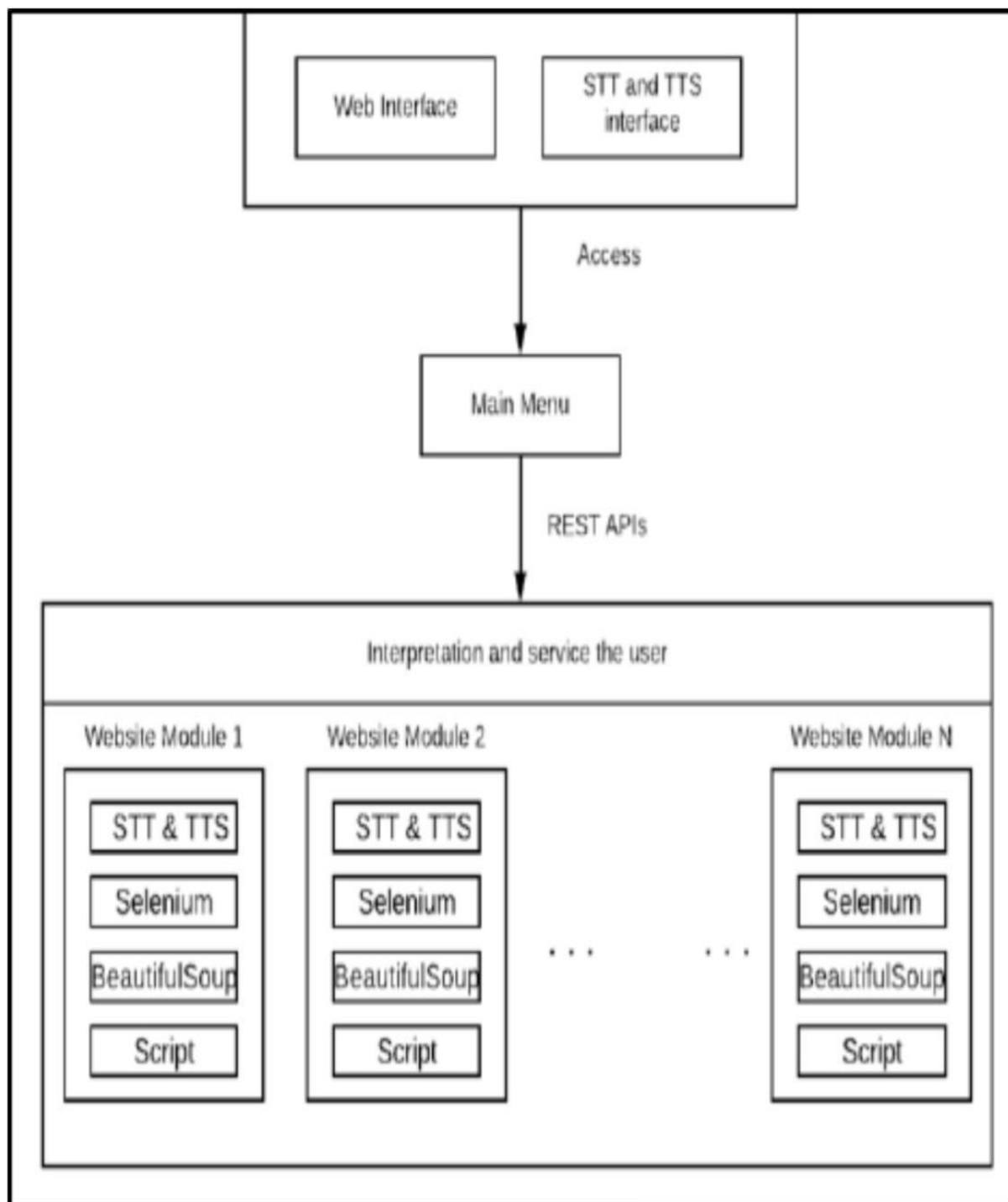
Figure 2: System Architecture

Figure 3:

Dataset – we have used the Standard Questions Answering
Dataset(SQUAD) available to pre train the machine learning model for the question and answers component of the module.
The dataset has questions posed by people on Wikipedia where the answer to the question is from within the given excerpt of text on Wikipedia or it may be unanswered
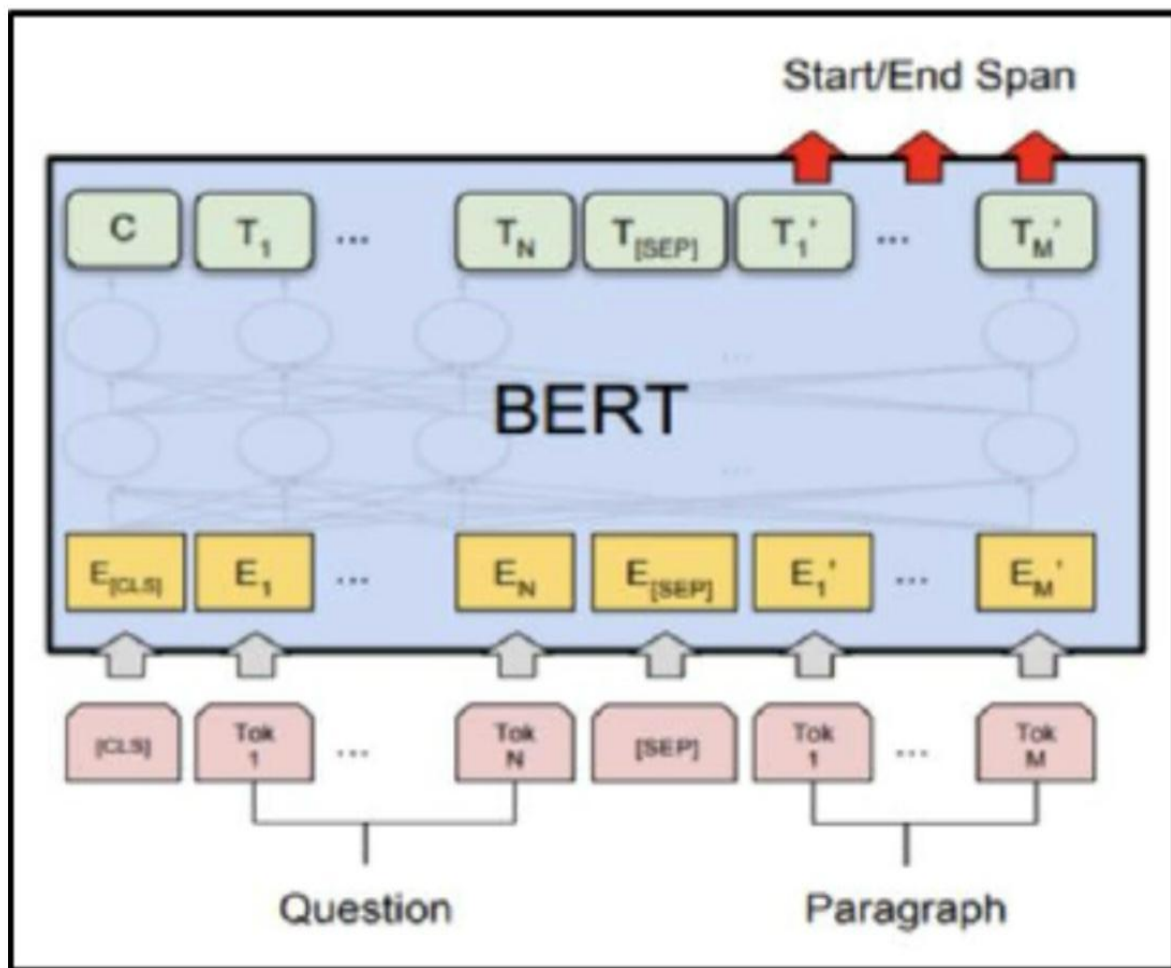
Figure 3: BERT model on SQuAD Dataset architecture [11]

CHAPTER 7

IMPLEMENTATION

7. <u>IMPLEMENTATION</u>

Implementation is the stage where the theoretical design is turned into a working system. The most crucial stage in achieving a new successful system and in giving confidence on the new system for the users that it will work efficiently and effectively.

The system can be implemented only after thorough testing is done and if it is found to work according to the specification. It involves careful planning, investigation of the current system and it constraints on implementation, design of methods to achieve the change over and an evaluation of change over methods a part from planning.

Two major tasks of preparing the implementation are education and training of the users and testing of the system. The more complex the system being implemented, the more involved will be the system analysis and design effort required just for implementation.

The implementation phase comprises of several activities. The required hardware and software acquisition is carried out. The system may require some software to be developed. For this, programs are written and tested. The user then changes over to his new fully tested system and the old system is discontinued.

TESTING

The testing phase is an important part of software development. It is the Information zed system will help in automate process of finding errors and missing operations and also a complete verification to determine whether the objectives are met and the user requirements are satisfied. Software testing is carried out in three steps:

1. The first includes unit testing, where in each module is tested to provide its correctness, validity and also determine any missing operations and to verify whether theobjectives have been met. Errors are noted down and corrected immediately.

2. Unit testing is the important and major part of the project. So errors are rectified easily in particular module and program clarity is increased. In this project entire system is divided into several modules and is developed individually. So unit testing is conducted to individual modules.

3. The second step includes Integration testing. It need not be the case, the software whose modules when run individually and showing perfect results, will also show perfect results when run as a whole.

CHAPTER 8

SNAPSHOTS

8. <u>SNAPSHOTS</u>

Top View of Cap

Cap with the camera to analyze and recognize images

Person Wearing the Cap

nd classify its reaction based on enter component in
. then the key elements are searched using decision
thm in the trained dataset.
tion gain IG(A) is the measure of the distinction in
om before to after the set S is part on an attribute A
ven in Algorithm 2.

```
n(exp, characteristics, eOfSet)
in
= eOfSet
r      value      in      characteristics      Values(exp.
ristics):
gin
sub = subset(exp, characteristics, value)
-=(no. in sub)/(total no. of exp)* entropy(sub)
nd
urn g
```

Algorithm 2: Information Gain

IV. RESULTS AND DISCUSSION

Fig. 5 Image Recognition GUI

Fig. 4 Chat Bot GUI

Fig. 6 Textual Recognition GUI

CHAPTER 9

CONCLUTION

9. <u>CONCLUTION</u>

The package was designed in such a way that future modifications can be done easily. The following conclusions can be deduced from the development of the project:

❖ Automation of the entire system improves the efficiency

❖ It provides a friendly graphical user interface which proves to be better when compared to the existing system.

❖ It gives appropriate access to the authorized users depending on their permissions.

❖ It effectively overcomes the delay in communications.

❖ Updating of information becomes so easier

❖ System security, data security and reliability are the striking features.

❖ The System has adequate scope for modification in future if it is necessary.

In this report, we presented a modular solution to improve web-based accessibility for the visually impaired. The virtual assistant is operating system independent and does not rely on keyboard inputs from the user to maximize ease ofuse and aims to provide a hassle-free experience for the user. Through speech to text and text to speech interfaces, the user can communicate with and customize the system. We presented the system design and methodology of the three modules that is currently implemented. The Wikipedia module uses a BERT model on the SQuAD dataset to answer user queries quickly and accurately. The Exact Match was found to be 80.88%.

The virtual assistant provides an easy way to access any website for the visually impaired. It eliminates the need to remember complex keyboard commands or the use of screen readers. The assistant is not only a great way to interact with the websites but also an effective way to do so. The software works as a steppingstone towards Web 3.0 where everything will work on voice commands.

FUTURE ENHANCEMENT

At present the application supports only commands given in the English language. We plan to expand that and make it
available in most of the daily used languages thus people from all parts of the world can access the web without any issue
We would also like to create a uniform framework that can be plugged to any website and create a browser extension thus especialty Posite to at le bitese able sual impaired.
individuals to access online courses just like the average individual.

10. REFERENCE

I] Pilling, D., Barett, P. and Floyd, M. (2004). Disabled people and the Internet: experiences, barriers and opportunities. York, ÜK: Joseph
Rowntree Foundation, unpublished.
121 Porter, P. 1997) Threading washing machine", Vinc, Vol. 106, p.34
[3] JAWS - https://www.freedomscientific.com/products/software/jaws/ accessed in April 2020
[4] Ferati, Mexhid & Vogel, Bahtijar & Kurti, Arianit & Raufi, Bujar & Astals, David. (2016). Web accessibility for visually impaired people: requirements and design issues. 9312. 79-96. 10.1007/978-3-319-45916-
[5] Power, C., Freire, A.P., Petrie, H., Swallow, D.: Guidelines are only half of the story:accessibility problems encountered by blind users on the web.
In: CHI 2012, Austin, Texas USA, 5-10 May 2012, pp. 1-10 (2012)
[6] Sinks, S., & King, J. (1998). Adults with disabilities: Perceived barriers that prevent Internet access. Paper presented at the CSUN 1998 Conference, Los Angeles, March. Retrieved January 24, 2000 from the World Wide Web
171 Muller, M J., Wharton, C., McIver, W. J. (r.), & Laux, L. (1997). Toward an HCI research and practice agenda based on human needs and social responsibility. Conference on Human Actors in Computing Systems. Atlanta, Georgia, 22-27 March.
18]
Kirsty Williamson, Steve Wright, Don Schauder, Amanda Bow, The internet for the blind and visually impaired, Journal of Computer-Mediated Communication, Volume 7, Issue 1, 1 October 2001,JCMC712
[9]
Deeppavlov
documentation
http://docs.deeppavlov.ai/en/master/features/models/squad.html accessed in April 2020
[10] The website for American foundation
for the blind
https://www.afb.org/about-afb/what-we-do/afb-consulting/afb-accessibility-resources/challenges-web-accessibility accessed in April 2020
I Be ho, ution answering models for SQUAD 2.0, Sanford
[12] Global data on visual impairments 2010 by World Health Organisation (WHO)https://www.who.int/blindness/GLOBALDATAFINALforweb.p

THANKYOU