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WEB ACCESS FOR VISUALLY IMPAIRED

A Report for the Evaluation 3 of Project 2

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GALGOTIAS UNIVERSITY

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BONAFIDE CERTIFICATE

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THANK YOU.

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ABSTRACT:

Technology has boosted the existence of human kind and the quality of life they live. Every day we are planning to create something new and different. We have solutions for our every other problem. Being incapable due to the presence of weak organs is an option anymore. We have machines to support our lives and make us somewhat complete. Accessing the internet is like a daily breakfast which is essential for living. Someone with visual impairment might face problems watching the screen and giving orders to the computer or system. In this paper we will discuss technology advancement for supporting the visually impaired to access the internet by multiple ways. Firstly, we will discuss the changes we can make in websites to make it feasible for the people with different eye impairments. The contrast and text size with background color, the program which reads through every word hovered etc. Secondly, we will talk about a virtual assistant which will turn speech into text and help the person throughout the session. The system allows blind users to access this web portal to access and navigate the web through this portal. Since a blind person cannot see the website, we here use a smart text to speech system integrated into the web portal to help the blind navigate by hearing the data on web. We make use of an audio menu that speaks out all available navigation options to the blind user and then instructs him/her to press respective keys on the keyboard (There is a specially designed keyboard for the blind, through which they can press desired keys). The

system allows the person to login and after that provides a stepwise instruction on how to operate and which keys to press to enter a particular section. Later it instructs them to enter into desired sub sections. Past that the system reads out desired news, plays desired songs for the person as desired using the audio navigation menu. The person may thus easily navigate through the portal with ease. Now we also have an admin login section in the web portal. Here admin may add, update the news and other section data in the system.

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TITLE	ABBREVIATION
1. **IOMT**	INTERNET OF MEDICAL THINGS
2. **API**	APPLICATION PROGRAMMING INTERFACE
3. **MO**	MOTION OSSILATION
4. **FDA**	FOOD AND DRUG ADMINISTRATION
5. **GPS**	GLOBAL POSITIONING SYSTEM
6. **IT**	INFORMATION TECHNOLOGY
7. **AR/VR**	AUGMENTED REALITY VIRTUAL REALITY
8. **3D**	THREE DIMENSIONS
9. **UPI**	UNIFIED PAYMENT INTERFACE
10. **5G**	FIFTH GENERATION
11. **DNA**	DEOXYRIBONUCLEIC ACID
12. **RNA**	RIBONUCLEIC ACID
13. **GRU- NN**	GATED RECURRENT UNIT NEURAL NETWORKS
14. **CT- SCAN**	COMPUTERIZED TOMOGRAPHY SCAN
15. **AI**	ARTIFICIAL INTELLIGENCE
16. **IOT**	INTERNET OF THINGS
17. **USB**	UNIVERSAL SERIAL BUS
18. **UART**	UNIVERSAL ASYNCHRONOUS RESISTOR TRANSMITTER
19. **WHO**	WORLD HEALTH ORGANIZATION

CHAPTER-1
INTRODUCTION

1.1 VISUAL IMPAIRMENT:

Visual impairment, also known as **vision impairment** or **vision loss**, is a decreased ability to see to a degree that causes problems not fixable by usual means, such as glasses. Some also include those who have a decreased ability to see because they do not have access to glasses or contact lenses. Visual impairment is often defined as a best corrected visual acuity of worse than either 20/40 or 20/60. The term **blindness** is used for complete or nearly complete vision loss. Visual impairment may cause difficulties with normal daily activities such as driving, reading, socializing, and walking.

The most common causes of visual impairment globally are uncorrected refractive errors (43%), cataracts (33%), and glaucoma (2%). Refractive errors include near-sightedness, far-sightedness, presbyopia, and astigmatism. Cataracts are the most common cause of blindness. Other disorders that may cause visual problems include age-related macular degeneration, diabetic retinopathy, corneal clouding, childhood blindness, and a number of infections. Visual impairment can also be caused by problems in the brain due to stroke, premature birth, or trauma among others. These cases are known as cortical visual impairment. Screening for vision problems in children

may improve future vision and educational achievement. Screening adults without symptoms is of uncertain benefit. Diagnosis is by an eye exam.

The World Health Organization (WHO) estimates that 80% of visual impairment is either preventable or curable with treatment. This includes cataracts, the infections river blindness and trachoma, glaucoma, diabetic retinopathy, uncorrected refractive errors, and some cases of childhood blindness. Many people with significant visual impairment benefit from vision rehabilitation, changes in their environment, and assistive devices. As of 2015 there were 940 million people with some degree of vision loss. 246 million had low vision and 39 million were blind. The majority of people with poor vision are in the developing world and are over the age of 50 years. Rates of visual impairment have decreased since the 1990s. Visual impairments have considerable economic costs both directly due to the cost of treatment and indirectly due to decreased ability to work.

1.2 WEB ACCESIBILITY:

Web accessibility is the inclusive practice of ensuring there are no barriers that prevent interaction with, or access to, websites on the World Wide Web by people with physical disabilities, situational disabilities, and socio-economic restrictions on bandwidth and speed. When sites are correctly designed, developed and edited, generally all users have equal access to information and functionality.

For example, when a site is coded with semantically meaningful HTML, with textual equivalents provided for images and with links named meaningfully, this helps blind users using text-to-speech software and/or text-to-Braille hardware. When text and images are large and/or enlargeable, it is easier for users with poor sight to read and understand the content. When links are underlined (or otherwise differentiated) as well as coloured, this ensures that color blind users will be able to notice them. When clickable links and areas are large, this helps users who cannot control a mouse with precision. When pages are not coded in a way that hinders navigation by means of the keyboard alone, or a single switch access device alone, this helps users who cannot use a mouse or even a standard keyboard. When videos are closed captioned or a sign language version is available, deaf and hard-of-hearing users can understand the video. When flashing effects are avoided or made optional, users prone to seizures caused by these effects are not put at risk. And when content is written in plain language and illustrated with instructional diagrams and animations, users with dyslexia and learning difficulties are better able to understand the content. When sites are correctly built and maintained, all of these users can be accommodated without decreasing the usability of the site for non-disabled users.

The needs that Web accessibility aims to address include:

- **Visual:** Visual impairments including blindness, various common types of low vision and poor eyesight, various types of color blindness;

- **Motor/mobility:** e.g. difficulty or inability to use the hands, including tremors, muscle slowness, loss of fine muscle control, etc., due to conditions such as Parkinson's disease, muscular dystrophy, cerebral palsy, stroke;
- **Auditory:** Deafness or hearing impairments, including individuals who are hard of hearing;
- **Seizures:** Photo epileptic seizures caused by visual strobe or flashing effects.
- **Cognitive and intellectual:** Developmental disabilities, learning difficulties (dyslexia, dyscalculia, etc.), and cognitive disabilities (PTSD, Alzheimer's) of various origins, affecting memory, attention, developmental "maturity", problem-solving and logic skills, etc.

Accessibility is not confined to the list above, rather it extends to anyone who is experiencing any permanent, temporary or situational disability. Situational disability refers to someone who may be experiencing a boundary based on the current experience. For example, a person may be situationally one-handed if they are carrying a baby. Web accessibility should be mindful of users experiencing a wide variety of barriers.

Web accessibility features

Examples of accessibility features include:

- WAI-AA compliance with the WAI's WCAG
- Semantic Web mark-up

- (X)HTML Validation from the W3C for the pages content
- CSS Validation from the W3C for the page's layout
- Compliance with all guidelines from Section 508 of the US Rehabilitation Act
- A high contrast version of the site for individuals with low vision, and a low contrast (yellow or blue) version of the site for individuals with dyslexia
- Alternative media for any multimedia used on the site (video, flash, audio, etc.)
- Simple and consistent navigation
- Device independent

1.3 THE OVERALL DESCRIPTION:

The WCAG 2.0 guidelines have been followed to understand the requirement of the visually impaired patients for accessing the website. The guidelines work on four fundamentals

Perceivable: It means that the user must be able to perceive the information given on the website. There are multiple symbols and acronyms which are hard to understand especially when they are non-programmable. This type of signs and symbols make it hard to access the website.

Operable: The website should be easily operational by the user. The content and interface provided should be easily operable. Interaction shouldn't be complicated and less user friendly.

Understandable: The aim and goal of the website should be easily delivered and it has to be easily understandable. The user interface and content provided should be more informative and less complicated.

Robust: The content provided should be robust enough to take the technology advancement. The assisting tools and background should be provided to make it robust for all technological evolution.

These are the four main fundamentals upon which the website should be made to make it better and useful for the person with disability. If any of the points proves to be true then the website will lack the support. The technology is giving itself a new shape and advancement every day. Hereby it is essential to be a part of the internet community to stay updated and keep the track of life. Someone with a disability is not different from the requirement, thus they require a system of support to be a part of the community. Here we will discuss the research conducted by some individuals after they tried making the website and collected the data. The public reviews and the result generated will be discussed with some deep understanding about the more development they could have made to improve the ratio of yes, they received.

Similarly, after we studied the guidelines and made the website, we understood the things we need to do for differently able to provide full assistance, this concept failed for fully blind people. The website can only be improved and made useful for those with minor eye impairment or color disorder etc. For fully blind individuals there was no such assistance on the website. Even if we provided

speech support, he/she couldn't see the word or exact position of the cursor to hover over for listening. The solution popped up after the development of Industry 4.0. It came out with various assistance solutions in the name of artificial intelligence and machine learning. We can see a new form of machines where they can understand what the user is saying and also can talk back. The understanding of the deep neural network and learning provided to machines can behave almost like a human. They give assistance such as changing the speech to text and text to speech. They listen to what the person has to say then they take word by word and based on the learning provided to them they change those speech to text. Later the text is taken in for the process and relevant answers are again provided to the user. This process is inspired by the human brain and procedure of grooming of a child. It takes the whole life cycle to understand the making of an AI. An AI assistant is a friend, a support which can help the visually impaired or blind person just like a human would do. Give commands and ask your assistant to do that for you. Simple, easy steps and the work is done. It does not require any changes to be made in the website or interaction to the keyboard. All you need is your AI speaker with you. From sitting in your living room, you can control the functioning of AC, water cooler, car door, office etc. Our life has been made simpler and better this way.

Here we will also discuss the virtual personal assistant which will take the orders from the person for a specific list and will provide the assistance accordingly. We will also try to understand the basic code in python for the development of the

Virtual Personal Assistant. More lines of codes will be added for browsing various websites and understanding the need and mood of the person. It will be like a total best friend who will be with the person throughout the AI session. All that is needed is internet connection and a fully connected environment. The code works on some of the basic library functions such as speech recognition, pyttsx3, OS etc. It uses a Microsoft speech voice token named Zira to convert the speech to text and then reply back from text to speech. We can also change the speech voice tokens by downloading multiple voice tokens available online. The program made can be more enhanced and multiple lines of codes can be added depending on the understanding of the need of the person. It requires different keywords to recognise the website the person wants to access and then it takes to the URL. It supports opening various files and figures on the computer. Weather forecasting and daily news updates etc.

1.4 PERSONAL VOICE ASSISTANT:

A machine which works as a personal voice assistant. Personal voice assistant helps the person to control all the features of the network just by reading the speech of the user. The only requirement is stable internet connection. In this growing era of developing technologies, we can think of Industry 4.0 as the solution for everything. People have seen multiple advancements in the field of technology, here we are talking about developing a machine with human-like brain and thinking capabilities. The recent developments in artificial intelligence and machine learning have made the way for the new future. All of it is inspired

by the humans and the way they live their life. The basic VPA model works according to the training it receives. Let us take an example of a mother and her child. While the child is born it is like a blank sheet of paper doesn't know anything. How to live, how to talk, even how to walk. It grows up with its mother learning the basic necessity of life and with learning the life experience increases and finally the child becomes capable of taking rightful and necessary decisions. Similarly, the VPA is trained to make it work for the people by training it through providing various data sets and lessons on how to perform. With time and repeated interaction, the feasibility increases hence leading to desired results. The best examples of VPA's can be understood by referring to the following:

Amazon's Alexa: It is a device made by Amazon company which looks like a speaker and has an inbuilt voice which listens and then converts speech to text, after which it takes the commands, follows the instructions and again converts from text to speech and narrates to the user. It is well developed for supporting the Industry 4.0 applications. When it is connected in a personal VPN it may act as the controller of every other device if given permission. The only requirement of Amazon Alexa is that it requires internet connection to operate. It can also be used to visit internet and web access without the need of the computer screen and keyboard.

Microsoft's Cortana: It is also like a personal voice assistant for Microsoft Windows. It solves the troubleshooting problems when asked to do. Also, it can open particular files from the folders if named properly. Microsoft is

trying to make varieties of changes for the Cortana. We can expect a better form of Cortana support in the upcoming years.

Apple's Siri: It is the personal Voice assistant for the Apple i-phone users. It is installed as an application inside the phone. It starts when its name is called "SIRI". It helps throughout the functioning of the mobile phone. it can make calls on the user's demand, set reminders and make notes on the behalf of the person. While playing music or entertaining by jokes everything can be done by Apple siri.

Google's Assistant: The personal voice assistant for Android users. It can be found in every android device except the i-phone of Apple. It is specially designed to help the android users and it is a product of google. It is installed in phones and can be very helpful in making notes, writing reminders etc. the very new update assistant of google also has the basic image processing ability. The google lens can be connected to google assistant and then information about any place is easily narrated on demand.

The above are some of the examples of the leading VPA's along with the name of the companies they are associated with. We are moving towards the digital era and everything we use and try to operate, we expect minimum time loss and efficiency of work. Having a personal assistant is nothing but finding a support for comfort. Even the person with minimal knowledge of technology can access these devices and benefit themselves.

We are tending to use a similar form of device to benefit the visually impaired or blind person. The device being created is coded in python and is at its very basic stage. Further developments and efficiency can be increased with deploying the codes for various work processes.

It will be like a messiah for the people with visual impairment or blind. the only thing they are expected to do is give the instructions and the assistant will do it for them. From maintaining the daily reminders to setting the alarm. Browsing the internet to listen to the news and keeping track of the world wide activities. There is always a sense among the people with disabilities that they are lacking behind from the world. It arises the sense of hatred and frustration among them. This VPA can also be a friend and guide to the people feeling low or for those who cannot keep up their social lives.

CHAPTER 2
LITERATURE REVIEW

From the work idea suggested until date about making a website for visually impaired various websites has been made. A research was conducted in SEEU, Tetovo. Various individuals were given an opportunity to take part in this scenario. The workshop included a total of 21 participants who were ready to take the test of the website. They were given the systems and were asked to answer some of the questions. Many of them suffered from various types of disabilities of eyes but the website formation was somehow helpful and better. It was found out that the website is not 100% reliable but yes at some point it is successful. The user was provided with the help support voice for browsing the website, also it had options such as names of various diseases and level of impairment according to the menu chosen the assistance was provided. Highlighted text in yellow with some letters with normal size and some with bigger texture. Below is the example of the look of the website.

Fig 1: previous study

The activity was performed in three parts in various states.

The whole aim worked as follows: The view of the user is set by asking the required filter and type of disease he has. Then accordingly the website content is accessed and with some control measures the content is altered according to the view measure after which the content is made visible.

There were many techniques provided to tackle the problem such as transformation (image, text, color), filtering (image, content), context switching (switching control, amplifying lens), Modality (voice narrator).

2.1 RESEARCH GAP:

- Viewpoints of the patients are not well recorded.
- The control measures need to be set up every time with very specific detailing.
- No alternatives for a completely blind person.
- Narrator is not 100% reliable as it speaks only the word over which the cursor hovers.
- The detailing of the page is missed.

2.2 NVDA:

NonVisual Desktop Access (**NVDA**) is a free, open-source, portable screen reader for Microsoft Windows. The project was started by Michael Curran in 2006. NVDA is programmed in Python. It currently works exclusively with accessibility APIs such as UI Automation, Microsoft Active

Accessibility, IAccessible2 and the Java Access Bridge, rather than using specialized video drivers to "intercept" and interpret visual information. It is licensed under the GNU General Public License version 2.

NVDA uses eSpeak as its integrated speech synthesizer. It also supports the Microsoft Speech platform synthesiser, ETI Eloquence and also supports synthesizers. Output to braille displays is supported officially from Version 0.6p3 onward.

Besides general Windows functionality, NVDA works with software such as Microsoft office applications, WordPad, Notepad, Windows Media Player, web browsers such as Mozilla Firefox, Google Chrome, Internet Explorer, and Microsoft Edge. It supports most email clients such as Outlook, Mozilla Thunderbird, and Outlook Express. NVDA also works with most functions of Microsoft Word, Microsoft PowerPoint and Microsoft Excel. The free office suites LibreOffice and OpenOffice.org are supported by way of the Java Access Bridge package. Since early 2009, NVDA supports the WAIARIA standard for Accessible Rich Internet Applications, to facilitate better accessibility of web applications for blind users. In 2019 the screen reader user survey by WebAIM found NVDA to be the most popular screen reader worldwide, displacing JAWS for the first time; 40.6% of survey participants used it as a primary screen reader, while 72.4% of participants used it often. Screen readers

can be used to test the accessibility of software and websites. NVDA is the primary screen reader of choice by accessibility practitioners.

NVDA is organized into various subsystems, including the core loop, add-ons manager, app modules, event handler and input and output handlers, along with modules to support accessibility APIs such as Microsoft Active Accessibility. NvDA also features various graphical user interfaces of its own powered by wxPython, such as various preference dialogs, and setup and update management dialogs. NVDA uses objects to represent elements in an application such as menu bars, status bars and various foreground windows. Various information about an object such as its name, value and screen coordinates are gathered by NVDA through accessibility APIs exposed by an object, such as through UIA (User Interface Automation). The gathered information is passed through various subsystems, such as speech handler and presented to the user in speech, braille and via on-screen window. NVDA also provides facilities to handle events such as key presses, name changes and when an application gains or loses focus. NVDA provides facilities to examine an application's object hierarchy and implement ways to enhance accessibility of a program. It provides dedicated commands to move through object hierarchy within an application, as well as an interactive python console to perform focus manipulation, monitoring objects for events and test code for improving accessibility of an application to be packaged in an app module.

2.3 JAWS:

JAWS ("**Job Access with Speech**") is a computer screen reader program for Microsoft Windows that allows blind and visually impaired users to read the screen either with a text-to-speech output or by a refreshable Braille display. JAWS is produced by the Blind and Low Vision Group of Freedom Scientific. An August–September 2019 screen reader user survey by Web AIM, a web accessibility company, found JAWS to be the second-most popular screen reader worldwide, displaced for the first time by Nonvisual Desktop Access; 40.1% of survey participants used it as a primary screen reader, while 61.7% of participants used it often. AWS supports all versions of Windows released since Windows Vista. There are two versions of the program: The *Home* edition for non-commercial use and the *Professional* edition for commercial environments. Before JAWS 16, the *Home* edition was called *Standard*, and only worked on home Windows operating systems. A DOS version, sometimes also known as *JDOS*, is free. The JAWS Scripting Language allows the user to use programs without standard Windows controls, and programs that were not designed for accessibility.

JAWS allow all major functions of the Microsoft Windows operating system to be controlled with keyboard shortcuts and spoken feedback. These shortcuts are kept as consistent as possible throughout most programs, but the very high number of functions needed to fluidly use modern computer software effectively

requires the end user to memorize many specific keystrokes. Virtually every aspect of JAWS can be customized by the user, including all keystrokes and factors such as reading speed, granularity used when reading punctuation, and hints. JAWS also include a scripting language to automate tasks and make more complex modifications to the program's behaviour.

The software includes a distinct mode designed specifically for web browsers, activated when Internet Explorer or another browser is in the foreground. Support for Internet Explorer is standard; other browsers often have compatibility issues ranging from minor to severe. Notably, Microsoft Edge support lagged behind most common third-party browsers before the release of the Chromium-based Edge in January 2020. When browsing web pages, JAWS first declares the title and number of links. Speech can be stopped with the control key, lines are navigated with the up/down arrow keys, and the tab key moves between links and controls. Specific letter keys on the keyboard can be pressed to navigate to the next or previous element of a specific type, such as text boxes or check boxes. JAWS can access headings in Word and PDF documents in a similar fashion.

The JAWS feature set and its configurability have been described as "complex," with training recommended for users such as web designers performing accessibility testing, to avoid drawing the wrong conclusions from such testing.

CHAPTER 3
TYPES OF WEB ACCESS FOR VISUALLY IMPAIRED

3.1 HOW TO MAKE YOUR WEBSITE ACCESSIBLE FOR VISUALLY IMAPIRED:

The internet has become a part of our life. Some might even consider it as one of the basic necessities of life. It is so integrated in our life that we first search symptoms for any health issue on Google before consulting any doctor. The point is, everyone now relies on internet to get most of the things done, this also include people with disabilities, like visual impairment.

"285 million people are estimated to be visually impaired worldwide: 39 million are blind and 246 have low vision." Considering that people with visual impairment also browse websites, there is a great need for designing websites that are accessible to them. This is a challenge for website designers as there are more than one type of visual impairment. Some might be blind, while others might have color blindness. Designing websites that is accessible for these types of users as well is a challenge as well as responsibility of designers and developers.

- The Principles of Accessible Website

According to W3C WCAG 2.0 Guidelines, a website must be perceivable, operable, understandable and robust to be accessible for disabled users (including visually impaired users).

Perceivable: Content of a website must be presented in a way that users can perceive. For example, people with blindness or severe visual impairment might not be able to see an image. For this, alt tag can be used on the image that describes what is in that image.

Operable: UI and navigation should be easily operable by everyone. For example, such users should be able to use keyboard to navigate a website. For this, the necessary functionality should be available using keyboard.

Understandable: The content and elements of UI must be understand to everyone. For example, the text must be legible, readable and understandable.

Robust: Content must robust enough to be interpreted by available browsers. For example, the HTML on the form should be using proper tags and values so it will be displayed properly on browsers.

These principles are the most important ingredients of creating an accessible website. Let's see how you can apply these principles in creating a website that visually impaired users can easily access.

- Give Users Control Over the Text Size

For the text to be readable by such users, the font size must be large enough. However, some users might not need 2x large fonts, while some might even need fonts larger than that. For catering to the need of these people, you can provide a button that users can use to enlarge the text as much as they want. Embraceme.org provides three text size options so user can enlarge the text size if current size is too small to read for them. The text size becomes more important when it comes

to CTA buttons. If a CTA has “Contact Us” text that is not clearly visible to such users, it is unlikely that they will click on it. This mean you can forget that such users would do business with you.

- Don’t Left Color Blind Users Out

Color and contrast are the most basic as well as the most important parts of a design. Using right color scheme can affect the mood of users and using right contrast will get their attention. However, not everyone sees colors the same way. There are people who cannot perceive certain colors right. Designing for visually impaired users, especially users with color blindness, is a great challenge for designers. More so because there is not one but three types of color blindness. The key to designing for color blind users is to ensure high contrast between foreground and background elements and not relying entirely on colors.You must also make sure that the text content on the page is easily readable on grey scale (black text on white background or opposite of that). Facebook uses warning icons and popup messages to show errors or invalid requests, instead of solely relying on red color. The color and contrast also becomes important when it comes CTA. For example, a green color CTA on red color theme might not stand out much for color blind users. This issue can be tackled by using bigger CTA button and with large text on it so it is clearly visible for even a color blind user.

- Making Everything Accessible Over a Press of Keys

One of the biggest hurdles for blind users could be using the navigation menu, especially if it has dropdowns and submenus. Blind users use screen readers, so

they can tell what labels are there in the navigation menu. However, it might be difficult for them to click on the Home button, for example. To solve this issue, most browsers have built-in function of keyboard focus. This means users can, for example, press Tab key to jump to links on a page. The screen reader will read the label of the link and user can press Enter key to visit the desired link. To make it even easier, you can provide a list of keyboard shortcuts on your page so users know how they can navigate using keyboard only. Jackson church provides a short list of Access Keys on their website to make their website accessible and "as user friendly as possible". To ensure keyboard navigation, avoid using certain keyboard traps. For example, some designers disable keyboard focus on their website thinking that it doesn't look good on it. This make it difficult for users who are using keyboard to navigate a website

3.2 10+ Special Browsers For Visually Impaired Users:

Visual impairment (or vision impairment) is vision loss (of a person) to such a degree as to qualify as an additional support need through a significant limitation of visual capability resulting from either disease, trauma, or congenital or degenerative conditions that cannot be corrected by conventional means, such as refractive correction, medication, or surgery. Some browsers have been developed especially for people with such disabilities. Features include optical character recognition, screen magnifier, screen readers, voice recognition, speech synthesisers, etc. Below I mentioned top 10 web browsers for visually impaired users.

- MozBraille: MozBraille is a browser but an extension to transform Mozilla or Firefox to a stand-alone accessible Internet browser designed for blind or partially sighted users. So, with mozBraille you don't need a third part program like a screen reader. MozBraille offers its users three displays or outputs: A Braille output on a braille terminal, a text to speech output, and a big character's view. MozBraille is a part of the VICKIE project. The main goal of this project is to create an electronic school bag for visually impaired children. So, the main output is the Braille and the less important is the text to speech because students have to listen their teacher.
- pwWebSpeak: pwWebSpeak is an Internet browser designed for users who wish to access the Internet in a non-visual or combined auditory and visual way. This includes blind or partially sighted users, people with dyslexia or learning difficulties, and users who are learning new languages. pwWebSpeak is designed to interact directly with the information on a web page, and to translate it into speech, as well as providing a magnified visual display. The user may navigate through the structure of a document based on its contents: links, headings and paragraphs, rather than having to deal with scrolling and interpreting a complex screen lay-out. The basic format used on the Web is called HTML. The intelligence built into pwWebSpeak understands the HTML constructs and automatically presents them in a

logical sequence, greatly simplifying navigation of even complex documents.

- EMACSPEAK: Emacspeak is a speech interface that allows visually impaired users to interact independently and efficiently with the computer. Audio formatting –a technique pioneered by AsTeR– and full support for W3C's Aural CSS (ACSS) allows Emacspeak to produce rich aural presentations of electronic information. By seamlessly blending all aspects of the Internet such as Web-surfing and messaging, Emacspeak speech-enables local and remote information via a consistent and well-integrated user interface. When combined with Linux running on low-cost PC hardware, Emacspeak/Linux provides a reliable, stable speech-friendly solution that opens up the Internet to visually impaired users around the world.
- eGuideDog: eGuideDog project is to write free software for the blind. Currently, they focus on WebSpeech, Ekho TTS and WebAnywhere. eGuideDog Browser is a voice web browser designed for the blind. It focus on how to present HTML in speech rather than in text. It's written in Perl and supports eSpeak TTS engine. Some techniques such as re-constructing the HTML structure, summarizing the content and filtering Ads, etc will

be used. Some accessibility problem is taken into account (see Accessibility for more detail).

- Simply Web 2000: Simply Web 2000 is an speech friendly, speech enabled accessible web browser with advance features that allow easy navigation of complex pages by blind users. It uses Internet Explorer 4.01 or later as it's engine. We recommend installing Explorer 5.0 for optimal performance and flexibility. The Simply Web 2000 package includes a software based speech synthesizer and can be used in standalone mode as a "Talking Web Browser". It you already have a screen reader installed in your computer, then you can take advantage of the fact that it has been design to be speech friendly. Particularly, it is fully compatible with Simply Talker 98/2000, our inexpensive screen reader also with built-in software synthesis.
- WebbIE: WebbIE is a web browser for blind and visually-impaired people, especially those using screen readers, used since 2001 all over the world. It comes with the Accessible programs, letting you access news and audio on the Internet in a simple and accessible way, allowing you to use podcasts, listen to the radio and read RSS and news with your screen reader or other access solution. Together they provide a way to access websites and other great things online – and they are all free!
- **EIA:** EIA (Enhancing Internet Access) – A specialized Web Browser, suitable for touchscreen systems, with fully integrated Web awareness,

assessment and training modules. Designed for Internet training and access for people with disabilities and other special needs. Provides interactive, stepwise learning of the skills needed for Web browsing. The interactive Web Tutorial is integrated into the EIA Web Browser and leads on naturally from the Awareness Assessment Protocol. It finishes with the option to connect to the World Wide Web.

- netECHO – InternetSpeech: netECHO® by InternetSpeech lets people unleash the power of the Internet simply with the sound of their voice. netECHO® lets users give simple voice commands like “Yahoo,” or “e-mail” to get the Net-based information they want. netECHO is a voice input and voice output web browser designed for use by individuals who are blind or have low vision. Using voice commands over a telephone line, the user gets access to a voice portal with customized information, such as stocks, news, horoscopes, restaurants, and directions. Starting from there, access to the entire Internet is provided.
- PnC Net: PnC Net is software that provides people with low vision the same power to use the Internet that fully sighted people have. You can easily read the daily newspaper, get up-to-minute stock quotes, make travel reservations, purchase goods, get information on almost any topic, and participate fully in the World Wide Web! For example, Internet Explorer® controls for accessing the Internet (shown below) require good vision to see the menu selections and good eye-hand coordination to position the

pointer in 2-dimensions on specific spots and click the mouse button. Internet Explorer's web page presentation doesn't speak, and a portion of the screen is taken by the controls at the top, leaving only a part of the screen to display the web page.

- QualiSURF: QualiSURF is the Internet Browser of the software platform QualiWORLD that gives the access to Internet to all physically disabled people. QualiSURF is an easy-to-use and user-friendly Internet Browser, which enables the user to surf the Internet without the use of a mouse and a keyboard. The user has the freedom to choose any computer accessibility solutions offered by QualiWORLD in order to find the easiest way to surf the net. Users with any type and degree of disability can now surf Internet freely, even totally paralyzed or blind people.
- ReadText: ReadText and ReadText Plus are voice output text reader and web browser program designed for use by individuals who are blind or have low vision or reading disabilities. It speaks digital files and web pages, including on-line books and PDF files. It can also magnify text and change the type face and color of the text. For people with dyslexia and other reading challenges, the program highlights and associates the visual

and verbal word together for future recognition. ReadText comes with AT&T Natural Voices and one year of free updates.

3.3 Current Assistive Technologies for Information Provision:

It is only possible for blind or visually impaired people to gain access to information provided through the WWW because of the availability of technologies which enlarge text or convert the information to audile or tactile media. The following presents a brief outline of the technologies most frequently used, either for computer or other electronic access, or for computer use in conjunction with the Internet.

Magnification programs for the computer screen allow people with some vision to view text or images which have been magnified several times and are capable of integrating hardware and software. *Synthetic speech* systems comprise a synthesizer, which does the speaking, and the screen reader, which tells the synthesizer what to say (American Federation for the Blind, 2000, n. p.).

Screen reader is the commonly-used name for Voice Output Technology. Hardware and software produce synthesized voice output for text displayed on the computer screen, as well as for keystrokes entered on the keyboard. (Adaptive Technology Resource Centre, 2000, n. p.). Screen readers can be used for all kinds of computer-assisted processes, including use of the Internet.

Optical character recognition (OCR) technology consists of three possible processes: scanning, recognition, and reading text. A printed document is scanned

by a camera. OCR software then converts the images into recognized characters and words. The synthesizer in the OCR system then speaks the recognized text. Finally, the information is stored in an electronic form, either in a personal computer or in the memory of the OCR system itself. (American Foundation for the Blind, 2000, n. p.)

Braille printers are available for those who can read Braille. These produce a hard copy and can do so from various computer devices. Other *Braille Display* technology allows what is displayed on the computer screen to be transposed into Braille. These devices operate by raising and lowering different combinations of pins electronically to produce what appears on a portion of the computer screen. They are refreshable, that is, they change continuously as the user moves around on the screen. (American Foundation for the Blind, 2000, n. p.)

Note takers are small electronic devices similar to electronic daily organizers available to anyone, with the exception that they have speech output and an optional Braille keyboard. (American Foundation for the Blind, 2000, n. p)

A *haptic* interface is a device which allows a user to interact with a computer by receiving tactile feed back. It is a force reflecting device which allows a user to touch, feel, manipulate, create, and/or alter simulated three-dimensional objects in a virtual environment (Office of Training Technology, 2000) Haptics was first developed so that users could feel objects in virtual environments. It is still a relatively new technology and may broaden the interaction between computer-

stored information and blind or visual impaired people when the technology and training required become more freely available

3.4 TYPES OF WEB ACCESS FOR VISIUALLY IMAPIRED:

1. Social Media Photo Annotations

Facebook and Twitter both have products to help visually impaired users access photos on their social networks. With Twitter's mobile apps, when uploading pictures with your tweet, you can enable a feature called Accessible Images and add a description (up to 420 characters) to the image. Unfortunately, it's only available on the Android and iOS apps at the moment. It uses the existing alt text standard, which is a built-in attribute of the img HTML tag. Alt text is available when reading your feed with a screen reader or braille display. Facebook also has an accessibility initiative that uses the alt text attribute, but photos are automatically captioned for you. This is done via a learning neural network that can recognize objects and backgrounds in photos, which is similar to the system that YouTube uses to recognize videos.

YouTube Will Use Neural Networks to Actually Understand Videos :At the moment, Facebook's system can detect and describe about 100 concepts that cover things commonly found in photographs. In the case of a photo with trees, it can give the description of outdoor, cloud, foliage, land, and tree. For a photo of pizza on a plate, it would say pizza and food. There's also a specific process

to describing the elements. Photos are described with people first, then objects, then the setting. The minimum accuracy for concepts is 80 percent, but Facebook claims for some concepts it's closer to 99 percent.

Fig 2: facebook users

It is currently available for English speaking users in the U.S., U.K., and Canada. As it's used more, the AI should learn new concepts and be able to caption even more photos. The AI actually recognizes many more objects already, but it has been limited to those it can predict with more than 80 percent accuracy.

2. Screen Reader Software

Screen readers date back to the command-line era of computers, and while the technology is more complex now, the concept is the same: the software reads on-screen elements and translates them to voice so visually impaired users can interact with them. These apps work by creating a model of what's being displayed on screen and interpreting them as text. More modern implementations use built-in APIs offered by operating systems. On mobile, screen readers have tight system integrations - especially iOS where accessibility is a tentpole feature of the operating system.

What Are APIs, And How Are Open APIs Changing The Internet These APIs allow for developers to add content descriptions to interface elements. For example, the Save As menu might have an attribute that lets the screen reader detect and read it out: "Menu, Save As". Each interface element's read-out would be defined by the app's developer.

Microsoft has Narrator on Windows, and while it does work, it's basic. Windows recommends that users install something more advanced for full-time use, such as the commercial alternative JAWS. However, with a bit of research, you can find free options such as NVAccess. Apple has a more aggressive approach to accessibility across their platforms. VoiceOver is built into OS X and iOS, and features a library of multi-touch gestures for enhanced navigation. It uses the Alex voice on OS X and the default Siri voice on iOS to read elements.

VoiceOver Makes Apple Devices More Accessible Than Ever: President of the American Foundation of the Blind reckons that "Apple has done more for accessibility than any other company to date," — and VoiceOver played a big part in that. There are several options for Linux, but Ocra is one of the better ones (and it's developed by the GNOME Project). The project is actively looking for help to make Linux more accessible. Firefox and Chrome both have screen reader plugins to help navigate the web, too.

3. Braille Displays

Refreshable Braille displays can act as both a display and input device for visually impaired users. There is a row of "letters" that run across the bottom. The characters are a series of pins that pop up to create the braille letters. This is used in conjunction with a screen reader. **Braille readers are the only way that users that are deafblind can interact with a computer.** Readers vary from 40 to 80 characters. The American Foundation for The Blind advises that 40-character displays should be sufficient for most users, but they also say that if you're doing programming or customer service, you may want one of the larger displays.

Many braille displays have a built-in Perkins keyboard, which is a keyboard dedicated to typing braille. It has six keys for input, each corresponds to one of the six dots in braille characters. There are also some that have a QWERTY keyboard with some additional keys dedicated to navigation.

This interface allows for some braille screen readers to act as standalone note-takers. In these cases, the braille interface can be used to navigate the saved text. It should be noted that braille readers are expensive, usually over $2000.

4. Screen Magnifier Software

Screen magnifiers help people who have low vision and need to strain their eyes to read small text. These programs zoom in on an area of a screen in detail, enlarging both text and images. The zoom depends on your configuration.

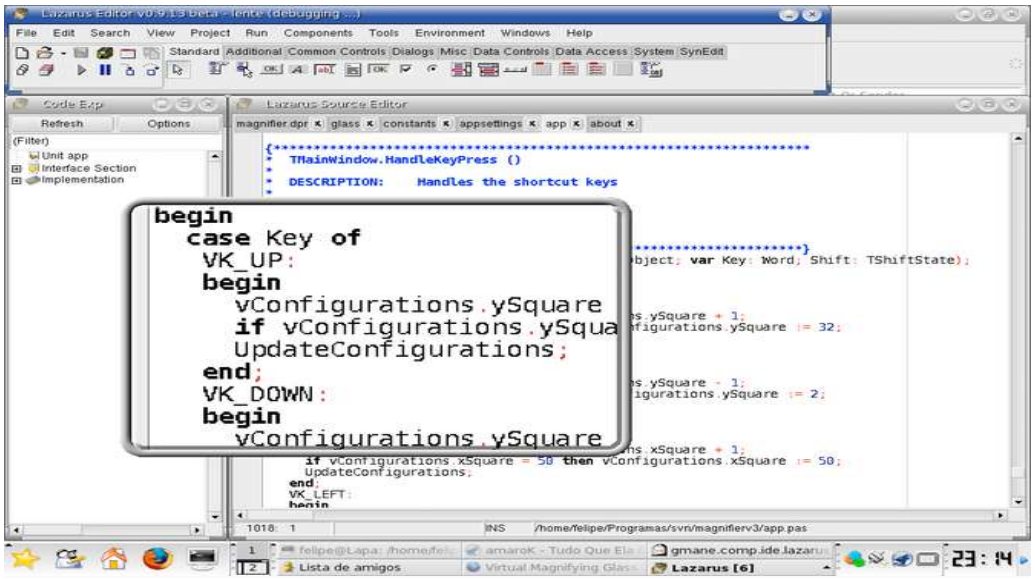

Fig 3: zoomification

In some cases the entire screen zooms in to the focus point, moving some of the detail off screen. The system UI is still set to its native resolution and the elements are drawn at normal size. This makes screen magnification different from setting a monitor to a lower resolution, or even setting the system font to a larger size.

Many screen readers have a secondary mode that places a window on the screen that acts as a magnifier. It can either float around the screen enlarging as it goes, or can be pinned in one spot on the screen and follow the mouse.

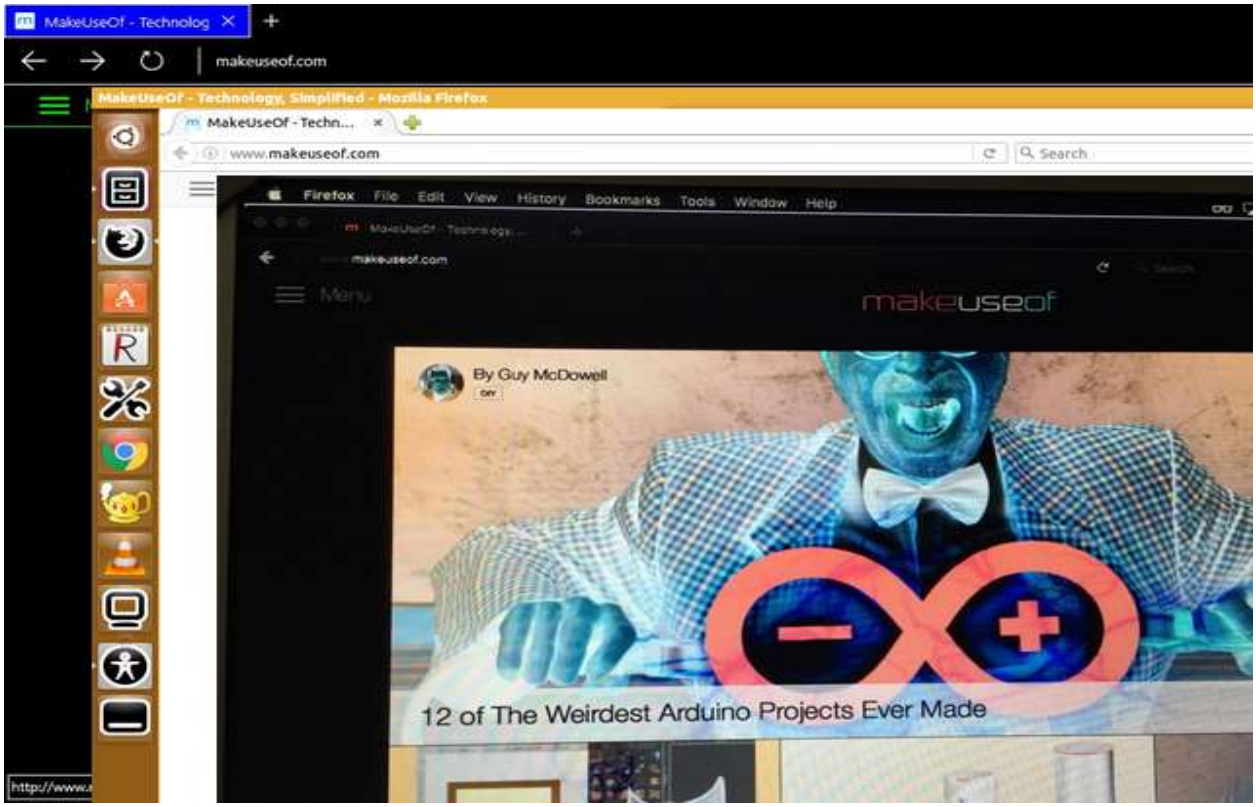

Fig 4: screen readers

There are additional options that help non-blind users with visual impairments. Inverted colors puts white text on a black background, resembling a photo negative for more complex color. Colorblind users can enable grayscale for easier distinction between color values. Screen magnifiers are built into all major operating systems. These have basic settings that allow you to use any of the above configurations. However, there are still some other commercial and open source options you can explore.

5. Vinux for Linux Users

Vinux [Broken URL Removed] is a Linux distro that combines these technologies for an easy-to-set-up accessible computer. Released by the UK Vision Strategy,

the distro is an Ubuntu variant. What Vinux provides is a pre-configured accessible environment. This makes it much easier to set up and configure a new PC for a visually impaired user than existing Linux distros.

Fig 5: vinux

One of the more unique features is a call for help built into the Linux command line. As long as you have network access, you can always ask for assistance from the Vinux team. It uses their IRC channel and email to send the request, so you can get assistance with your system.

The screen reader and other accessibility features are built into most distros. What sets Vinux apart is that they are enabled by default during the install. With a default accessible installer, it's an out of the box solution for visually impaired users.

6. Accessibility: Complex But Necessary

The technology of accessibility for visually impaired users is a complex ecosystem. What's refreshing about the last few years is seeing how many of these technologies are built right into operating systems now.

Fig 6: accessibility

Braille displays are still really expensive. However, the rest of these technologies can be used on vanilla hardware. It doesn't require any extra money to make a smartphone or modern laptop accessible to the visually impaired. Third-party screen readers and magnifiers can add features, but are no longer necessary for basic use.

CHAPTER-4
EXISTING MODEL

4.1 ADVANTAGES:

- Blind person listens to the speech, and easily navigate through the web portal based on the instruction made by the system.
- User can listen to his desired songs, plays and news.
- System reads out current news and other new events.

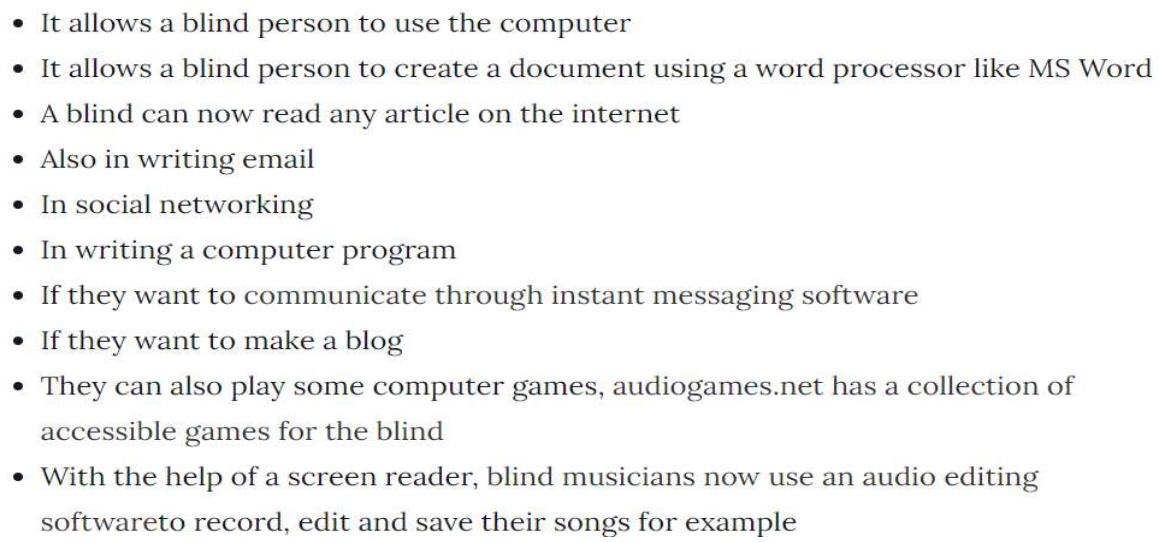

Fig 7: Advantages

4.2 DISADVANTAGES:

- To use this system, User must have some knowledge of computer.
- User should know the key position on the keyboard.
- User must clearly listen to the speech made by the system.

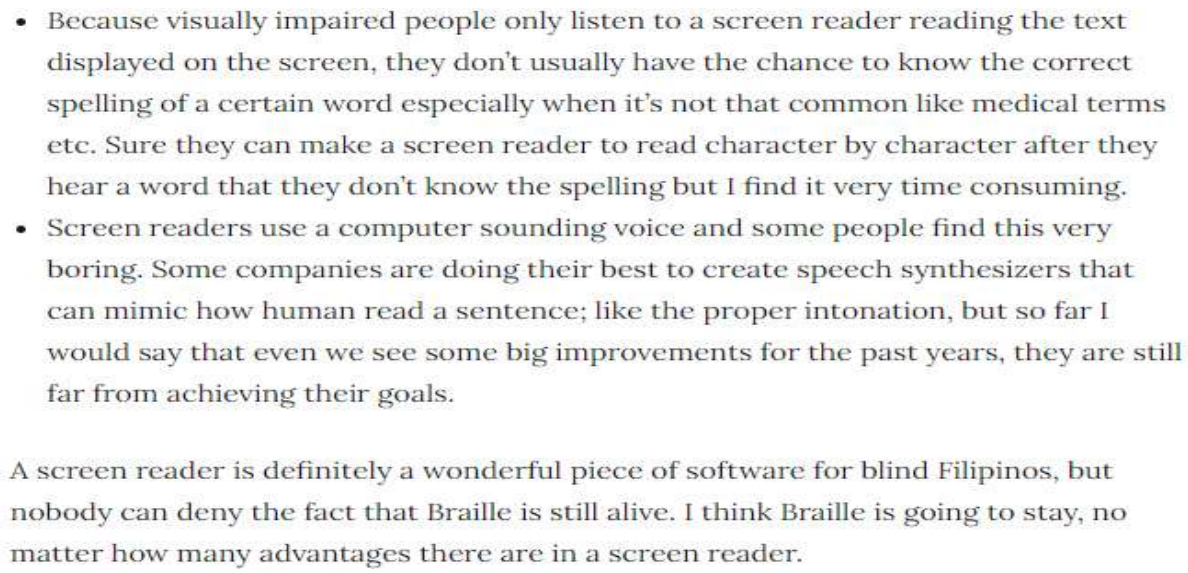

Fig 8: DISADVANTAGES

4.3 PROBLEM STATEMENT:

Voice recognition could be a relatively narrow field. this suggests given enough samples, you'll be able to create a model that may recognize and transcribe voice commands under different circumstances and with different background noises and accents.

However, linguistic communication processing is that the challenging a part of smart speakers, because it's not a narrow field. Let's say you have got a voice assistant that may perform three or four specific commands. You provide its AI with enough samples of various ways in which a user might utter those commands, and it develops a virtually flawless model that may understand and execute all the various ways those commands are sent. This model works as long because the smart speaker can perform those three specific tasks and its users know that those are its only functions. But that's not how Amazon Echo and its counterparts, the Google Home and Apple HomePod work. for example, Amazon

enables developers to form new skills for its Alexa-powered devices, and since its release, the Echo has created an unlimited skills market around itself with over 30,000 skills. The problem with adding too many skills to a voice assistant is that there's no way for the user to memorize the list of voice commands it can and can't give the AI assistant. As a result, when an AI assistant can perform too many tasks, users will expect it to be able to understand and do anything they tell it. An alternative is to form a general-purpose AI that may do anything the user tells it. But that's general AI, something that's a minimum of decades away and beyond the capabilities of current blends of AI. With today's technology, if you are trying to tackle a controversy domain that's too broad, you'll find yourself having to feature humans to the loop to form up for the failures of your AI.

4.4 EXISTING MODEL:

Typically those with vision impairment use screen reading software to navigate the web. Job Access With Speech (JAWS) is one such program and it's the most commonly used internet reading software in the U.S. JAWS reads out loud what is on the computer screen while the keyboard is used to navigate (most visually impaired people do not use a mouse). It is compatible with Windows operating systems and many other programs, such as Microsoft Office, Firefox and Adobe Acrobat. The second most popular program for the blind is Window-Eyes.

- **Empty Alt-Text:** Just like sighted users are not going to read every word of your website and will only scan to find the information they need, vision impaired users will "scan" your website using screen readers. Those who

are accustomed to using the program can navigate through a website remarkably fast. However, since screen readers read the code and not just the text, sometimes there are factors preventing vision impaired users from getting to the information they want quickly. For example, a list of links using decorative bullets looks like this to a sighted user:

Yikes, that's rather annoying isn't it? The participants in the study certainly thought so. For elements that aren't relevant for a vision-impaired user, such as a decorative bullet, use empty alt-text. Screen reading software knows not to read this code and will skip over it. The same applies to images next to a link. One example is an envelope image next to an "email this" link. The envelope helps sighted users quickly see what that link is for, but is completely irrelevant for the vision impaired. It could be argued that another lesson learned from this is to ask yourself if these decorative elements are necessary before adding them to your site. Even for sighted users, it could be creating clutter that doesn't need to be there.

- **Limit the Links per Page:** Limiting the number of links on a page should be a priority even if your website is not built with the visually impaired in mind. When users open a page using JAWS, the first thing they hear is the number of links on the page. When participants heard that there were more than 100 links on a page, they expressed feelings of disappointment and were overwhelmed.

- **Use Anchor Text and Headings:** Relevant anchor text and headings are something every content developer should implement and this point is reinforced through screen reading software users. Screen reading software provides the option of hearing just a list of links on the page as a way to speed up navigation. If your links read “click here” or “more information”, then this is not helpful to a person with visual impairments. They will have to exit out of the “Links List” mode (as it is called in JAWS) and listen to the content that comes before the link in order to know whether it is the link they want. Anchor text such as “More information on product X” is better.
- **Keywords Should Be Text on the Page:** The use of keywords on a page isn’t just important to Google, it’s important to the visually impaired as well. Screen reading software has a search function that allows users to navigate directly to the content they’re searching for. It’s important to note that a text image will not be read by the search function. The keywords that people are searching for need to be actual text.

Some websites have a separate screen-reader friendly version that is entirely text in an attempt to provide a better experience for the visually impaired; however, the participants in the study said they hardly used these sites when they found them, because they felt as though they weren’t updated often and contained inaccurate information. The visually impaired would rather have the graphic version of the website be made accessible with a few changes. This is actually

good news for web developers who wish to make their sites accessible to the visually impaired. Instead of creating a separate all-text website, all you need to do is take some of these considerations into account to make your preexisting site accessible.

Only if you are using JavaScript, Flash, or other interactive multimedia elements is it necessary to create a separate version. Sites using JavaScript should still be able to function at a basic level without JavaScript, since some may have it disabled. Flash, Java, and DHTML should also have the ability to be accessed with a keyboard, and plain text navigation links should be available in the footer of the page.

Adobe's programs are typically made to be compatible with screen reading software. If you use Flash, then check the Adobe website which is updated with information on the latest version of Flash and its accessibility. If it is still not possible to create an accessible website using these guidelines, then it may be best to create a separate, plain text version, but be sure to update this version as often as your multimedia site.

- **American Foundation for The Blind**

The American non-profit is well-known for its association with Helen Keller. The organization tries to promote healthy living for the visually impaired by making them aware of technological innovations and their individual rights. AFB over the years has many achievements to its credit. It helped to standardize the English Braille code; AFB's *Directory of Services for Blind and Visually Impaired*

Persons is one of the most well-compiled information resources on vision loss; and it remains one of the largest producers of talking books. AFB also offers many elearning initiatives aimed at increasing creating awareness for solutions that can be used by the blind to better their lives.

Fig 9: AFB

- **National Federation for The Blind**

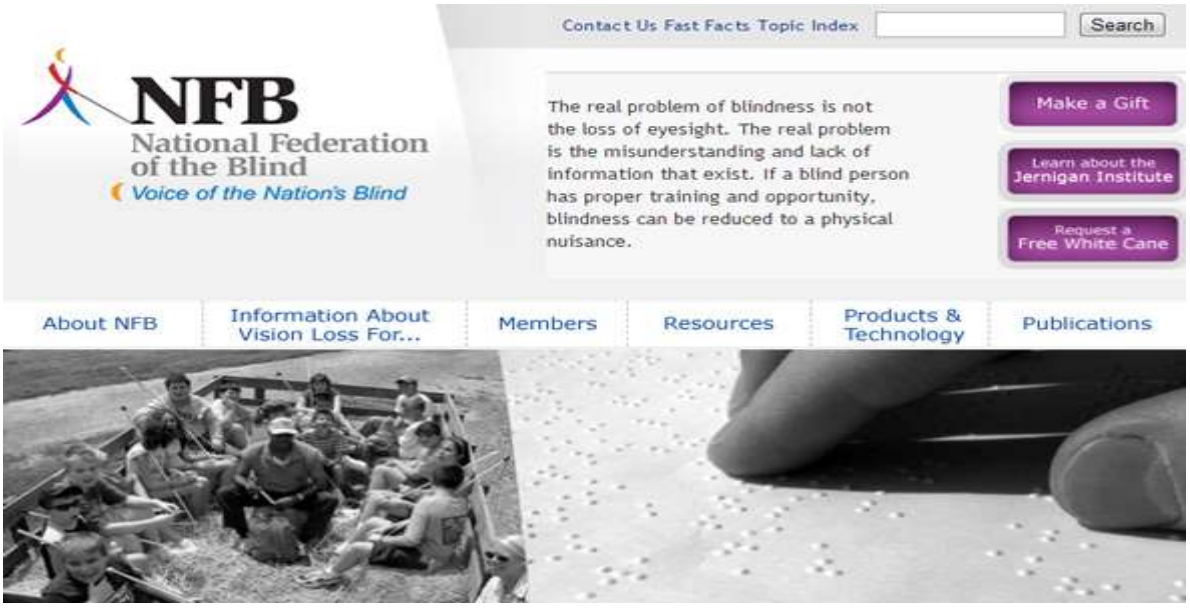

Fig 10: NFB

The National Federation for The Blind has umbrella coverage over 50 U.S. states. It is the largest and oldest (since 1940) membership organization of blind people in the United States. The organization is as much about self-expression as it is about the tools and methods the visually challenged can take advantage of to improve their lives. The organization defines its purpose as — public education about blindness, information and referral services, scholarships, literature and publications about blindness, aids and appliances and other adaptive equipment for the blind, advocacy services and protection of civil rights, development and evaluation of technology, and support for blind persons and their families.

CHAPTER-5
PROPOSED MODEL

5.1 PROPOSED MODEL

A wide range of technology products are available to deal with visual impairment. This includes screen magnification for monitors, screen-reading technology for computers and small screen devices, mouse-over speech synthesis browsing, braille displays, braille printers, braille cameras, voice-operated phones, and tablets. One emerging product that will make ordinary computer displays available for the blind is the refreshable tactile display, which is very different from a conventional braille display. This provides a raised surface corresponding to the bright and dim spots on a conventional display. An example is the Touch Sight Camera for the Blind.

Speech Synthesis Mark-up Language *(V1.0 Released 7 September 2004*[1]*)* and Speech Recognition Grammar Specification *(V1.0 released 16 March 2004*[1]*)* are relatively recent technologies intended to standardize communication interfaces using Augmented BNF Form and XML Form. These technologies assist visual impairments and physical impairment by providing interactive access to web content without the need to visually observe the content. While these technologies provide access for visually impaired individuals, the primary benefactor has been automated systems that replace live human customer service representatives that handle telephone calls

To start Web Access for Visually Challenge on PC you should perform following Steps:

Hardware Requirement

- Pentium IV processor
- 512 RAM
- CD ROM
- 102 Keyboard and Mouse
- Monitor etc.

Software Requirement

- Go to **Control Panel** and open **Add /Remove Programs**
- In **Add /Remove Programs** Install **IIS**(Windows Components)
- Install **Microsoft .NET 2003.**
- Install **SQL Server 2000.**
- Install **MENU Software** additional tool provided with Asset Management Soft Copy.
  1. Past "vchallenge" folder into **R**oot **D**irector in **I**netpub in '**C' D**rive.
  2. Past "webaccess"(MDF & PDF) database files in **SQL Server 2000** database, perform step as follows: Open **C:>** then Open **Program Files.**
  3. Open **Microsoft SQL Server** Folder then Open **MSSQL** Folder.
  4. Open **D**ata Folder Past database files Here
- Open **Enterprise Manager** from **Startup** Menu.

- Click **SQL Server Group** then right click on **Databases** then click on **All task** then click on **Attach Databases** and then Add **MDF** files.

How to Run the Project:

- Go to "C:\Inetpub\wwwroot\ vchallenge" folder & locate & double click to open **solution (vchallange.slu)** file of project
- Go to Debug menu & click on **Start without debugging**, this will compile all code & Runs project without debugging the code.
- Program gets started from **'Web Access for Visually Challenge Home'** page module.

How to Operate Program:

A very first screen on window is **'Web Access for Visually Challenge Home'** Page which will allow user to login. There are two options for login. One is for Sign In Button and second one is for Sign Out Button.

1) Login Module:

- User will be asked to enter Login ID
- Then he will be asked to enter Password
- If ID is correct then system will Say Menu, else it will tell to re-enter ID/Password

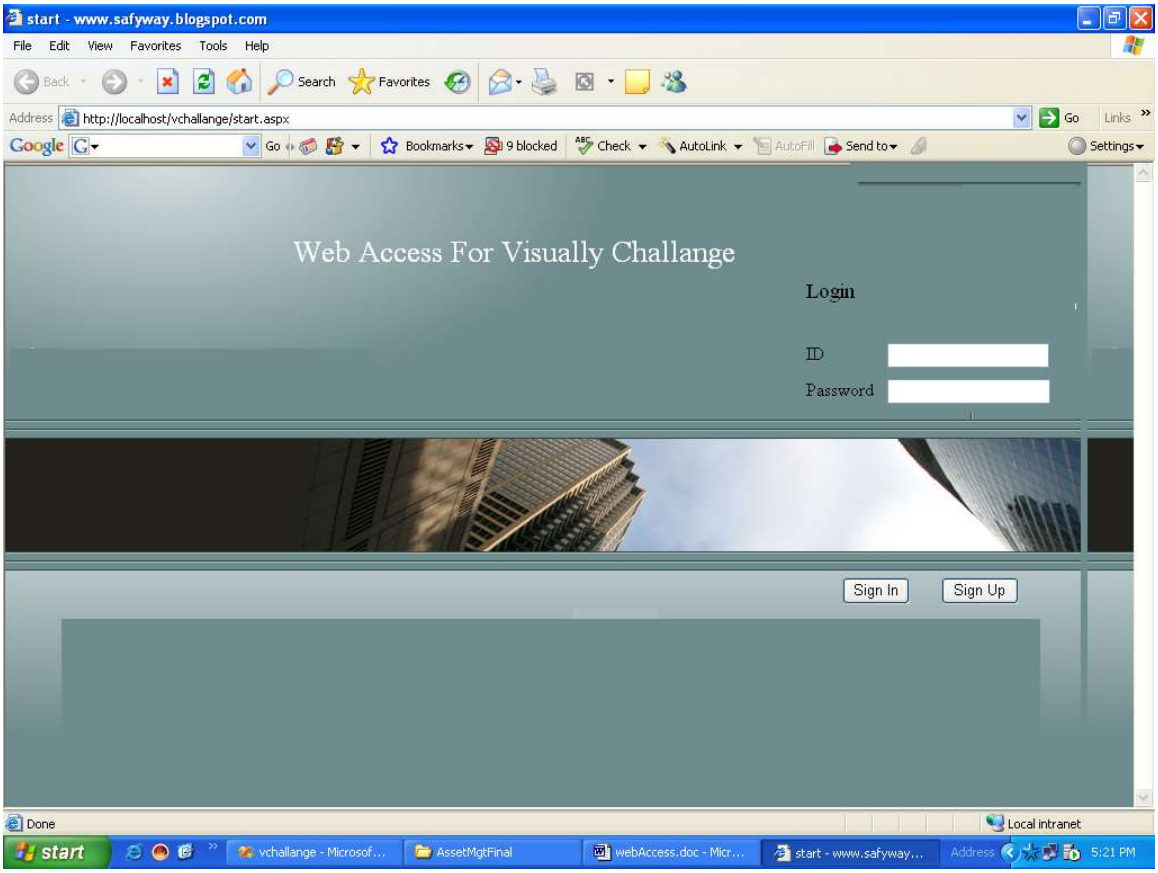

Fig 11: login module

2) Web Access for Visually Challenge Home:

This page contains following Menu page Contain following sub menu:

2.1) News Menu:

It will display new web page with menu for News that can forward you to different page for type of news etc.

- Business News: Displays new web page that contain all detail of Business News.
- Sports News: Displays new web page that contain all detail of Sport News.
- Political News: Displays new web page that contain all detail of Political News.

- Film Industry News: Displays new web page that contain all detail of Bollywood news.

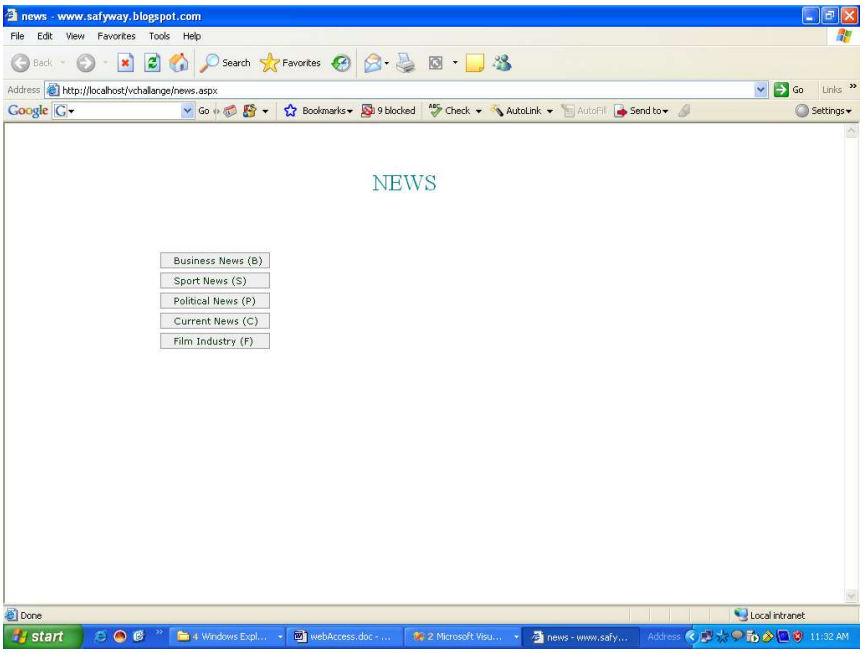

Fig12: news menu

2.2) Entertainment Menu:

It will display new web page with menu for Entertainment related information

- **Songs:** Displays new web page that contain all detail of different Songs.
- **Jokes:** Displays new web page that contains different jokes and Riddles**.**
- **Astrology:** Displays new web page that contains different links of Astrologist web sites.
- **Weather Reports:** Displays new web page that contains different links of weather report web sites.

3) Admin Login

- Admin will log into his a/c.

- Admin will be asked to add new News, Article, Jokes, Astrology, etc. for the day.
- Admin will have to update the System daily for users to use the System

5.2 DESIGN/ ARCHITECTURE

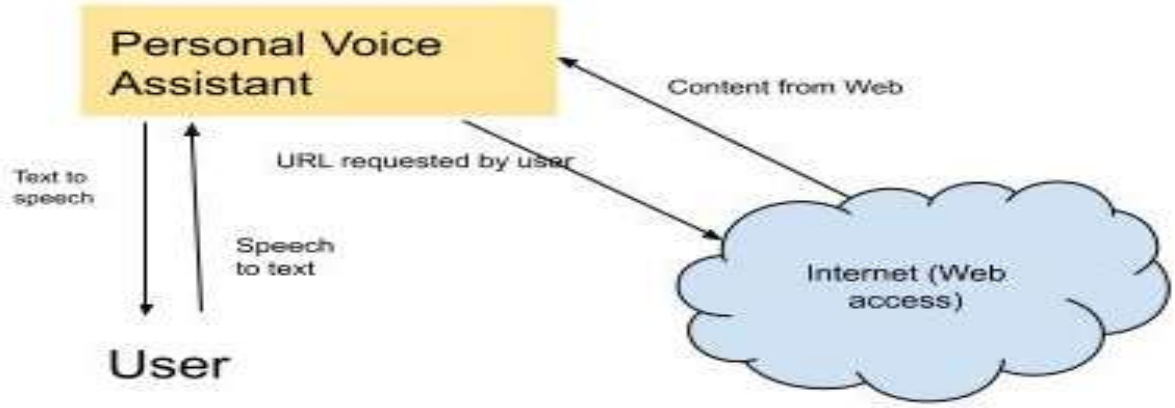

Fig 13: architecture design

Every part of the design has its own role to perform.

User: The instructor is the user. He gives the order in speech format and receives the output in the narrated form.

Personal voice Assistant: It is the interface between the web access and the user. It takes the input in the speech format and changes the input into text form. Later, it decodes what the user is expecting in return and searches for the answers on the web. Finally, after getting the result it again changes the result into speech format and narrates to the user.

Web Access (Internet): It is the open source platform where any question can be answered. Multiple accessing points are attached together to browse. I Want to play music or play video games. Listen to news or daily activity. Weather forecasts etc everything is available on the internet. It helps connect people. Every

other need of the person can be fulfilled and every question can be answered. Accessing social media or learning any recipe. The Internet is a broad environment for creating something or accessing something. People who are visually impaired or blind lack the advantages provided by the internet. But with VPA there is no more lacking behind

CHAPTER 6
IMPLEMENTATION and RESULT ANALYSIS

For implementing the Web access for visually impaired we are here trying to set up the website where we will try a different login page for the person and according to his personalised view set the narrator will be activated and then the steps will be given to view or browse the different elements of the network. We will start with working on the login address of the website where the login and passwords will be verified for further process.

```
<!DOCTYPE html>
<html>
<head>
<title>Login Detail</title>
<style>
table,th,td{
border:1px solid black;
font-family:arial,sans-serif;
border-collapse:collapse;
padding:15px;
}

table tr:nth-child(even){
background-color:#eee;}
table tr:nth-child(odd){
background-color:#fff;}
</style>
</head>
<body>
<form>
<center>
<h2> Login Detail</h2>
</center>
```

```
      <table align="center">
            <tr>
               <td>
                  <strong>
                   Select type of impairment :
                  </td>
              </strong>
                 <td>
                 <select name="type of impairment"
id="type of impairment">
            <option value=""hidden>Select your
option</option>
                 <option value="Loss of Central
Vision">Loss of Central Vision</option>
                 <option value="Loss of Peripheral
">Loss of Peripheral </option>
                 <option value="Kerela">Kerela</option>
                 <option value="Blurred Vision">Blurred
Vision</option>
                 <option value="Generalized
Haze">Generalized Haze</option>
                 <option value="Night Blindness">Night
Blindness</option>
                 <option value="Extreme Light
Sensitivity">Extreme Light Sensitivity</option>
                 <option value="Age-Related Macular
Degeneration
">Age-Related Macular Degeneration </option>
                                    </select>
                 </td>
                 </tr>
                 <tr>
                 <td>
                  <strong>
                   Month :
                  </td>
         </strong>
                  <td>
```

```
                <select name="month" id="month">
            <option value=""hidden>Select
Month</option>
                <option
value="January">January</option>
                <option
value="February">February</option>
                <option value="March">March</option>
                <option value="April">April</option>
                <option value="May">May</option>
                <option value="June">June</option>
                <option value="July">July</option>
                <option value="August">August</option>
                <option
value="Sepetember">Sepetember</option>
                <option
value="October">October</option>
                <option
value="November">November</option>
                <option
value="December">December</option>
                 </select>
                 <select name="month" id="month">
         <option value=""hidden>Select Year</option>
                 <option value="2010">2010</option>
         <option value="2011">2011</option>
                 <option value="2012">2012</option>
                 <option value="2013">2013</option>
         <option value="2014">2014</option>
         <option value="2015">2015</option>
         <option value="2016">2016</option>
         <option value="2017">2017</option>
         <option value="2018">2018</option>
         <option value="2019">2019</option>
         <option value="2020">2020</option>
                 </select>
                 </select>
                 </td>
```

```
                </tr>
               </center>
          </td>
         </tr>
          </form>
         </body>
```

After forming the tabular format for the logging in the website we can assign the narrator to read the following for the person and according to the disease the website will be edited to make it visible to the person at some extent of point. According to the study made in the literature survey of the report the website can be customised to make it quite visible for the patient.

The following can be used to make up the form login and password details:

```
<?php
    $conn=mysqli_connect('localhost','root','');
    mysqli_select_db($conn,"my_users");
if(isset($_POST['login']))
    {
    $u=$_POST['user'];
    $p=$_POST['password'];

$q=mysqli_query($conn,"insert                    into
users_details(username,password) values('$u','$p')");
}
?>
```

```
<html>
<head>
<link rel="stylesheet"href="css.css">
</head>
<body>
<h1>Login Page</h1>
<form action="" method="post">
Username:              <input              type="text"
name="Username"></br></br>
Password:              <input              type="text"
name="Password"></br></br>
<input type="submit" name="submit" value="Login">
</form>
</body>
</html>
```

These were the ways to implement for the visually impaired person. Lter for the person being completely blind we cannot provide a narrator because clicks will be hard for him or her to make at the exact position. So, the need for a personal virtual assistant aroses. Here we will see the formation of an artificial assistant which can listen to the voice of the person and responds according to the code fix.

```
import speech_recognition as sr
import os
import sys
import re
import webbrowser
import smtplib
import requests
import subprocess
from pyowm import OWM
import youtube_dl
import vlc
import urllib
import urllib2
import json
from bs4 import BeautifulSoup as soup
from urllib2 import urlopen
import wikipedia
import random
from time import strftimedef sofiaResponse(audio):
    "speaks audio passed as argument"
    print(audio)
    for line in audio.splitlines():
        os.system("say " + audio)def myCommand():
    "listens for commands"
    r = sr.Recognizer()
    with sr.Microphone() as source:
        print('Say something...')
        r.pause_threshold = 1
        r.adjust_for_ambient_noise(source,
duration=1)
        audio = r.listen(source)
    try:
        command = r.recognize_google(audio).lower()
        print('You said: ' + command + '\n')
    #loop back to continue to listen for commands if
unrecognizable speech is received
    except sr.UnknownValueError:
        print('....')
        command = myCommand();
    return commanddef assistant(command):
    "if statements for executing commands"#open
subreddit Reddit
    if 'open reddit' in command:
        reg_ex = re.search('open reddit (.*)',
```

```
command)
        url = 'https://www.reddit.com/'
        if reg_ex:
            subreddit = reg_ex.group(1)
            url = url + 'r/' + subreddit
        webbrowser.open(url)
        sofiaResponse('The Reddit content has been
opened for you Sir.')elif 'shutdown' in command:
        sofiaResponse('Bye bye Sir. Have a nice day')
        sys.exit()#open website
    elif 'open' in command:
        reg_ex = re.search('open (.+)', command)
        if reg_ex:
            domain = reg_ex.group(1)
            print(domain)
            url = 'https://www.' + domain
            webbrowser.open(url)
            sofiaResponse('The website you have
requested has been opened for you Sir.')
        else:
            pass#greetings
    elif 'hello' in command:
        day_time = int(strftime('%H'))
        if day_time < 12:
            sofiaResponse('Hello Sir. Good morning')
        elif 12 <= day_time < 18:
            sofiaResponse('Hello Sir. Good
afternoon')
        else:
            sofiaResponse('Hello Sir. Good
evening')elif 'help me' in command:
        sofiaResponse("""
        You can use these commands and I'll help you
out:1. Open reddit subreddit : Opens the subreddit in
default browser.
        2. Open xyz.com : replace xyz with any
website name
        3. Send email/email : Follow up questions
such as recipient name, content will be asked in
order.
        4. Current weather in {cityname} : Tells you
the current condition and temperture
        5. Hello
        6. play me a video : Plays song in your VLC
```

```
media player
        7. change wallpaper : Change desktop
wallpaper
        8. news for today : reads top news of today
        9. time : Current system time
        10. top stories from google news (RSS feeds)
        11. tell me about xyz : tells you about xyz
        """)#joke
    elif 'joke' in command:
        res = requests.get(
                'https://icanhazdadjoke.com/',

headers={"Accept":"application/json"})
        if res.status_code == requests.codes.ok:
            sofiaResponse(str(res.json()['joke']))
        else:
            sofiaResponse('oops!I ran out of
jokes')#top stories from google news
    elif 'news for today' in command:
        try:

news_url="https://news.google.com/news/rss"
            Client=urlopen(news_url)
            xml_page=Client.read()
            Client.close()
            soup_page=soup(xml_page,"xml")
            news_list=soup_page.findAll("item")
            for news in news_list[:15]:

sofiaResponse(news.title.text.encode('utf-8'))
        except Exception as e:
                print(e)#current weather
    elif 'current weather' in command:
        reg_ex = re.search('current weather in (.*)',
command)
        if reg_ex:
            city = reg_ex.group(1)
            owm =
OWM(API_key='ab0d5e80e8dafb2cb81fa9e82431c1fa')
            obs = owm.weather_at_place(city)
            w = obs.get_weather()
            k = w.get_status()
            x = w.get_temperature(unit='celsius')
            sofiaResponse('Current weather in %s is
```

```
%s. The maximum temperature is %0.2f and the minimum
temperature is %0.2f degree celcius' % (city, k,
x['temp_max'], x['temp_min']))#time
    elif 'time' in command:
        import datetime
        now = datetime.datetime.now()
        sofiaResponse('Current time is %d hours %d
minutes' % (now.hour, now.minute))elif 'email' in
command:
        sofiaResponse('Who is the recipient?')
        recipient = myCommand()
        if 'rajat' in recipient:
            sofiaResponse('What should I say to
him?')
            content = myCommand()
            mail = smtplib.SMTP('smtp.gmail.com',
587)
            mail.ehlo()
            mail.starttls()
            mail.login('your_email_address',
'your_password')
            mail.sendmail('sender_email',
'receiver_email', content)
            mail.close()
            sofiaResponse('Email has been sent
successfuly. You can check your inbox.')
        else:
            sofiaResponse('I don\'t know what you
mean!')#launch any application
    elif 'launch' in command:
        reg_ex = re.search('launch (.*)', command)
        if reg_ex:
            appname = reg_ex.group(1)
            appname1 = appname+".app"
            subprocess.Popen(["open", "-n",
"/Applications/" + appname1],
stdout=subprocess.PIPE)sofiaResponse('I have launched
the desired application')#play youtube song
    elif 'play me a song' in command:
        path =
'/Users/nageshsinghchauhan/Documents/videos/'
        folder = path
        for the_file in os.listdir(folder):
            file_path = os.path.join(folder,
```

```
the_file)
            try:
                if os.path.isfile(file_path):
                    os.unlink(file_path)
            except Exception as e:
                print(e)sofiaResponse('What song
shall I play Sir?')
        mysong = myCommand()
        if mysong:
            flag = 0
            url =
"https://www.youtube.com/results?search_query=" +
mysong.replace(' ', '+')
            response = urllib2.urlopen(url)
            html = response.read()
            soup1 = soup(html,"lxml")
            url_list = []
            for vid in
soup1.findAll(attrs={'class':'yt-uix-tile-link'}):
                if ('https://www.youtube.com' +
vid['href']).startswith("https://www.youtube.com/watc
h?v="):
                    flag = 1
                    final_url =
'https://www.youtube.com' + vid['href']
                    url_list.append(final_url)url =
url_list[0]
            ydl_opts = {}os.chdir(path)
            with youtube_dl.YoutubeDL(ydl_opts) as
ydl:
                ydl.download([url])
            vlc.play(path)if flag == 0:
                sofiaResponse('I have not found
anything in Youtube ')#change wallpaper
    elif 'change wallpaper' in command:
        folder =
'/Users/nageshsinghchauhan/Documents/wallpaper/'
        for the_file in os.listdir(folder):
            file_path = os.path.join(folder,
the_file)
            try:
                if os.path.isfile(file_path):
                    os.unlink(file_path)
            except Exception as e:
```

```
                print(e)
        api_key =
'fd66364c0ad9e0f8aabe54ec3cfbed0a947f3f4014ce3b841bf2
ff6e20948795'
        url =
'https://api.unsplash.com/photos/random?client_id=' +
api_key #pic from unspalsh.com
        f = urllib2.urlopen(url)
        json_string = f.read()
        f.close()
        parsed_json = json.loads(json_string)
        photo = parsed_json['urls']['full']
        urllib.urlretrieve(photo,
"/Users/nageshsinghchauhan/Documents/wallpaper/a") #
Location where we download the image to.
        subprocess.call(["killall Dock"], shell=True)
        sofiaResponse('wallpaper changed
successfully')#askme anything
    elif 'tell me about' in command:
        reg_ex = re.search('tell me about (.*)',
command)
        try:
            if reg_ex:
                topic = reg_ex.group(1)
                ny = wikipedia.page(topic)

sofiaResponse(ny.content[:500].encode('utf-8'))
        except Exception as e:
                print(e)
                sofiaResponse(e)sofiaResponse('Hi
User, I am Sofia and I am your personal voice
assistant, Please give a command or say "help me" and
I will tell you what all I can do for you.')#loop to
continue executing multiple commands
while True:
    assistant(myCommand())
```

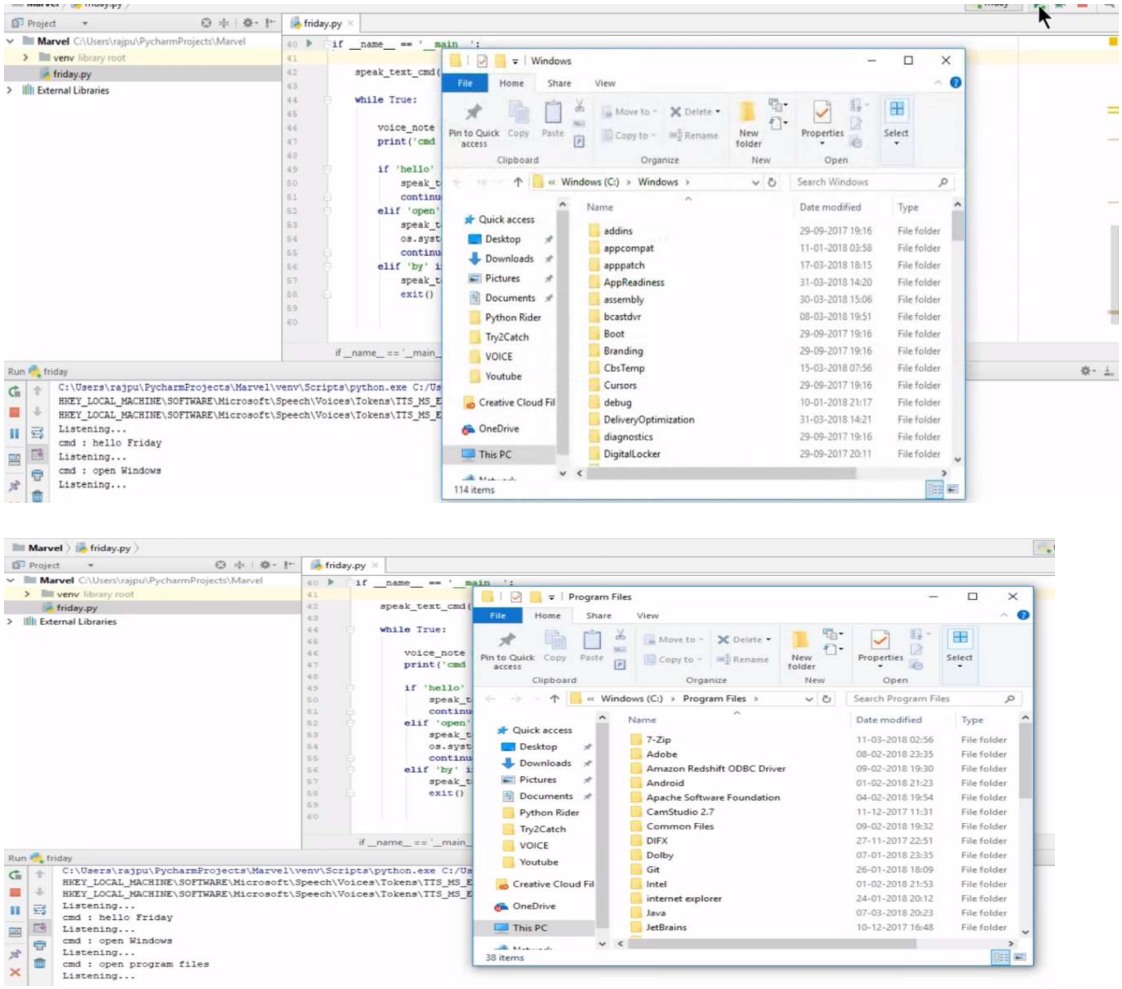

Fig 14: Results

Examples and results of performing internal actions.

The areas where this program may be applied include the following:

• At Home: to assist the elderly and disabled use computers

• Telecoms industry: to assist the event of higher self-care services

• Robotics: to assist create more “human-like” robots (that can listen and talk)

For opening Windows by giving instructions to the Personal assistant.

CHAPTER-7
CONCLUSION AND FUTURE SCOPE

7.1 CONCLUSION

The paper aims at designing the code for web accessibility for the visually impaired or blind with all the design measures and some research gaps explained in this field of development. We have discussed the previous work of website making for supporting the visually impaired and the disadvantages it has. We are finally able to design an application which will support the blind and visually impaired both to access the internet and stay updated. More work can be suggested in different applications by altering the code a bit. Earlier in the paper, we stated that the potential of the Internet could not be understood without reference to other information sources, disability and the larger frameworks of economy and culture as well as the micro-social context. The importance of understanding the perceptions about issues of potentialities, as well as barriers, is underlined by the fact that, despite the putative benefits of Internet for people with disabilities, their level of access is well below that of people without disabilities.

Within the micro-social context, the Internet can mean many things to people with a disability: a luxury, a necessity, a way to participate in the information society, a way to gain access to more information than was previously available, or only one of the many ways of accessing information. It is also seen as a

technology which may potentially disadvantage them if they cannot access it. Within this individual context, the lack of fit between the needs of the person with a disability and technology is of less concern than the economic practicalities of affording the equipment in the first place. In this sense the economic framework of our society impinges more than, or perhaps before, the technical-cultural. In the present consumer society, there appears to be a continuum of participation: those who can afford to participate and do, those who can afford to participate but feel they have no need to, those who cannot afford to participate but would like to, and those who cannot afford to participate and feel they have no need to. The consumer society aims to target those who can afford to participate and this group of people tend to be able-bodied. Technology is aimed at an able-bodied, salaried group of people. People with disabilities tend to fall at the other end of the continuum: those who cannot afford to participate.

We are also living at a time during which information has become one of the most important commodities. New ways of presenting information which reach wider audiences and are cheaper and more efficient are being encouraged. The Internet is seen as the future of information provision because it has a world-wide audience. However, on a local scale, television, radio, newspapers, and newsletters are still recognized as legitimate forms of information and communication. For people who are blind or visually impaired, as with the rest of society, the Internet is a choice among many other media. Television and radio

are very important ways in which they get information. Organizations for the blind are extremely important in disseminating information which is printed and family and friends are, as always, information sources. While a consumer society often stimulates more choice through competition, it also tends to converge on ways of disseminating information which are the cheapest. It is becoming clearer to many (particularly government departments) that it is cheaper and more convenient to provide information to the public via the Internet. If this form of information provision becomes the predominant one, those who have difficulty participating physically, economically, because they have a fear of technology, or lack training opportunities, will be disadvantaged.

In the meantime, there are many options available for getting information and the Internet is not yet a necessity. Whether people are being disadvantaged when they have difficulty in accessing a technology which is not as yet a necessity is a difficult question. It seems pointless to answer this question with a blanket statement of ‘yes’ or ‘no’, as some people clearly get all the information they need for their lives without using the Internet, and others indicate that they would clearly benefit from using the Internet. It is best to answer this question from the standpoint of each individual's need. As people's needs change according to their changes in lifestyles and life stages, their need to access the Internet likely to change. What is clear is that the choice for participation should be available to everyone.

7.2 FUTURE SCOPE:

Here we have discussed the use of VPA for blind or visually impaired. Not only this but it can be broadly used in the system in future. Unlocking everything by your voice. Accessing anything without any keyboard touch. Smart home appliances can be controlled by the voice. Also, the office and automatic car system can be controlled by the personal assistant. We will have a VPA for all our needs and support someday. It will take care of all our daily needs according to the feeded routine. Now we do have our radio for the print handicapped. And also you learn how to use the radio, whichever radio service is the best at giving you good up to date information and commentary.

- By the time a news bulletin is brailled, it's yesterday's news, it's old news. We are pretty well served in (brailled) magazine articles, but it is the immediate news and commentary that we tend to miss out on.
- Government bodies and welfare bodies etc. are not the best people at disseminating information. They wait for you to find out via someone who knows something, who knows something. You know, very rarely do they issue out information. They may issue out a little pamphlet but fortunately now our two major organizations for the blind are brailling or taping major information sheets, such as health and government benefits information. Safety matters, too, such as information from the fire services, and ambulance services.

- these days, before an election, we are given a tape recording of the policies of the various parties and the candidates, so things have improved greatly.
- Oh I think it [the Internet] is tremendously important. It gives people quite a bit more independence and I find most people very, very enthusiastic once they've got over the initial hurdle of how to use it. (Worker with blind and sight-impaired people)
- To get a newspaper and read through the newspaper, you can't, so you've got to have someone read it. You can access the phones so that you can get the newspaper read to you, but they'll only read certain pages. So what page are you going to pick? And it costs you a fortune. If you can just go in and open up a page on your computer that says all your different newspapers and you decide you want the Telegraph or you want the Melbourne Times, and go in and just browse through the newspaper till you find what you want, and then read what you want. You know, that's great.
- I think the (Internet would play the) same role that it plays in the lives of everyone else. You know, for finding information, for research, for talking to other people, for keeping up to date with things. For me, it would also mean being able to contact lecturers, and having an email address so it wouldn't matter where I was someone could contact me.

- There's no reason why I can't be a news writer and presenter. Because if I can get onto the relevant Internet sites at work, I can do the things that a sighted person can do. I can watch the news on the Internet, watch the developments and write the headlines for the half hour. You know that's a job that's often done on the radio and that's an example of a job that I will be able to do. Whereas without the Internet, that type of job wouldn't have been possible for me.
- There is quite a bit of loneliness out there and so to the extent that they create these virtual communities by exchanging email with each other or connecting onto a chatline, that makes a huge difference. You know, it sort of enlarges their world.
- I think it doesn't matter whether you've got sight or not. For a lot of people, particularly older people, there's a big adjustment to actually using the technology and getting access to reasonable training and getting up to speed and feeling confident. It can be a very disempowering process trying to use online and Internet technology
- I don't like to broadcast the fact that I can't see very well. I don't mind acknowledging it. I don't mind reading things up close in public or anything like that. But I don't want it brought home to me every time I turn around. It helps if adaptive equipment looks nice because it indicates that just because you have a disability, it doesn't mean that you can't have something that looks nice. I think the aesthetics are missing from adaptive

equipment, partly because there's always been a bit of a charity element associated with helping people with a disability.

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