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Insight for Blind

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Abstract–*The world health organization(WHO) announces that the percentage about 80% of visual impairment is either preventable or curable with treatment, but 20% of people are suffering due to disability, so we decided to help with existing and future technologies. The most difficulty faced by a visually challenged person is difficulty in reading the text and detecting the object in front of them. Variousdevelopment in the field of technology help the blind person by developing camera based and voice based system combined with computer vision tools with the existing beneficial products such as an ultrasonic sensor, Google Text to Speech tool, Optical Character Recognition System, etc.*

Key Words:*Ultrasonic sensor, OCR, gTTS Tool, Personal Assistant, Machine Learning, Chat-Bot, IOT enabled Location Tracker.*

1. INTRODUCTION

Vision is an important factor in human life. The visually impaired peoples are increasing every year due to health- related issues and many other reasons. The most difficulty faced by a visually challenged person is difficulty in reading the text and detecting the object in front of them. Various developments in the field of technology help the blind person by developing camera-based and voice-based system combined with computer vision tools with the existing beneficial products such as an ultrasonic sensor, Google Text to Speech tool, Optical Character Recognition System, etc.

INSIGHT is a prototype for blind peoples to do their activities without the help of others. The device is worn on the head part of the person. The proposed method is carried out by using Raspberry Pi and the portability is achieved by using a battery backup. Thus, the user could carry the device anywhere and able to use anywhere. The device has the first login using a username and password. After login, the various modules such as the ultrasonic sensor, GPS tracker, chat-bot begins to start their processing. The Ultrasonic sensor starts working when there are any obstacles in front of the blind user and alerts them using the voice with distance. Text extraction from an image is carried out by Optical Character Recognition (OCR) is the mechanical or electronic conversion of images of typed, handwritten or printed text into machine- encoded text, whether from a scanned document, a photo of a document, a scene- photo. The binary image is converted to text using the Tesseract OCR engine that detects the outline, slope, pitches, white spaces and joint letters. It also checks the quality of the recognized text. In this system, the conversion of text to voice output is by an e-Speak algorithm. The e-Speak is a Text-To-Speech (TTS) system which converts text into speech. Here we use Google text to speech tool.

The personal assistant based on the latest technology machine learning in the system helps the blind person to know about the wanted information such as date, time, location etc. Machine learning is not a single technique or technology but is rather a field of computational science that incorporates numerous technologies to create systems that can learn from the data in their environment and then make predictions and take actions when confronted with a new situation. The personal assistant enables the microphone for taking inputs and outputs through the attached headphone. The chat- bot an android based application in the system helps the person to communicate with their relatives or friends. The text message received is then converted into voice and the input will be given a voice, then it will be converted as text and then send to the relatives or friends of the blind user. The IOT enabled GPS tracker in the system helps their relatives or friends to track the location using the chat-bot.

2. TECHNOLOGIES IMPLEMENTED

2.1 Machine Learning

Machine learning (ML) is a field of artificial intelligence that uses statistical techniques to give computer systems the ability to "learn" (e.g., progressively improve performance on a specific task) from data, without being explicitly programmed. The name machine learning was coined in 1959 by Arthur Samuel. Machine learning explores the study and construction that can learn from and make predictions on data– such algorithms overcome following strictly static program instructions by making data-driven predictions or decisions, through building a model from sample inputs. Machine learning is employed in a range of computing tasks where designing and programming explicit algorithms with

good performance is difficult or infeasible; example applications include email filtering, detection of network intruders, and computer vision. Machine learning is closely related to (and often overlaps with) computational statistics, which also focuses on prediction- making through the use of computers. It has strong ties to mathematical optimization, which delivers methods, theory and application domains to the field.

Machine learning is sometimes conflated with data mining, where the latter subfield focuses more on exploratory data analysis and is known as unsupervised learning. Within the field of data analytics, machine learning is a method used to devise complex models and algorithms that lend themselves to prediction; in commercial use, this is known as predictive analytics. These analytical models allow researchers, data scientists, engineers, and analysts to "produce reliable, repeatable decisions and results" and uncover "hidden insights" through learning from historical relationships and trends in the data.

2.2 Internet of Things(IoT)

The Internet of things (IoT) is the network of physical devices, vehicles, home appliances, and other items embedded with electronics, sensors, actuators, and connectivity which enable these things to connect, collect and exchange data. IoT deep neural network architectures, which are particular types of machine learning algorithms. It Involves extending Internet connectivity beyond standard devices, such as desktops, laptops, smartphones and tablets, to any range of traditionally dumb or non-internet-enabled physical devices and everyday objects. Embedded with technology, these devices can communicate and interact over the Internet, and they can be remotely monitored and controlled. With the arrival of driverless vehicles, a branch of IoT, i.e. the Internet of Vehicle starts to gain moreattention.

Ambient intelligence and autonomous control do not necessarily require Internet structures, either. In the future, the Internet of Things may be a non-deterministic and open network in which auto-organized or intelligent entities (web services, SOA components) and virtual objects (avatars) will be interoperable andable to act independently (pursuing their own objectives or shared ones) depending on the context, circumstances or environments. Autonomous behaviour through the collection and reasoning of context information as well as the object's ability to detect changesin the environment (faults affecting sensors) and introduce suitable mitigation measures constitutes a major research trend, clearly needed to provide credibility to the IoT technology. Modern IoT products and solutions in the marketplace use a variety of different technologies to support such context-aware automation, but more sophisticated forms of intelligence are requested to permit sensor units and intelligent cyber-physical systems to be deployed in real environments.

3. LITERATURE SURVEY

TEXT DETECTION AND RECOGNITION

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Text detection and recognition in natural scene can give valuable information for many applications. In this work, an approach has been attempted to extract and recognize text from scene images and convert that recognized text into speech. This task can definitely be an empowering force in a visually challenged person's life and can be supportive in relieving them of their frustration of not being able to read whatever they want, thus enhancing the quality of their lives. To extract text information from image, text detection and recognition algorithms are necessary. However, extracting scene image's text is a not easy task due to two key factors cluttered backgrounds with noise and non-text outliers, and diverse text patterns such as character types, fonts, and sizes. The frequency of occurrence of text in scene image is very small, and a limited number of text characters are embedded into difficult non-text background outliers. Detection of text and classification of characters in scene images is a challenging visual recognition difficulty for visually challenged people. Text detection is used to localize image regions containing text characters and strings. It aims to remove most non-text background outliers. Text recognition isto convert pixel-based text into readable code. It aims to accurately distinguish different text characters and properly composed text words.

4. PROPOSED METHODOLOGY

In proposed system, MSER is used to detect text region from image (video frames). Non-text regions obtained from MSER algorithm is removed by applying geometry-based filtering. Text characters obtained through this process are merged together to form words or group of words based on their positioning. This process gives text regions from image which are further applied to 'Tesseract' open-source OCR engine for optical character recognition which converts image of text into actual text. Recognized text is then input to an open-source speech synthesizer, which gives audio output. This audio output is fed to user through headphones which guides user about its surroundings.

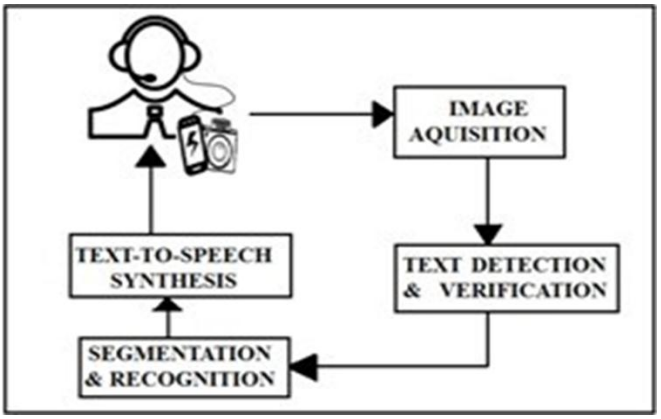

Fig 4.1: *System Design*

TEXT EXTRACTION USING MSER

MSER algorithm is fast and robust algorithm for text detection. It basically finds out connected components in the image that are stable over a sequence of increasing threshold. It is independent of transforms of image intensities, scaling of image as well as illumination, which helps in better text detection in various conditions. Despite of favorable features of MSER, it is sensitive to image blur which makes it difficult to use for detection of very small sized character. Chen et al. have proposed a method in to combine MSER with Canny Edge Detection to detect small sized character. However, for Blind assistance application, major important text information is available in large sized text form which allows use of MSER algorithm in its simplest form in proposed work.

Fig 4.2:*Text Detection using MSER algorithm on image captured by mobile camera (top row) and ICDAR 2011 dataset image (bottom row) .(a) Original Image (b) Detected MSER Regions (c) Text Regions obtained after applying proposed algorithm*

TEXT RECOGNITION AND TEXT-TO-SPEECH SYNTHESIS

Text regions obtained in previous stage is applied to 'Tesseract' open source OCR module for character recognition. Tesseract is Google funded OCR engine with accurate recognition results with support of 100 languages. Image needs to be scaled and pre-processed for this OCR to give better results. This OCR engine is tested on various manually captured images as well as on ICDAR 2011 Text localization dataset and good accuracy was observed. After OCR engine performs text recognition, this text is fed to Text-to-Speech (TTS) synthesizer to obtain audio output. 'eSpeakNG' is a speech synthesizer used for this purpose, which is open source synthesizer based on formant synthesis method. It supports more than 80 languages in very small memory size. Audio output thus generated through TTS is fed to user through headphones as final output.

a. Advantages

- When a visually impaired person is walking in a man-made environment, it is important to be able to acquire the text information is present in the scene.
- It helps the visually impaired person to read the newspapers, text information etc.
- This paper mainly focuses on accurate detection and recognition of text without consideration of computation time.
- Another advantage is inclusion of any training-based classifier or other time- complex algorithms are avoided by using very fast MSER algorithm in proposed method which results into real-time performance of system.

b. Disadvantages

- The small text on the newspaper cannot accurately detected.
- The small office boards in city cannot easily be recognized.

5. SYSTEM DESIGN

5.1 Overview of System Design

The system enters in action whenever a user presses a button specially designed in the user interface. The camera, in principle placed on the user's shoulder, acquires an image of the scene. Then the search for text areas is performed using several different methods exploiting edge, color and morphological information. In the current paper, we focus on text -detection methods geared for small characters. If text areas are detected in the initial input image, the camera zooms -in to obtain more detailed images of each candidate text area. The higher resolution characters are then recognized and read out to the blind person via a voice synthesizer.

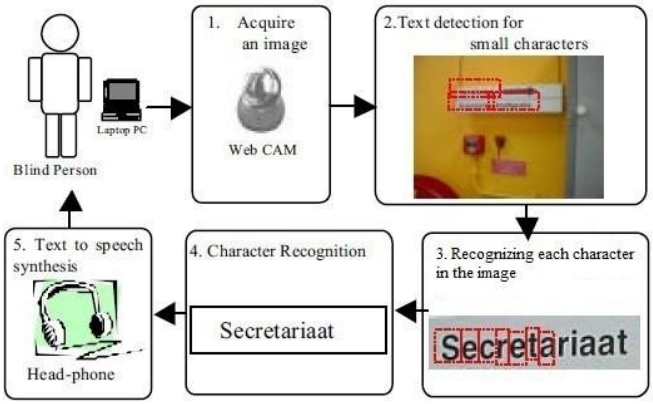

Fig 5.1: *System Design*

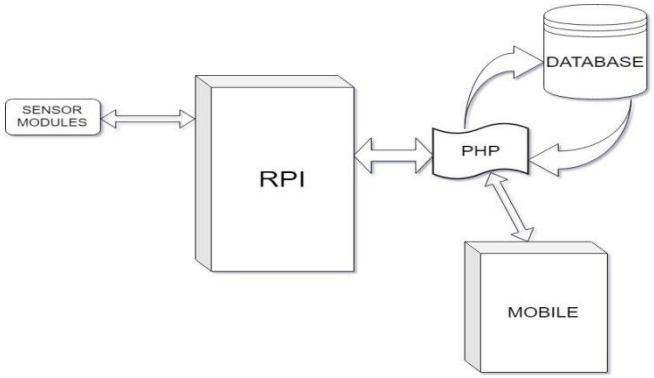

Fig 5.2: *Architecture of the System*

5.2 Architecture Diagram

The system helps the blind person to read the text from any kind of notes and gives him better support through voice. The system has the ability to alert the blind user if any obstacle is in front of him. Thus, the user safety could be ensured. Also, an android based chat-Bot helps the person to communicate with their friends or relatives also they could track him using the same application. The proposed system has several modules such as Camera, Ultrasonic Sensor, Chat-Bot, GPS, Microphone, Personal Assistant, Headphone, LCD, and Touch Sensor. The text recognition from an image taken by the camera and recognizes the text using Optical Character Recognition (OCR). Conversion of the recognized text file to voice output by using the gTTS tool. The captured image is first converted to gray scale and then filtered using a Gaussian filter to reduce the noise in the image. Here adaptive Gaussian thresholding is used to reduce the noise in the image. The filtered image is then converted to binary. The binarized image is cropped so that the portions of the image with no characters are removed. The cropped frame is loaded to the Tesseract OCR so as to perform text recognition. The output of the Tesseract OCR will be a text file which will be the input of the gTTS tool. The Ultrasonic sensor helps in emitting sound waves at a frequency too high for humans to hear. They then wait for the sound to be reflected back, then calculating distance based on the time required. Then the system will alert the blind user by voice with the distance. The Chat-Bot an android based application in the system helps the person to communicate with their relatives or friends. The text message received is then converted into voice and the input will be given a voice, then it will be converted as text and then send to the relatives or friends of the blind user.

An IOT system consists of sensors or devices which "talk" to the cloud through connectivity. Once the data gets to the cloud, software processes it and then might decide to perform an action, such as sending an alert or automatically adjusting the sensors/devices without the need for the user. The GPS tracker in the system helps their relatives or friends to track the location using the Chat-Bot by using IOT server. This helps in saving the track history of the blind person for their safety. The microphone is a type of transducer which converts energy from one form to another. Microphones convert acoustical energy (sound waves) into electrical energy (the audio signal).Here we use the microphone for taking input for Personal Assistant.

The Personal Assistant based on the latest technology Machine Learning helps the user to communicate with the device and to know the attributes like time and date, text information, etc. Machine Learning is not a single technique or technology but is rather a field of computational science that incorporates numerous technologies to create systems that can learn from the data in their environment and then make predictions and take actions when confronted with a new situation.

The Headphone converts the electrical signals to sound waves for the output to the user from the system. The LCD is used as another output of the system. It is not for the blind user, it is for the system diagnosis. The Touch sensor is similar to that of a simple switch. It is used for the function selections and for different purposes like a trigger for image capture, friend selection in chat-bot, to enable Personal Assistant.

5.3 Block Diagram

The various hardware component used in the device is Raspberry Pi, ultrasonic sensor, camera, touch keys, USB microphone. Raspberry Pi is a mini computer which can be programmed. The Raspberry Pi 3 Model B is the third generation Raspberry Pi which is used in the system. The Raspberry Pi 3 Model B is a more powerful processor, 10x faster than the first-generation Raspberry Pi.

Raspberry Pi works in an open source platform. It has 1GB RAM ,64 Bit CPU, 4 x USB ports, 4 pole Stereo output and Composite video port ,10/100 Base Ethernet socket, CSI camera port for connecting the Raspberry Pi camera, DSI display port for connecting the Raspberry Pi touch screen display, Micro SD port for loading your operating system and storing data. Micro USB power source helps in the running of Raspberry Pi. USB ports available on this board are used to connect the camera with raspberry pi. Three GPIO pins are used, for capturing an image, for more control and for shutting down the system respectively. The board is operated in such a way that the code starts executing when it is powered ON. The audio output is available through the audio jack.

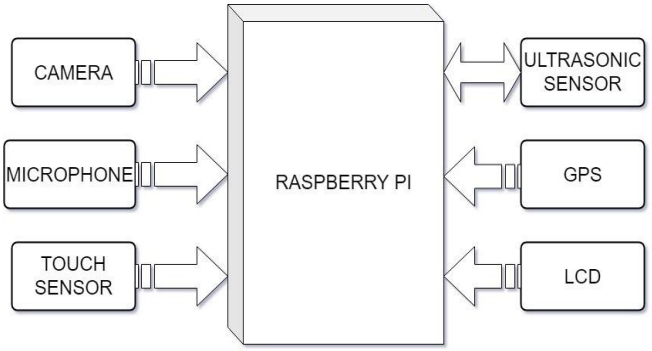

Fig 5.3: *Block Diagram*

A compactable camera on the device is used for image capturing. It has autofocusing capability with a resolution of 1280 X 720 which is capable of capturing some good quality images. The USB powered camera is used in order to connect it with the Raspberry Pi board. The captured images are sent to Raspberry Pi and all the image processing was done. The voice output is available through the audio jack. It can be heard through the headphone.

An Ultrasonic sensor measures the distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception. An optical sensor has a transmitter and receiver, whereas an ultrasonic sensor uses a single ultrasonic element for both emission and reception. In a reflective model ultrasonic sensor, a single oscillator emits and receives ultrasonic waves alternately. This enables the miniaturization of the sensor head. Ultrasonic sensors are a reliable, cost-effective solution for distance sensing, level, and obstacle detection.

The Touch sensor is similar to that of a simple switch. When there is contact with the surface of the touch sensor, the circuit is closed inside the sensor and there is a flow of current. When the contact is released, the circuit is opened and no current flows. It helps to detect touch, typically by a human. The system enters in action whenever a user presses a button specially designed in the user interface. The camera, in principle placed on the device, acquires an image of the scene. Then the search for text areas is performed using several different methods exploiting edge, color, and morphological information. If text areas are detected in the initial input image, Then the texts from the image will be recognized and extract. The higher resolution characters are then recognized and read out to the blind person via a Headphone.

6. WORK PLAN

6.1 Requirement Analysis

Requirements analysis, also called requirements engineering, is the process of determining user expectations for a new or modified product. These features, called requirements, must be quantifiable, relevant and detailed. In software engineering, such requirements are often called functional specifications. Requirements analysis is an important aspect of project management. Requirements analysis involves frequent communication with system users to determine specific feature expectations, resolution of conflict or ambiguity in requirements as demanded by the various users or groups of users, avoidance of feature creep and documentation of all aspects of the project development process from start to finish. Energy should be directed towards ensuring that the final system or product conforms to client needs rather than attempting to mold user expectations to fit the requirements.

Requirements analysis is a team effort that demands a combination of hardware, software and human factors engineering expertise as well as skills in dealing with people. Requirements analysis in systems engineering and software engineering, encompasses those tasks that go into determining the needs or conditions to meet for a new or altered product, taking account of the possibly conflicting requirements of the various stakeholders, analyzing, documenting, validating and managing software or system requirements.

6.2 Hardware Requirements

6.2.1 RASPBERRY PI 3 MODEL B

The raspberry pi is like motherboard having all the required constituents which forms a great CPU. Its size of a credit card and still it can perform like a full- fledged computer. The main purpose is to encourage learning, experimentation and innovation for school level students. It comes up with open source technologies. A monitor or TV has to be connected with it externally to visualize its operating system and operate it. We can use a keyboard and mouse to provide input to it. A n external

memory has to be used to load its operating system. We can program it with several languages like C++, python etc.

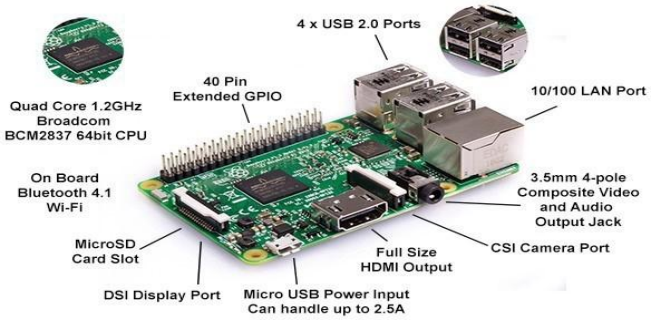

Fig 6.2.1: *1 Raspberry Pi 3 model B*

6.2.2COMPACTABLE CAMERA

Fig 6.2.2: *Microphone*

A compactable camera on the device is used for image capturing. It has autofocusing capability with a resolution of 1280 X 720 which is capable of capturing some good quality images. The USB powered camera is used in order to connect it with the Raspberry Pi board. The captured images are sent to Raspberry Pi and all the image processing was done. The voice output is available through the audio jack. It can be heard through the headphone.

6.2.3 ULTRASONIC SENSORS

Fig 6.2.3: *Ultrasonic sensor*

An Ultrasonic sensor measures the distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception. An optical sensor has a transmitter and receiver, whereas an ultrasonic sensor uses a single ultrasonic element for both emission and reception. In a reflective model ultrasonic sensor, a single oscillator emitsand receives ultrasonic waves alternately. This enables the miniaturization of the sensor head. Ultrasonic sensors are a reliable, cost-effective solution for distance sensing, level, and obstacle detection.

6.2.4 TOUCH SENSORS

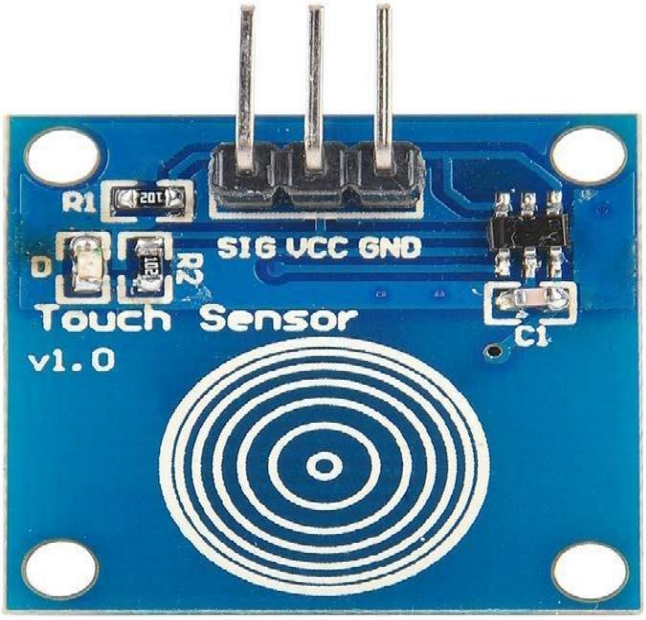

Fig 6.2.4: *Touch Sensor*

The Touch sensor is similar to that of a simple switch. When there is contact with the surface of the touch sensor, the circuit is closed inside the sensor and there is a flow of current. When the contact is released, the circuit is opened and no current flows. It helps to detect touch, typically by a human user or operator.

6.2.5 MICROPHONE

Fig 6.2.5:*Microphone*

The microphone is a type of transducer which converts energy from one form to another. Microphones convert acoustical energy (sound waves) into electrical energy (the audio signal). Here we use the microphone for taking input for Personal Assistant. The Personal Assistant based on the latest technology Machine Learning helps the user to communicate with the device and to know the attributes like time and date, text information, etc. Machine Learning is not a single technique or technology but is rather a field of computational science that incorporates numerous technologies to create systems that can learn from the data in their environment and then make predictions and take actions when confronted with a new situation. The Headphone converts the electrical signals to sound waves for the output to the user from the system.

6.3 SoftwareRequirements

6.3.1 PHP OR HYPERTEXT PRE-PROCESSOR

PHP is a server-side scripting language designed for web development. It was originally created by Rasmus Lerdorf in 1994; the PHP reference implementation is now produced by The PHP Group. PHP originally stood for Personal Home Page, but it now stands for the recursive initialism PHP: Hypertext Pre-processor. PHP code may be embedded into HTML code, or it can be used in combination with various web template systems, web content management systems, and web frameworks. PHP code is usually processed by a PHP interpreter implemented as a module in the web server or as a Common Gateway Interface (CGI) executable. The web server combines the results of the interpreted and executed PHP code, which may be any type of data, including images, with the generated web page. PHP code may also be executed witha command-line interface (CLI) and can be used to implement standalone graphical applications.

6.3.2 MySQL ("My S-Q-L", officially, but also called "My Sequel")

MY SQL is the world's second most widely used open-source relational database management system (RDBMS). The SQL phrase stands for Structured Query Language. The MySQL development project has made its source code available under the terms of the GNU General Public License, as well as under a variety of proprietary agreements.

6.3.3 NODE JS

Node.js is a server-side platform built on Google Chrome's JavaScript Engine (V8 Engine). Node.js was developed by Ryan Dahl in 2009 and its latest version is v0.10.36. Node.js is an open source, cross-platform runtime environment for developing server-side and networking applications. Node.js applications are written in JavaScript, and can be run within the Node.js runtime on OS X, Microsoft Windows, and Linux. Node.js also provides a rich library of various JavaScript modules which simplifies the development of web applications using Node.js to a great extent.

6.3.4 RASPBIAN OS

Raspbian is a Debian-based computer operating system for Raspberry Pi. There are several versions of Raspbian including Raspbian Stretch and Raspbian Jessie. Since 2015 it has been officially provided by the Raspberry Pi Foundation as the primary operating system for the family of Raspberry Pi single-board computers. Raspbian was created by Mike Thompson and Peter Green as an independent project. The operating system is still under active development. Raspbian is highly optimized for the Raspberry Pi line's low-performance ARM CPUs.

6.3.5 PYTHON TESSERACT

Python-Tesseract is an optical character recognition (OCR) tool for python. That is, it will recognize and “read” the text embedded in images. Python-Tesseract is a wrapper for Google’s Tesseract-OCR Engine. It is also useful as a stand-alone invocation script to Tesseract, as it can read all image types supported by the Python Imaging Library, including jpeg, png, gif, bmp, tiff, and others, whereas Tesseract- OCR by default only supports tiff and bmp. If used as a script, Python-Tesseract will print the recognized text instead of writing it to a file.

6.3.6 gTTS

gTTS (Google Text-to-Speech), a Python library and CLI tool to interface with Google Translates text-to speech API. Writes spoken mp3 data to a file, a file- like object

(bytestring) for further audio manipulation, or stdout. It features flexible pre- processing and tokenizing, as well as automatic retrieval ofsupported languages.

6.3.7 OPEN CV

OpenCV-Python is a library of Python bindings designed to solve computer vision problems. It can be programmed using different programming languages like C, C++, Python, Java, etc. Using these we could create image processing functions and high-level algorithms. With the development of computer vision technology,

Open CV has a number of algorithms for image processing. Open CV is a good image processing tool. We use open CV for image processing for text extraction.

6.3.8 ANDROID STUDIO

Android Studio is the officially integrated development environment (IDE) for Google's Android operating system, built on JetBrains' IntelliJ IDEA software and designed specifically for Android development. It is available for download on Windows, macOS and Linux based operating systems. It is a replacement for the Eclipse Android Development Tools (ADT) as the primary IDE for native Android application development. We use Android studio for developing the Chat-Bot application for an android user. The chat-bot will help in communication with their colleagues or Friends or Relatives.

6.3.9 SPYDER

Spyder is used to edit the python code in Raspberry Pi. It is a powerful scientific environment written in Python. It offers built-in integration with many popular scientific packages such as NumPy, SciPy, Pandas, I Python, Qt Console, Matplotlib, SymPy, etc. It has many built-in features and its functions could be extended even further via first- and third-party plugins. It can also be used as a PyQt5 extension library for the advanced editing processes.

6.3.10 VISUAL STUDIO CODE EDITOR

Visual Studio Code is a source code editor developed by Microsoft for Windows, Linux, and macOS. It includes support for debugging, embedded Git control, syntax highlighting, intelligent code completion, snippets, and code refactoring. It is also customizable, so users can change the editor's theme, keyboard shortcuts, and preferences. The source code is free and open source and released under the permissive MIT License. The compiled binaries are freeware and free for private or commercial use. We use visual studio code Editor for the development of Graphical User Interface (GUI) and several important developments of the proposed system using the python PyQt5.

6.3.11 PyQt5

PyQt5 is a comprehensive set of Python bindings for Qt v5. It is implemented as more than 35 extension modules and enables Python to be used as an alternative application development language to C++ on all supported platforms including iOS and Android.

7. MODULES

❖ OCR IDENTIFICATION

Capture frame of Image from Web Cam when you press any event and stored the data into some directory. Color image is converted into gray scale while processing. Gray scaled image is given to input image of Tesseract based OCR Engine by google. This extract text form given image and converted into text.

❖ TEXT TO SPEECH

Google Text to Speech API commonly known as the gTTS API. gTTS is a very easy to use tool which converts the text entered, into audio which can be saved as a mp3 file. The gTTS API supports several languages including English, Hindi, Tamil, French, German and many more. The speech can be delivered in any one of the two available audio speeds, fast or slow. However, as of the latest update, it is not possible to change the voice of the generated audio.

❖ PERSONAL ASSISTANT

Microphone is attached with USB of Raspberry Pi. Touch sensor is attached with Digital input pin of GPIO Headers. When Touch sensor is activated google speech recognizer start recognize your voice and this voice is converted into text. If this voice matches your trained data set system response.

❖ LOCATION TRACKER

Gps communication module is connected with UART Protocol of Raspberry Pi GPIO. Gps module collects current latitude and longitude. Location data updated to Cloud server.

❖ CHAT BOT

Today the use of mobile is broadly increased, every person possesses a mobile phone, in which lots of application run. Using Android mobile phones, we can help the visually challenged people by providing a microphone to easy send message input in the form of voice and covert speech to text information and send to

the corresponding person. The blind person wants to press the button to on the microphone and the corresponding person can be selected by the second press. When pressing the button, the corresponding name saved in the chat bot is output as voice so that he can select the corresponding person.

8. RESULT ANALYSIS

Insight is a portable device which can wear on the head. The battery backup is used, so the user could carry the device anywhere and able to use at any time. The device helps the visually impaired person in the following ways. Text extraction from the scanned image using Optical Character Recognition (OCR) and convert the text to voice as an output using the Google Text- to-Speech (gTTS) tool. Obstacle detection by Ultrasonic Sensor and gives an alert about the danger and the distance from the user to the obstacle in front of the blind person. An android based Chat-Bot application help in communicating with their friends and relatives. Inside the Chat-Bot, an IOT enabled location tracker is included. It will store the location history of the blind user, so the android user could find the person where he is at the instant. Personal Assistant based on Machine Learning helps in the user interaction with the device and it will respond to what he wants to know at the moment.

9. CONCLUSION

The proposed system is a voice-based system which helps the visually impaired person to recognize the real-world products. The device is designed in such a way that, they could carry anywhere they go so portability is solved. This system helps millions of peoples who are suffering from blindness. The most difficulty faced by a visually challenged person is difficulty in reading the text and detecting the object in front of them. Various developments in the field of technology help the blind person by developing camera-based and voice-based system combined with computer vision tools with the existing beneficial products such as an ultrasonic sensor, Google Text to Speech tool, Optical Character Recognition System, etc. The main aim of this system is to act as a security guard and helps the blind to be aware of their surroundings and guardian can able to trace them by the help of GPS and IoT. The system will be an interactive one to the user by adding the Personal Assistant to this prototype. It is based on the latest technology Machine Learning, helps the user to communicate with the device and to know the attributes like time and date, text information, etc. An android based Chat- Bot helps the user to communicate with their friends, colleagues, friends, etc. by converting the speech to text and vice versa.

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