Overhead Mounted Display

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Abstract— 37 million people across the globe who are blind, over 5 million are from India based on the definition that a person who is unable to count fingers from a distance of three metres would be considered blind. About 1.99 million people of our county are deaf. The idea of Smart Glasses or Over Head Mounted Display A Head-mounted Display (HMD) is just what it sounds like -- a computer display you wear on your head. Most HMDs are mounted in a helmet or a set of goggles. wearable computer glasses that are able to change their optical properties at runtime and can communicate with the Internet via natural language voice commands, while other use touch buttons. Also has inbuilt speakers and microphones. It uses various sensors which give real time inputs to the machine which then computes all the parameters and provides the user with guidance and feedback to help them navigate, interact and understand better about the world around them. Though it doesn't compensate for the missing senses that the user may have damaged due to accident or by must have so from birth but it does acts as a supporter for them.

Key words: Wireless Sensor Networks, WSNs Design, Network Topologies, OSI Model Layers, Sensor Nodes

I. INTRODUCTION

India is the second most populous country in the world. This has provided us with enormous talent and workforce. But also of the 37 million people across the globe who are blind, over 5 million are from India based on the definition that a person who is unable to count fingers from a distance of three metres would be considered blind. About 1.99 million people of our county are deaf. This made us to think about the contribution that we could provide using our technical knowledge and this shaped into the idea of Smart Glasses or Over Head Mounted Display for them. Person with disability have missing senses, which makes it hard for them to do some of the daily tasks easily done by normal people. The blind find it hard to navigate and detect obstacle in front of them. They find it hard to see what is in front and around them. As for the deaf people, they cannot hear sounds around them. They need someone to help them with these tasks or some device to help them interact with the people in the vicinity or to better understand the environment.

Vision makes us enable to see things all around us. It is one of the primary senses that the human body has and as we grow our dependence over it keeps on increasing. The real time information that the eyes provide us with is commutated at a very high speed by our brain and corresponding to the learnings and experiences a decision is made. This primary process doesn't happen in the person who is unable to see. They simply cannot see what's in front of them and so they have to rely on other sensors to understand things that are in front or around them. One method of doing so is by the sense of touch. They can understand about any obstacle/object in front of them by the sensation of touch which makes it a bit tedious and risky for them. Moreover our eyes also provide us with the ability to capture the image of what we see. Not all but repetitive images get stored in our neurons that then help us to navigate and understand about our surrounding. The project is aimed to provide with these inputs to the user via a different medium which they will easily understand to.

Communication is one of the ability which we as humans have evolved to such heights that it has not only made us to learn and understand thousands of language but also helped us to interact with not only our species but others. For those who are deaf, normal vocal communication becomes difficult for them and they thus have to rely upon signs to communicate. This project eases this tedious work by automatically converting it into feeds that are easily readable by the user.

II. RELATED WORK

Sr.no	Title	Author	Feature
01	Smart Guiding Glasses for Visually Impaired People in Indoor Enviroment	Jinqiang Bai, Shiguo Lian, Zhaoxiang Liu,Kai Wang, Dijun Liu	Uses ultrasonic sensors and depth sensors to detect small obstacles and transparent obstacles.
02	Smart vision for the blind people	R.Mohanapiya, U.Nirmala, C.Pearlin	Helping the blind to recognise traffic signal pattern as well as obstacles around and to cross the road without depending on others.
03	Head-Mounted Display Visualizations to Support Sound	Dhruv Jain, Leah Findlater, Jamie Gilkeson, Benjamin Holland, Ramani Duraiswami, Dmirty Zotkin, Christian Vogler, Jon E. Froehlich	Sound recognition using cochlear implants
04	The SmartVision Navigation Prototype for Blind Users	J.M. Hans du Buf, João Barroso, João M.F. Rodrigues, Hugo Paredes, Miguel Farrajota, Hugo Fernandes, João José, Victor Teixeira, Mário Saleiro	Implementation of ETA (Electronic Travel Aids) for navigational guiding techniques

Table 1:

III. BLOCK DIAGRAM

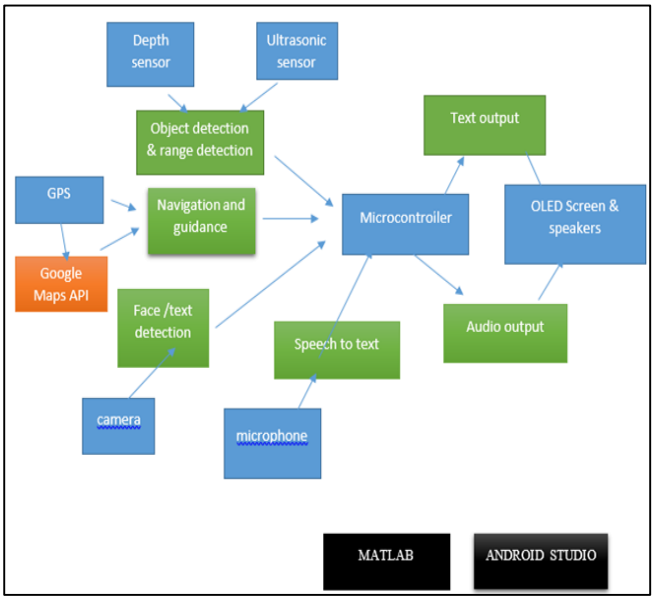

Fig. 1:

IV. WORKING

The project carries out various tasks that link together to provide the user a real time feasible system with various feature. Major aim to the system is to provide object detection for the blind user for which Object Detection and Ranging block comes into the picture. It uses ultrasonic sensor and an IR sensor to read physical parameters and feed it to the microcontroller which processes it and gives the feedback through audio output.

For Navigational help of blind user, data about the current location is collected from the GPS from the mobile phone, which transmits data through Bluetooth. This GPS value is compared with the predefined path saved in the data logger and guides the user accordingly with the audio commands.

For deaf users, the required data is displayed over the OLED (organic-light emitting diode) screen which is connected to the microcontroller.

Microphone is used to obtain the real time audio inputs from the people in vicinity of the user, which feeds these audio inputs to the microcontroller, which converts the audio signals to speech and displays over the OLED screen. Machine learning and Speech Processing are used to provide the outcome.

Camera takes real time pictures and then that are compared with the pre- stored database that is then fed to microcontroller where in using signal processing which involves the match parameter computing gives the required results.

V. RESULT

The results obtained can be divided into 2 parts: Obstacle detection and ranging: Based on the set values, the range for the detection of obstacle can be performed along with depth. Here in the project, the set value was 155cm, which was taken into consideration assuming that an average human's steps gap are smaller than this and if obstacle detected within this range, will alert the user about the location of the obstacle relative to the user and guide him accordingly. The system first detects the nearest obstacle and then when avoids it, confronts, another. It guides the user by commands such as take a left, take a right, no obstacle ahead, obstacle straight ahead. The detection and ranging occurs in real time making the system were well adjusted for the real life situations which can be handled in places like colleges, hospitals, lightly crowded markets, malls etc

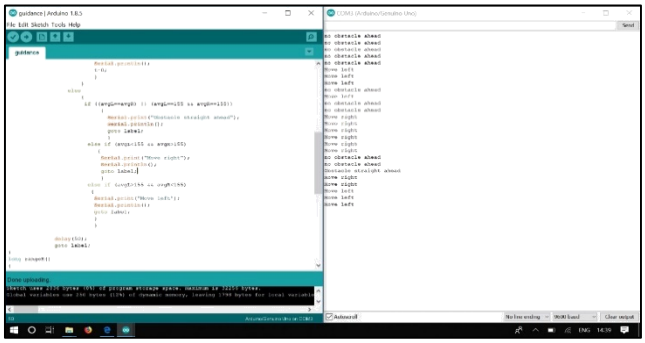

Fig. 2:

Digital Signature Verification/Face detection: using the speech processing techniques of MATLAB and the feature extraction techniques, difference between signatures were done with 66% accuracy. Here the system compared a given signature with sample images and then gave results as to the authenticity of the signature.

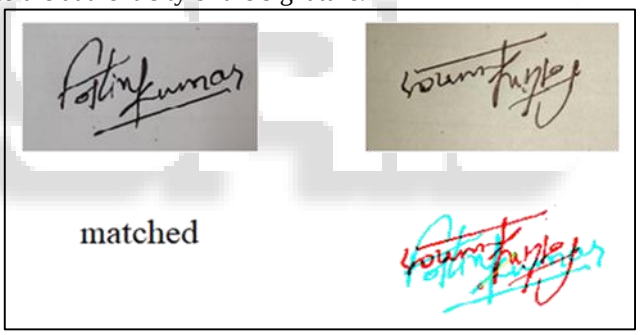

Fig. 3:

VI. FUTURE SCOPE

1) Navigation and Guidance: Using the google map api (application programmable interface) along with android studio, the system here first generates a unique key, which is provided by google itself. This key is used to access the parameters provided by google maps api. Here the main class takes in source location and destination location. The speed for the user is set for the average speed of a person (walking speed). These two parameters that is the source location and destination location are fed to the maps, which then compute the duration required for reaching the place as well as the route for the. Here using an app (developed by the team), was installed on the users phone which was used to get the guidance and the current gps (global positioning system) location from the system.
2) Speech to text: Using the broad and efficient libraries of Python along with the interfacing of it with OK google assistant, the algorithm here, takes in the voice recorded

input from the mobile phone, using internet on the very same device, accesses OK google, and then converts the voice command into simple text and displays it over.

3) Display: OLED screen was interfaced with the android nano and all the parameters were displayed over the screen.

VII. CONCLUSION

The project emphasises on self-dependence and self-reliance and imparts the same for those who unfortunately face the problems which a normal person doesn't even know about. The projects helps in bridging this gap by imitating the features of what real senses do, though not accurately and not up-to the very same extent.

The outcome of the project was that all the systems worked fine when used differently but few problems were generated when used together simultaneously. These problems arise due to difference in the platforms and hardware used.

Not all the parameters could be realised in this project, as it was not tested over a blind/deaf user, therefore the project faces the limitations of real life application and may or may not require some fine tuning when implicated over such users.

But for the future application, this project creates an ever growing platform for the help the system can provide to those who need help and assistance. The project ensures that money is not a factor that can limit the user, the access to this device.

Various features that were implemented in this project can be used for other purposes also, either together or individually. This increases the flexibility and broadens the domain of this project, inviting more ideas and algorithms to expand its working, efficiency and reach to the users

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