Impaired Glove for Blind and Impaired Person

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Abstract

Blind people come across many challenges in their routine activities which need attention. Mobility without any assistance is their main issue. They can't go anywhere without any support. Furthermore, they also face difficulties in learning. Therefore, proposed system is developed to resolve the issues associated with the blind community or visually impaired people. Thus, embraces a subjective and subsequent quantitative request to comprehend the academic difficulties confronted by blind children in secondary school and universities, their determination techniques and the utilization of innovation. A portable glove is designed that supports visionless people in their routine activities. With the help of this glove, blind can go anywhere without assistance. Navigation feature is also provided in case of obstacles. Obstacles are captured and detected by camera and notified through voice. Additionally, mobile application named as *"Impaired Glove"* is developed for continuous tracking of the sightless person and for object detection.

Keyword: Blind students, visually impaired, academic challenges, education.

1 Introduction

There are about two million visually impaired or blind persons [1]. People with visual impairment fall more often as compared to normal sighted people. They may fail to see or over correct in stepping over environmental hazards and may have difficulty taking corrective action after a stumble. They can't go anywhere without any assistance. This paper is based on a working project, impaired glove, designed to encounter the discussed problems faced by blind people. This glove can assist a blind person anywhere. The glove has the ability to navigate the path, measure distance and tell the blind if there is any hurdle or barrier by generating alarm. "Impaired Glove Mobile Application" is another module of the project which uses mobile camera to take image of object. After capturing image, object detection is performed and name of the detected object is notified to the blind. Impaired glove can also be used by blind students for study purpose such as to detect shapes and recognize text. Shape recognition mode is utilized to learn about the edges of the item and the surface mode enables the user to feel varieties in the surface of a picture. Voice email feature is also provided in mobile application which helps user to email by voice.

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The rest of the paper is arranged as follows. Section II covers background study of the related sensors. Related work comes under the heading of section III. This section includes related applications which work for community services. Section IV is devoted to describe the proposed system covering its modules with technology used for each module. Finally, section V concludes the paper.

2 Background

Ultrasonic sensor, Arduino, IR sensors are used to develop impaired glove, where ultrasonic sensor measures the distance and sends out a high frequency pulse when there is any barrier/ obstacles. The sensor has 2 openings on its obverse. One initial transmits ultrasonic waves, (comparable to a little speaker), alternate receives them, (similar to a small amp) [2]. Furthermore, IR sensors in glove that sense and detect the shapes. It is utilized to get a handle on the edges of the item. An IR sensor can detect the daintiness or dimness of a surface with material criticism from a vibration engine. In addition, Arduino is used to embed coding of the hardware like IR sensor, ultrasonic sensor [3]. Arduino is a single board microcontroller intended to make the application more accessible which are interactive items and its environment. The hardware highlights with an open-source hardware board outlined that enables the user/client to append different extension boards. Keeping in mind the end goal to begin, they are essentially associated with a PC and USB cable or with an AC-to-DC connector or battery [4].

3 Related Work

Several related work for blind people has been done to resolve their mobility, navigation and other related issues.

A Applying QR code and portable phones for blinds

Applying QR code and portable phones for blinds, worked on a barcode based framework to help the blind and impaired person to recognize objects in nature is introduced. The framework depends on using QR codes (two-dimensional barcode) appended to a protest and examined utilizing a camera telephone outfitted with QR reader software. The software decodes the barcode to a URL and mentors the mobile's program to get a sound record from the Web that holds an oral description of the object. Our proposed outline is required to be helpful progressively communication with several situations.

B Usable gestures for blind

Regardless of developing awareness of the accessibility issues surrounding touch screen use a by impaired people, planners still face challenges while making open touch screen interfaces. One noteworthy stumbling block is lack of understanding about how blind people really utilize touch screens. We led two client contemplates that looked at how blind and sighted people utilize touch screen motions. To start with, we directed a signal elicitation think about in which 10 visually impaired and 10 located individuals imagined motions to perform basic processing assignments on a tablet PC. We found that visually impaired individuals have different gesture preferences than located individuals, including inclinations for edge-based gestures and motions that include tapping virtual keys on a keyboard.

C An Integrated Indoor/Outdoor System

There are many navigation systems for blind yet rare can give dynamic associations and versatility to changes. Nobody of these frameworks work flawlessly both inside and outside. Drishti utilizes an exact position estimation framework, a remote association, a portable PC, and a verbal statement line to manage impaired clients and support them to movement in common place and new conditions freely and securely.

D Tactile display for Blind

Tesla Touch is an innovation that gives material sensation to moving fingers on touch screens. In view of Tesla Touch, we have created applications for the visually impaired to interpret and make 2D tactile information. In this paper, we exhibit these applications, show perceptions from the association, and examine Tesla Touch's potential in supporting correspondence among outwardly impaired people.

4 Proposed System's Description

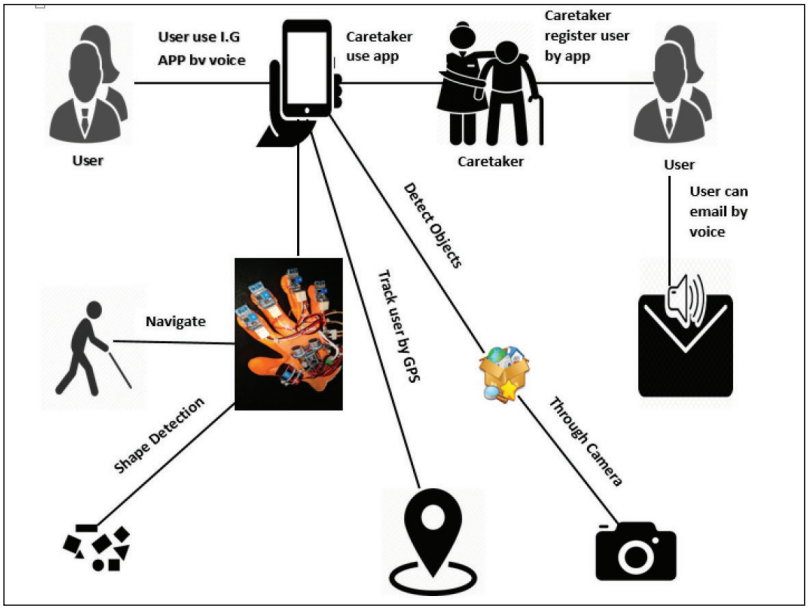

Figure 1: Proposed diagram of impaired glove

The above proposed diagram shows the flow of our project. A portable Glove supports blind people by helping them to navigate their right path. During navigation if any obstacles/barrier is found in front of them they can detect it with the help of ultrasonic sensor which we used in the glove and user will come to know by the frequency of sound. Camera detects the object and conveys message to blind person through voice recognition by an "Impaired Glove" application. With this glove it can recognize different shapes, alphabets and textures of an image. They can also gain their typing ability by taping their fingers in typing mode. In typing mode we embedded the IR sensor and vibrating motor on the finger tip of glove.IR sensor detects the black texture on white paper and vibrating motor vibrates only if we place our finger on black texture.so user can easily detect shapes, textures through vibration .In Impaired glove application there are

two modes caretaker and user mode. In caretaker where caretaker register his/her self and track the blind people. Caretaker may register multiple users. Caretaker will be responsible to track the user's location through GPS tracking system. If user goes anywhere caretaker detects the user's position and gets notified by the application.

A Modules

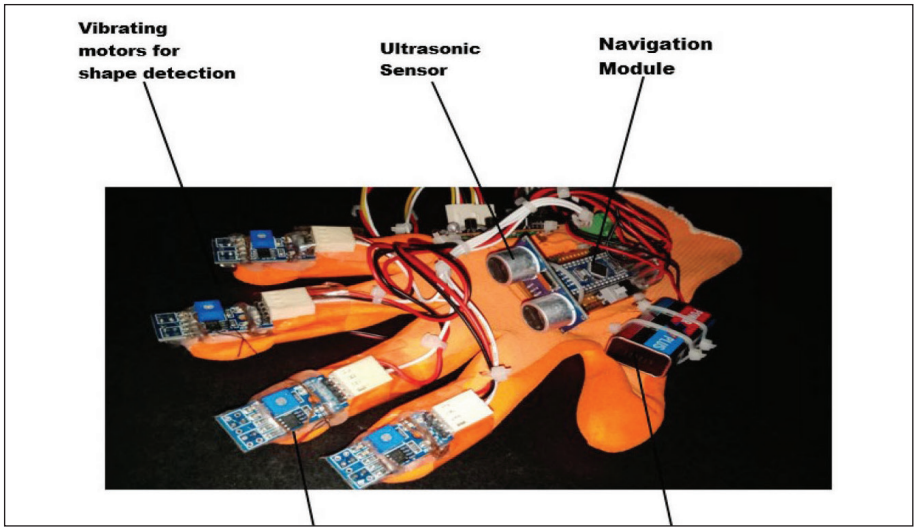

Figure 2: Impaired Glove

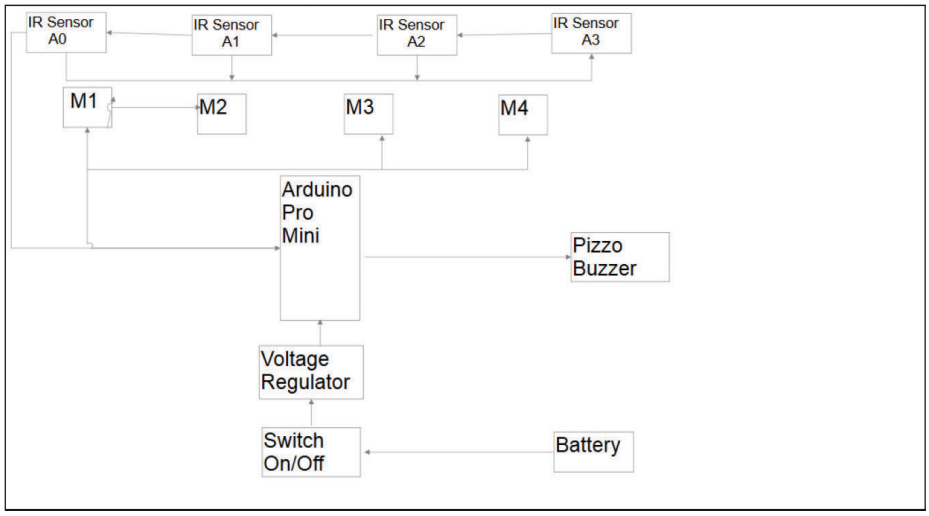

Figure 3: Block Diagram of Glove

1) ***Shape detection:*** In this mode, blind can recognize the edges of the item that is detecting the shapes by using this module for achieving the goals.

2) ***Voice Mail:*** Furthermore, In impaired glove application there is an email mode for blind which person can use by voice or tapping their finger on screen to fill the given fields.

3) ***Navigation:*** This is the main module where blind or impaired person can easily navigate their right path. As they face lots of problems if hurdles or any other obstacles in front of them so that this mode gives the feedback in beep sound.

4) ***Detection:*** In Object detection mode blind can detect the objects by camera through impaired glove's application and gets notified by voice.

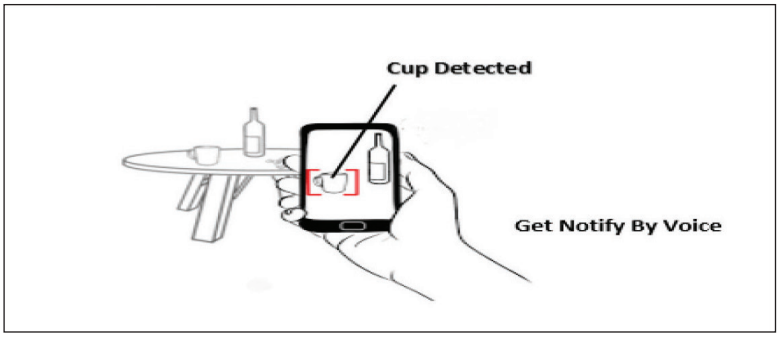

Figure 4: Object Detection

5) ***Tracking:*** In this module, Caretaker will be responsible to track the user's location through GPS tracking system. If the user travels somewhere caretaker can identify the user's position and track them, further caretaker gets notification through the application in case of unusual routes and can track them easily.

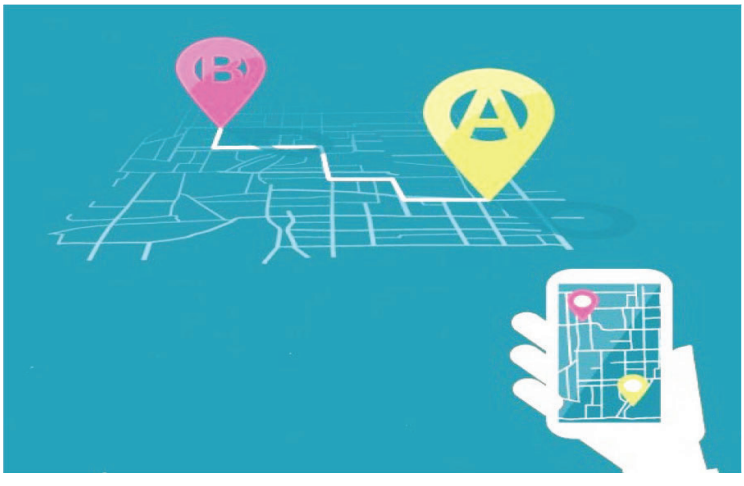

Figure 5: GPS Tracking

6) ***Text Recognition:*** Furthermore text recognition is also one of the features in the application where user can detect the real time text and gets notified by voice through application.

B Technologies used in modules

1) IR sensors

IR sensor technology used in glove which detects the shapes and recognizes the edges.IR sensor detects or senses black texture which is present on white surface.

2) Ultrasonic sensor

It is used in glove to detect the obstacle, measure the distance and give feedback in beep sound.

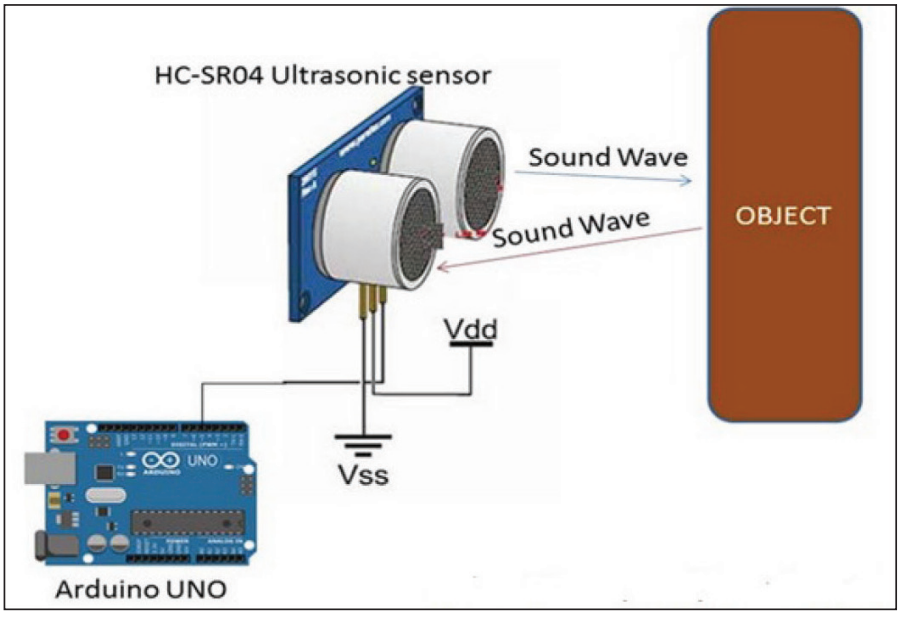

Figure 6: Ultrasonic Sensor working

3) Arduino

This technology was used to embed the coding. It is a single board microcontroller intended to make the application more accessible which are interactive items and its environment.

5 Conclusion

This project's aim is to support blind people who face so many problems due to their disability. A portable glove is designed which focuses to enhance their learning abilities through shape detection and text recognition. A mini camera is provided on the glove for blind to understand what object is in front of them.

Additionally we provide voice email and text recognition features in application. Furthermore, if caretaker wants to know where the blind person is, GPS tracking system facilitates caretaker using impaired glove application through which he can track blind person easily. Hence, this portable glove can be a beneficial application that fulfills a blind's basic needs.

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