

Ultrasonic bifocals for visually impaired person

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ABSTRACT: This project identifies the challenges faced by visually impaired persons and tries to provide an effective solution in the preview of IOT and Embedded domain. Here the design technique is formulated to address the over line problem identified in this project so that development of bifocals using ultrasonic signal which enables the subject to move with higher degree of freedom and communicate to his/her care taker through the GSM module incorporated in it. The design also incorporates a special sensing device to identify and alert the subject the near crater and obstacles. RFID Reader is included in the design which helps in area navigation.

KEYWORDS: RFID Reader, navigation, ultrasonic signal and GSM module.

I. INTRODUCTION

The complexity is increased in the implementation of blind navigation system due to the development of various features. The system is now able to detect any object or obstacles near the partially sighted or blind person and alerts them through voice message and this aids the subject to travel independently using special detecting sensors. Arduino UNO is a microcontroller which is coupled with the output to alert the concerned. The system consists of sensors such as ultrasonic sensor, fire sensor, water sensor and IR sensor which alerts the subject about the near crater by this he/she can avoid them. The system alerts others about the blind or partially sighted at night through LED strip light mounted on the glasses. The system does various activities other than object detection such as detecting fire, water and pothole and give voice message to the subject and it also gives information about bus route and area information. Area information is known by RFID tags that is when RFID tags communicate with RFID reader. Our

system also alerts the concerned about the subject by SMS through GSM module incorporated in it.

Sight plays a very important role in human life. More than 83% of the information regarding environment a human being gets is from visual sight. Lack in mobility, orientation and travelling independently becomes the most challenging task by lack of vision in day-to-day life. Having human assistance is not possible all the time. To overcome this problem, we developed our system which guides the blind or visually impaired person to travel independently avoiding any kind of obstacles. Our proposed system helps the partially impaired or blind person by identifying the bus number and also gives information about the bus route through voice output. The system also gives area information to the subject through RFID reader and RFID tags installed in it.

II. LITERATURE SURVEY

The "Ultrasonic Sensor for Blind and deaf persons Combines voice" proposed by Mahdi et al [1], in this a fire sensor which is a simple and compact device is used for protection against the fire. This module consists of an IR sensor and Comparator which can detect fire up to 1 meter range. The system can be easily mounted on system body because it only weighs 5 grams. This system is high efficient in detecting fire. For visual indication LED can also be provided.

Harshad et al [2], proposed "Electronic path guidance for visually impaired people" Travelling becomes most difficult task for blind and visually impaired people because they do not get enough information about the location and orientation with respect to traffic and obstacles on the way and things without visual disability people can easily see. The traditional way of using stick or use dog as a guide would only help to know the

obstacles but exactly don't know what they are. The navigation device has 3 parts by this the people with visual disability can travel with the highest degree of psychological comfort and independence by sensing the obstacles and hazards and providing information regarding it during travel.

Van [3] et al, "Wearable navigation assistance" The quality of life of disabled people has improved with the advancement of Assistive technology. In recent years there is an advancement in technology but in terms of mobility people with visual impairment still face difficulties and limitations. They travelling becomes the most challenging task for them as it involves obstacle detection and avoidance, walking on street, knowing the current location and keep on track the desired path until the destination is reached. Most of the navigation system used by the users are designed for the people without any major disability and this system are based on information system which focuses on outdoor road navigation, tourist and commercial destinations. The several approaches have been made in recent years to create the system that allows continuous tracking and help in navigation environment like indoor and outdoor. This device uses RFID technology to provide location service and navigation for both blind and visual impairment people.

III. METHODOLOGY

The proposed system consists of ultrasonic sensor, fire sensor, water sensor, IR sensor, LDR, strip light, vibrator, GSM module, voice kit and earphone.

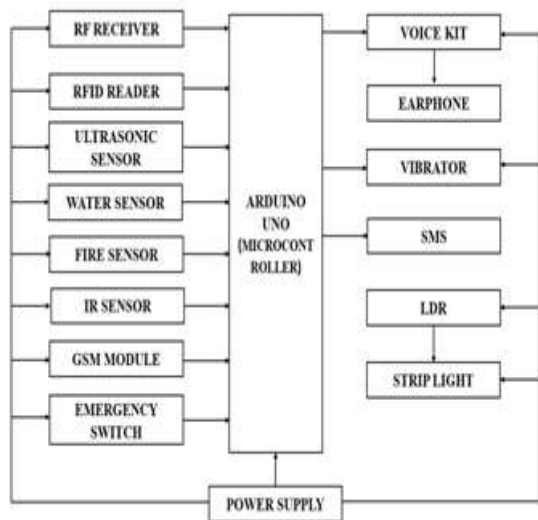


Fig 1: Block diagram of Ultrasonic bifocals for visually impaired person.

The sensors are used to detect obstacles like object, fire, water and pothole coming on the

way when the blind or partially impaired person walking. Our proposed system identifies the underlying problem and provides the effective solution. When object comes near range the ultrasonic sensor alerts the subject about it so he/she can avoid them. The fire is detected by the fire sensor when photons in the sensor activated and alerts the subject through vibrator and voice output fitted at stick. The water is detected by water sensor when there is a conductivity occurs and alerts the subject about the water on the way. The pothole is detected by the IR sensor when there is no mobility.

The main aim of this project is to make blind or visually impaired person walk or travel independently. The bus route is identified by RF receiver and transmitter communicates. The information about bus number, bus route and bus stop details are communicated to the subject by voice output through earphone put on to ear by the subject. Area navigation is done by RFID reader and RFID tags. When RFID card communicates (swiped) with RFID reader it gives the road, cross details of the place. When an emergency situation occurs the subject presses emergency switch installed at the stick which sends an SMS about location to the caretaker so they can help the blind or visually impaired person.

REQUIREMENTS

A. HARDWARE REQUIREMENTS:

- RFID Sensor
- Ultrasonic Sensor
- Fire Sensor
- Water Sensor
- GSM Module
- IR sensor
- RF Receiver and Transmitter
- Arduino Uno
- Vibrator
- Earphone
- Wheel And Emergency Button
- LDR
- Led- Strip Light
- Power Supply

B. SOFTWARE REQUIREMENTS:

- Embeddedc
- Arduino sketch

IV. IMPLEMENTATION

In this project solution as shown in Fig.2 obtained using software and hardware components to achieving the results of obstacle detection, bus route and area information. Obstacle detection is done by identifying the craters such as object, fire, water, pothole by using ultrasonic sensor, fire sensor, water

sensor and IR sensor. If there is a fire detected it alerts the blind or visually impaired person through vibrator fitted to it. The bifocals are fitted with strip lights which alerts others about blind or visually impaired person walking at night. The proposed model gives the bus route and area information. For area information it is known by RFID reader and RFID tags. The RFID tags contains area information. The GSM module is incorporated in this system which sends SMS to caretaker when emergency switch is pressed by blind or visually impaired person.



Fig 2: Snapshot of model of Ultrasonic bifocal for visually impaired person

V. RESULTS

As discussed above the proposed model will be helpful in object detection, obstacle detection and provides an audible output to the blind or visually impaired person through earphone. When there is a crater nearby it alerts the blind person through speech, next comes with the bus route identification, the bus route identification system is proposed with the identification of bus number and bus route information is provided. Next comes with the area information which is known by RFID reader and RFID tags, which contains area information. A quick notification/SMS is sent to the caretaker through GSM module when emergency switch is pressed by the blind or partially sighted person when there is a danger.

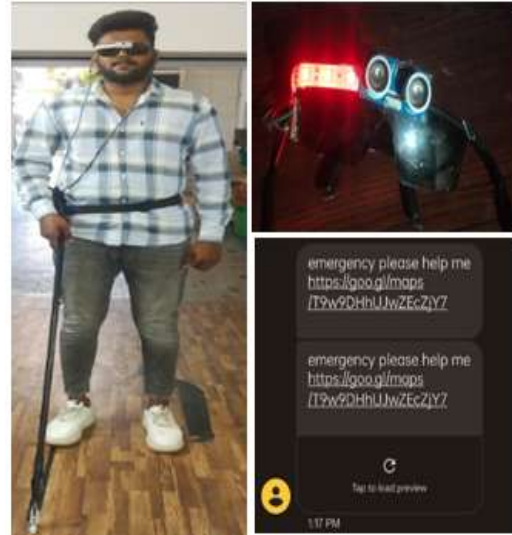


Fig 3: Results of Ultrasonic bifocals for visually impaired person

ADVANTAGES:

- Easy to implement
- User-friendly model
- Cost-effective system
- More accurate
- Low maintenance

FUTURE ENHANCEMENT:

- Making the system wireless and adding GPS tracking device in order to provide precise location of user.
- Include traffic sign detection and recognition in video stream using MATLAB.
- Implementing image recognition to get the information of the obstacle.
- Implementing more useful application such as talking to Wikipedia, Google, voice guidance and etc.

VI. CONCLUSION

This project aims to help the blind people to travel anytime independently avoiding any kind of obstacles. The system is used to identify the obstacles nearby the blind person and provide audible speech through earphone. We have designed the prototype model for providing bus route and area information. The advantage of this proposed system is that it alerts the caretaker by sending SMS through GSM module when emergency switch is pressed by the blind person when a danger situation occurs. The proposed system can detect obstacles in real time.

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