SMART GLOVES USED FOR BLIND VISUALLY IMPAIRED

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ABSTRACT

In order to help the visually challenged people, a study that helps those people to walk more confidently is proposed. The study hypothesizes a smart walking glove that alerts visually-impaired people over obstacles, pits thus this device could help them in walking with less accident. It outlines a better navigational tool for the visually impaired. It consists of a simple walking equipped with sensors to give information about the environment. GPS technology is integrated with microcontroller which will help their loved ones to keep eye on them. In this system ultrasonic sensor, GPS receiver, vibrator, PIC controller and battery are used. The overall aim of the device is to provide a convenient and safe method for the blind to overcome their difficulties in daily life. The research aimed to design a mobility aid for visually impaired. It was carried out to design a system which was compact and required with little or no training for users. The main focus of the research was to build a user-friendly design. The paper describes two different software developments on mobility aid using ultrasonic sensors. The signals send by the sensor detect obstacles and let user knows by vibrating a motor.

KEYWORD:Ultra-Reliable Communication, Ultra-Reliable Low-Latency Communications, Packet Error Rates, Cumulative Distribution Function.

1. INTRODUCTION

Blindness is the condition of lacking visual observation due to neurological and physiological factors. For blind pedestrian secure mobility is one of the biggest challenges faced in their daily life. According to the World Health Organization (WHO) in 2012, out of 7 billion global population there were over 285 million visually impaired people and 39 million were totally blind out of which 19 million are children (below 15 years) and this number is growing at an alarming rate.[l] So, some navigation system is required to assist or guide this people. Many researches are being conducted to build navigation system for blind people. Most of these technologies have boundaries as its challenge involves accuracy, interoperability, usability, coverage which is not easy to overcome with current technology for both indoor and outdoor navigation.

The disability and technology are considered as two cooperative words: by exploiting advances in bioengineering technology, smart solutions have been proposed for reducing the disease impact (artificial body parts, augmented reality sensors, etc). Due to the big effort in improving the usability of technological devices for impaired people, the uncanny valley has been filled up and we are facing at threshold of a new era in adopting these cyber-physical systems. This paper focuses the problem of visually impaired people, proposing a smart device able to improve their mobility. Visually impaired people use worldwide the white cane as tool for mobility: it is used not only to detect obstacles, but also to alert others as to the bearer's visual impairment.

The population of India has reached 120 Cr. of those 8.90 Cr. people are visually impaired. 90%of those cannot travel independently. In this paper, we present a survey of navigation system of visually impaired people highlighting various technologies with their practical usefulness, design and working challenges and requirements of blind people. The aim of this paper is to provide a better understanding to identify important research directions in this increasingly important social area for future research.

2. IMPLEMENTATION

Planning is the first task in the system implementation. Planning means deciding on the method and the time scale to be adopted. At the time of implementation of any system people from different departments and system analysis involve. They are confirmed to practical problem of controlling various activities of people outside their own data processing departments. The line managers controlled through an implementation coordinating committee. The committee considers ideas, problems and complaints of user department, it must also consider.

3. EXISTING SYSTEM

According to Mazo and Rodriguez the blind Cane is one of the assisting tools for the visually-impaired and it is really important. According to Herman , one of the main problems of the visually-impaired, is that most of these people have lost their physical integrity. When the visually-impaired walk into a new environment, they will find it difficult to memorize the locations of the object or obstacles. These examples demonstrate the difficulties of visually- impaired people.

3.1 DISADVANTAGES

- Cannot be carried easily, needs a lot of training to use.
- The features of Third eye for blinds: By wearing this device they can fully avoid the use of smart gloves and such other devices.
- This device will help the blind to navigate without holding a stick which is a bit annoying for them.
- They can simply wear it as a band or cloth and it can function very accurately and they only need a very little training to use it**.**

4. PROPOSED SYSTEM

The concept of integration of system is illustrated this is the concept of the project that shows the position of all the component which will be discussed in next section. All the components were integrated with glove and used by blind person. Sonar radiation of

system is shown which show the outcome of this system. If the ultrasonic sensor detects the output below 1 meter from the user, buzzer and LED will trigger and Vibrator Motor will decode the sound only if the obstacles detected exactly at 1 meter. The same process happen for distance 1.5 meters and 2 meters.

4.1 ADVANTAGES

- It requires fewer components so its cost is low.
- Due to small size can place its hardware on our hand easily.
- Light weight.
- Flexible to user.
- Anyone can operate it easily.
- Real time translation.

Generalizations:

Another real-time technology developed to alert visually impaired user by the presence of static dynamic obstacles in a few meters surrounding, which works without depending on any Smartphone, uses camera for background motion detection. This system is robust to complex camera and background motion and does not required any prior knowledge about the obstacle size, shape or position. This camera based image processing system can be a better option but it requires lot processing power and hence system becomes bulky, costly and it must be transportable

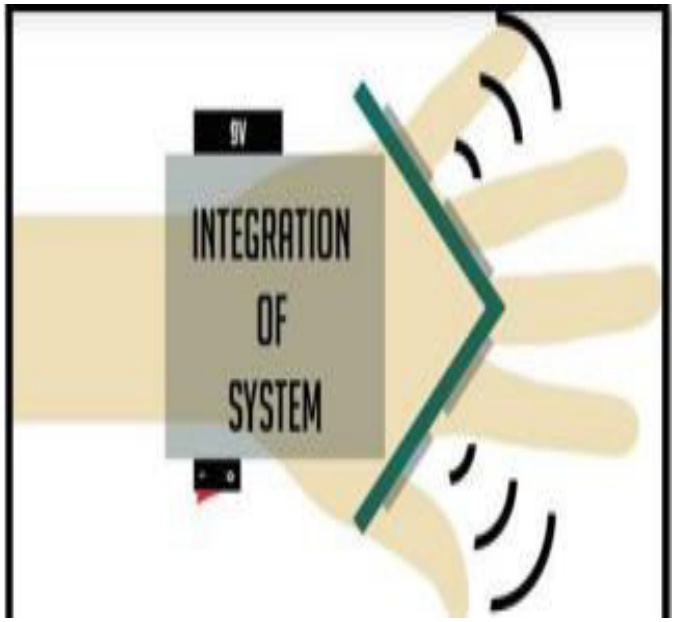


Fig No 1: Integration of system

5. METHODOLOGY

5.1 ULTRASONIC SENSOR

This type of ultrasonic sensor has an ability to determine the distance of objects with high accuracy and provide stable reading of data. The sensor widely used for the blind because it does not affected by

environmental noise. It works by transmitting an ultrasonic burst and provide output pulse which correspond to the time required for the burst echo to return to the sensor. The distance to the target or objects can be calculated by measuring the echo pulse width.

5.2 SERVO MOTOR

Servo motors are great devices that can turn to a specified position. Usually, they have a servo arm that can turn degrees. Using the Arduino, we can tell a servo to go to a specified position and it will go there. Servo motors were first used in the Remote Control (RC) world, usually to control the steering of RC cars or the flaps on a RC plane. With time, they found their uses in robotics, automation, and of course, the Arduino world.

5.3 SLOT SENSORS

(objectdetecting**sensors** that have the transmitter and receiver built into the opposing**).**

The slot sensor used here is MOC7811. A slot sensor is an Opto-isolator module, with an Infrared (IR) transmitter & a photodiode mounted on it. It performs Non-Contact Object Sensing. This is normally used as a position sensor switch (limit switch) or as Position Encoder sensors used to find the position of the wheel. It consists of Infrared (IR) LED and Photodiode mounted facing each other, enclosed in plastic.

5.4 MICROCONTROLLER (small computer on a single integrated circuit.**)**

The microcontroller development board is the processing unit of the proposed design. All the conversion algorithms for the system are stored in the microcontroller. This forms the control unit of the system. The slot sensors and the vibration motors have to be interfaced to this development board. Therefore, this is the most important component of the system.

ALGORITHM

We introduce a fast and reliable algorithm to estimate theposition of the hand considering only the x-acceleration. Thealgorithm is based on the well-known Zero Velocity Updateapproach, adopted in pedestrian dead reckoning the peaksare isolated using fixed threshold, while crosstalk and noiseare regarded as a bias and estimated when the hand is still.In this work we introduce the Zero Update algorithm.

Design Methods:

This research simulates an accomplishing system which includes both hardware and software. In terms of hardware part, a microcontroller, ultrasonic sensor, vibrating motor and a battery are required.

This research is expected to solve actual outdoor environment and use daily for visually impaired. The design is based on advanced technologies to detect obstacles and also here are rooms for future improvements. The design principles can be defined as:

- Reliable – chosen hardware is highly reliable.
- Advanced – advance software engineering system structure is applied and technology is state of the art.
- Expandable – design is prepared for future developments.

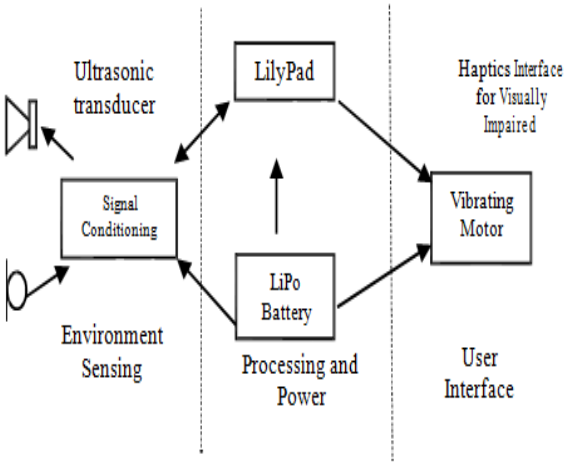


Fig No 2: Initial overall architecture of the Smart Glove

6. RESULTS AND DISCUSSION

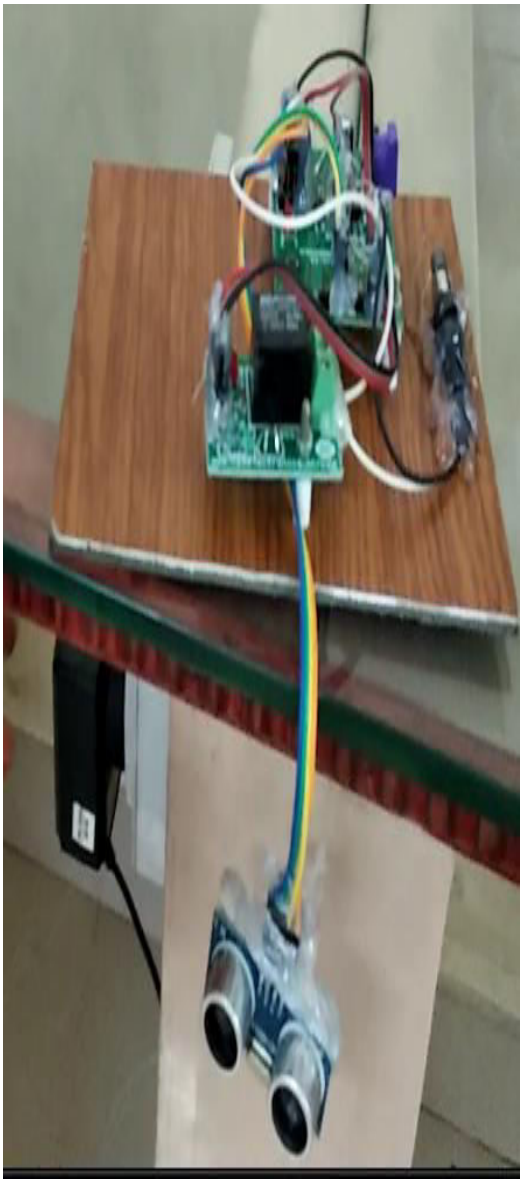


Fig No 3: Obstacle sensor with IOT board

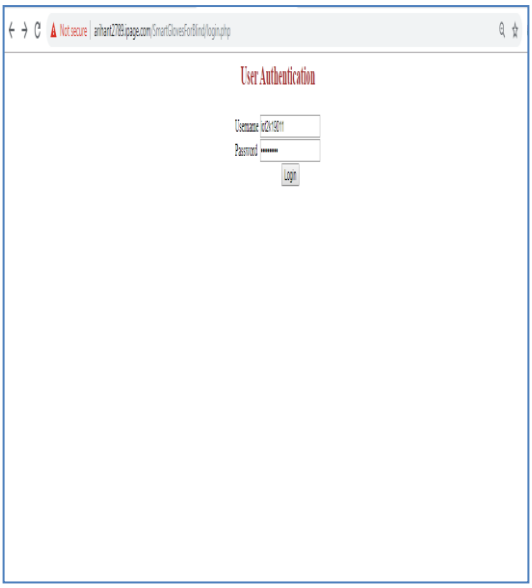
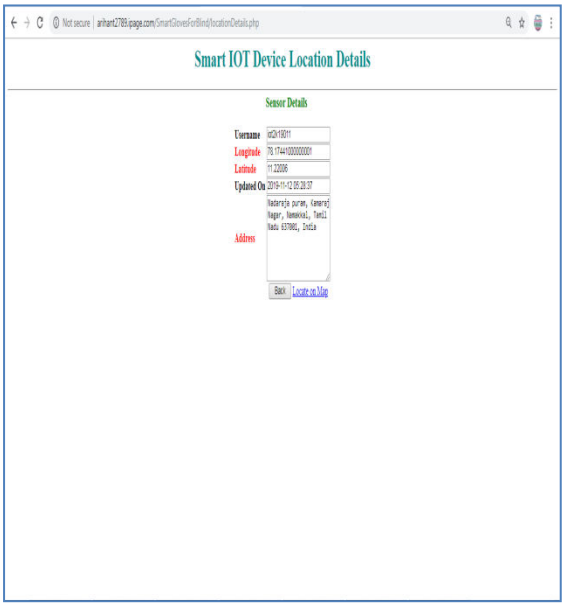


Fig No 4:User Authentication

Fig No 5: Location Tracking

Fig No 6: Obstacle sensor notification



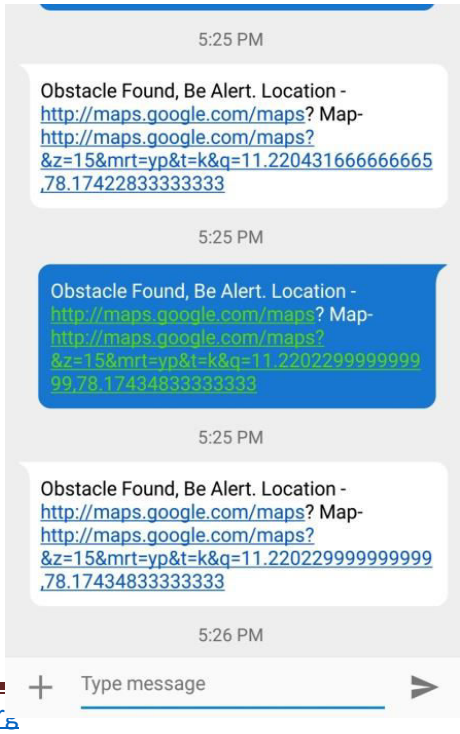


Fig No 7: Message Notification

7. CONCLUSION

Smart glove for the blind project is to help blind people walkand estimate the distance from obstacles. Main componentfor this project are Arduino UNO, Vibrator motor andultrasonic sensor. Based on the experiment that has beenconducted, there are few advantages and limitations of thisproject. One of the advantages of this project was the use ofultrasonic sensor. This sensor was very sensitive and willtrigger faster when it detect obstacles. Besides that, the costto develop this project was low and can be afforded by blindpeople. The limitation of this project was the ultrasonicsensor used can only detect the obstacles but cannotillustrate the shape of the obstacles. Furthermore, thisassistive glove can only be used by blind people but not theblind and deaf people.

8.FUTURE ENHANCEMENTS

The results are also compared to the functionalities of the products. Section VI, Conclusion and Future Work, delivers the summary of results with regard to aim of the project. It discusses the methods used and also suggests the future work.

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