FACILITATION OF MULTIPURPOSE GLOVES FOR IMPAIRED PEOPLE

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Abstract—**There are around 285 million of visually impaired people and 15 million of deafblinded people in the world. These people cannot live their lives independently.Not everyone can live a comfortable life .It is a social responsibility to make their lives easy and convenient using the fast pacing technology. So, we came up with a solution to facilitate gloves for both deaf and deafblinded people to live individually without someone's attention all the time. This paper proposes electronic aided device uses efficient solutions to indeed neutralize human disability. The echolated gloves is a technique to help sightless / blind people and deaf people to detect the barriers on their way and can aid the person to walk safely without having fear of hitting someone on the way or any solid objects. These gloves build
a low-power, low-cost, and practical solution for people suffering from visual and hearing impairments to aid in indoor and outdoor navigation using external sounds and vibrations to alert the person.**

Key-words—**Ultrasonic sensor, Obstacles, Gloves, Arduino, Alerts, Monitoring.**

I. INTRODUCTION

1.1 Overview

The scope of the project is towards the safety of impaired people which helps in alerting if any barrier/obstacle found on their way and also enabling vibrations to the users.

1.1.1 Proposed Systems
- IOT based obstacle detection system
- IOT based Collision detection system//
- Alerting by vibrations and buzzer sound

1.2 Domain Overview

Internet of Things (IoT) is a subtle set of technologies and uses inbound cases with a clear, single definition. One effective framework for viewing IoT such as the use of network-connected devices, embedded in a visible environment, to improve an existing process or to enable a new state that has never been seen before.

These devices, or objects, are connected to a network to provide information they collect from nature through sensors,

or to allow other applications to access and operate the earth through activators. They can be connected by phone to common objects that you may already be familiar with, or to new devices designed for the purpose of unreachable activities. It could be personal devices that you own and carry with you or keep in your home, or they can be imported into factory equipment, or part of the fabric of the city where you live. It helps to convert the realworld information to the digital data to convert real world problem to business solutions.

The world of IoT is just getting started with enormous use cases and opportunities across various industries and scenarios setting a common challenges and patterns.

1.3 Objective
The key objective of this project is to provide a secured and an efficient solution for the consistent and evident problems in daily life of impaired people. Considering the human safety as a major factor the proposed system is capable of:
- Sensing any obstacle found within certain distance
- Intimating the user by alerting them by vibrations and buzzer sound
- Alerting users to prevent rear-collisions.

1.4 THEME AND CASE STUDY:
Vision loss increases the risk of unintentional injury. Previous research has highlighted the correlation between the type, severity and frequency of injuries and type and degree of vision loss. The categories of injuries normally considered are falls, occupational injuries, and traffic-related injuries. One glimpse around us is enough to make us realize how visual is most of the information in our environment. Timetables in train stations, signs indicating the right way or potential danger, a billboard advertising a new product in the market, these are all the visual types of information we all come across in our daily life. Most of this information is inaccessible for the blind and the visually impaired, inhibiting their independence, since access to information signifies autonomy.

[the new Indian Express 2015] In a recent case, A majority of the 700 visually impaired persons in the two settlements travel at least 10 km to the city and also to various other districts for work. A few of them work in private companies, while others sell incense sticks, soaps, cleaning products and other items for a living. They have to cross the highway to take a bus or some mode of transport.

Believing in safety in numbers, they cross the road in a group, all the while gripped by fear of getting knocked down. Many of them have suffered fractures and injuries. At least ten persons died while crossing the road over the last eight years.

The below graph states the survey taken by blind people In previous years about there facing of the accidents whenever they go out. The survey targets on two types of people i.e legally blind and people with poor vision due to light perception.
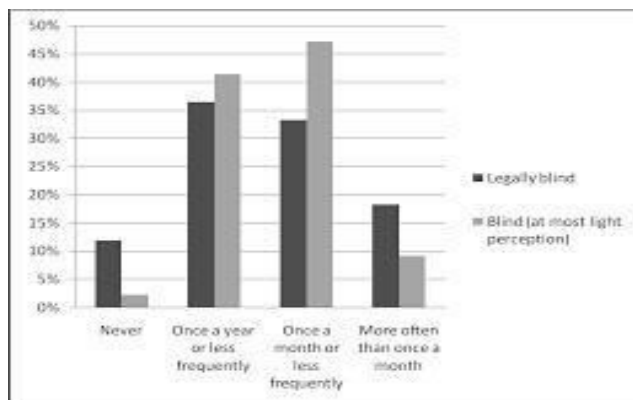
So, considering all the above facts we precepted to have a proposed system which could help the blind people in achieving the above factors:

- To detect the obstacles in a very convenient way
- To make it easy for special impaired people as a wearable device
- To help people with blind, deaf and night blindness affected people to clear their way
- To make their own way while crossing roads/ in a group in order to avoid collisions.
- To replace a long heavy blind stick.

1.4.1. Obstacle Management:

In this human world, every people want to live their lives comfortably and independently. To make this happen one should be perfect physically. a person whose organs are perfect need not to worry about leading their life. what if a person is blind or a deafblinded? It's risky to do anything. we

people primarily use our eyes first to do most of the things. Imagine a person who lost his eyesight and want to cross a road. In this case, anyways he can't see the objects but he can hear the traffic sound keenly to cross the road. The same way what will be the situation of a deafblinded people? he can't see, he can't hear anything it's very difficult to live like that. there are two main reasons why people with visual impairment are more susceptible to injury they have fewer visual clues to alert them to potential, with adequate lighting. Also, the risk of falling is exacerbated in certain groups, such as older people, who tend to be more dependent on vision to maintain vertical posture Refractive errors are caused by irregularity in the shape of the eye. making it hard to focus clearly. A person can take care of this people like helping them, supporting them to live their life but it's impossible to look after someone all the time. So, this proposed system can be the solution for all the problems facing till now

1.4.1. Input:

The input is considered automatically whenever the switch is on. Based on the input the gloves provide the alerts to the user accordingly.

1.4.2. Applications:

For any people who are blind, deaf blinded and has night blindness**.**

II. LITERATURE SURVEY AND SYSTEM ANALYSIS

2.1 Literature Survey:
Table 1 : Referring the literature Survey

PAPER TITLE/ WEBSITE INFERRED	IDEA INFERRED
[1] SMART STICK FOR BLIND PEOPLE	Only used by blind people to sense hurdles
[2] ULTRASONIC SENSOR BASED SMART BLIND STICK	Gives buzzer sound when obstacle found
[3] AURDINO BASED AUTOMATIC STICK GUIDE FOR A VISUALLY IMPAIRED PERSON	GPS and GSM tracking system to track the live location of person
[4] ASSISTIVE INFRARED SENSOR BASED SMART STICK FOR BLIND PEOPLE	Can sense a hurdle within two meters

2.2 Existing System:

The already existing system finds the solution of this problem by designing and implementation of an ultrasonic sensor based walking stick for visually impaired person. An ultrasonic sensor module, HC-SR04 is for obstacle detection in the path of the blind person and a buzzer is used to make the person alert. It is implemented using PIC microcontroller 16F877A. Blind persons can use this walking stick for safe navigation. It can detect obstacle within 5 to 35 cm range of distance.

2.2.1 Implementation of Existing System:

The design of the Ultrasonic Walking Stick for the Blind system involves the incorporation of three ultrasonic sensors are incorporated- to sense objects on the right, left and in front respectively. The PIC microcontroller has to be programmed in order to calculate the distance of any object from the sensor. The programming of the microcontroller is done in C language. On detection of an obstacle, a buzzer is sounded down and allows fresh air. The Arduino board, L298N dual motor controller module - 2A, DC motor and CO2 sensor are all connected to the breadboard. IO trigger is used for at least 10 us high level signal. Ultrasonic sensor module transmits 8 no of 40 kHz signal and detect if there is a pulse signal received back. Though high level if the signal is back then time duration of high output is the measure of the time taken by the ultrasonic senor from transmitting a pulse and receiving it back.

CALCULATIONS:

The distance between user and the very first obstacle/barrier found in front within 5 to 35cm of distance.

*Test distance= (high level time*velocity of sound)/2*

2.2.2 Disadvantages of Existing System:

This existing system has some drawbacks that has to be concentrated and could be used for reference of a new system.

- It is highly impossible to reserve one of your hand to hold up something all the time especially while travelling.
- Blind sticks and gloves so far designed are only useful for visually impaired people
- They don't have self-controllable devices

III. PROPOSED SYSTEM

3.1 Idea of the System

The proposed system provides the features of solving two main problems caused to both the blind and deafblinded people. This

type of system is one of the fastest growing safety features in the automotive industry. Such a system allows to detect the possibility of collisions and to issue audio and vibration signal

alerts to the user so that the user can take the necessary steps to avoid hitting barrier. It also provides an efficient obstacle detection which can prevent the danger rates caused due to inability and manages to alert the user and surroundings.

3.1.2 Flowchart

The below flow chart describes the working flow of the proposed system.
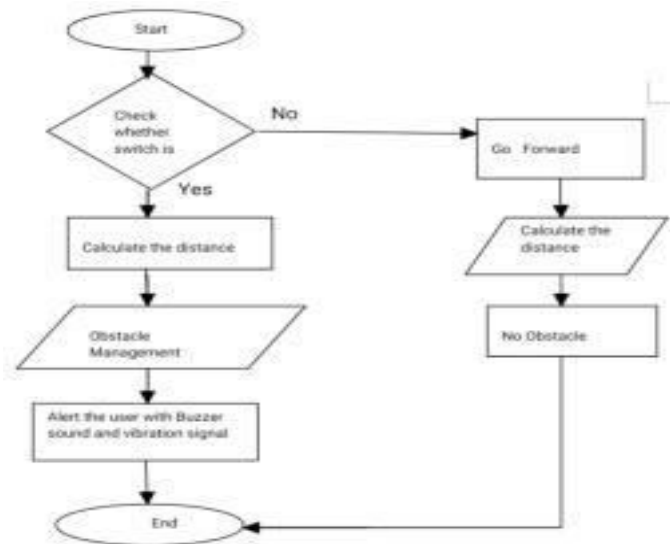
3.2 Implementation of the System

The project is combined with Arduino components, sensors and the alert system (buzzer and vibrator). The Arduino controller is connected within main sensors which plays the key role of the project. The distance calculation sensor (Ultrasonic distance sensor) is connected with Arduino UNO.

Fig 3.1: Working of Proposed system

3.2.1 Working Components:

1.Ultrasonic sensor:

An ultrasonic sensor is an electronic device that will measure the distance of an object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound.

2.Arduino Uno:

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits. To do so we use the Arduino programming language (Wiring), and the Arduino Software (IDE).
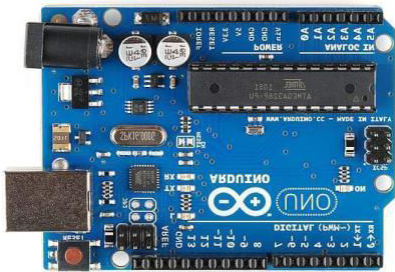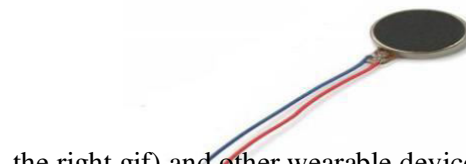
3.Buzzer:

The buzzer uses the piezoelectric effect of the piezoelectric ceramics and uses the pulse current to drive the vibration of the metal plate to generate sound. Piezoelectric buzzer is mainly composed of multi-resonator, piezoelectric plate, impedance matcher, resonance box, housing, etc.

4.Vibrating motor:

the right gif) and other wearable devices. They are widely used to provide the user with discrete alerts, precision alarms or haptic feedback.

A coin vibration motor may be used in applications such as the smart watches, fitness trackers (as shown in

3.3 Working of proposed system:

1. This goal is achieved by using the ultrasonic sensor and the calculation to find the distance using the echo transmission duration.
2. implementation of alert system using buzzers and the vibration motor. This also includes the switch which is helpful to handle the whole control of the product in order to avoid 24/7 working of the implemented system.
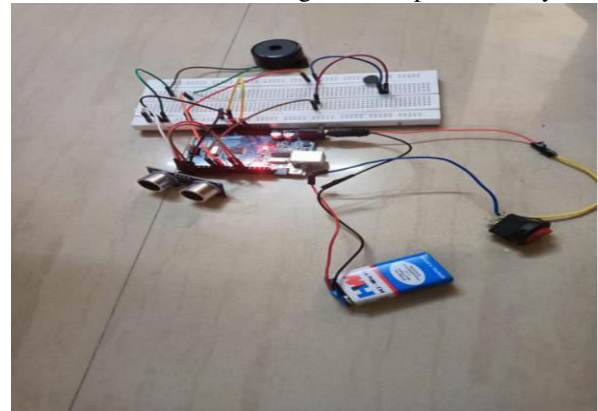
Fig 3.2: Implementation of proposed system

3. Using the distance calculation in the module 1, the tones and the frequency levels of both buzzer and vibration motor differs.
4. The buzzer sounds keep on toning from low to higher tones based on the distance between barrier and user.
5. The vibration motor provides pattern vibrations when the barrier is far and ends up with providing continuous vibration when the barrier is near.
6. The final module provides the complete proposed solution by inserting the prepared hardware into the gloves. This also ensures that the gloves are comfortable and convenient wearables that provides the efficient solution for the safety of the impaired people.

3.3.1Assembly

The parts assembly as shown in the Arduino Uno is connected to the ultrasonic sensor. Breadboard connects all the components on it acting as a base and power distributor. The glove on and off are stated with the help of the switch. When the switch is off, gloves doesn't work. portability was made to save the battery life. Similarly, when the switch is ON which states that the gloves is in working state, it detects the obstacles

from distance continuously. Once we find   distance   user is indicated with sounds and vibration signals   with the help of vibrating motor and buzzer.
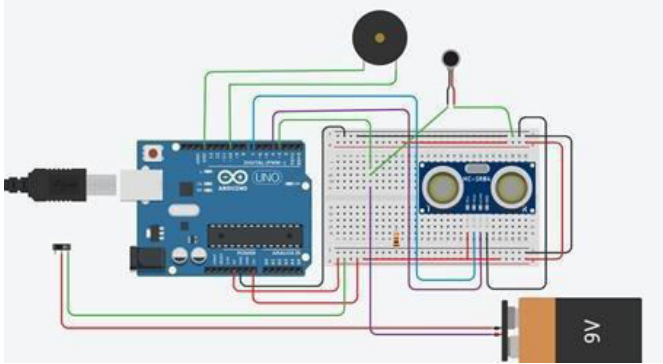

Fig 3.3: Circuit Diagram of Proposed System

3.4 Distance Calculation:

As the distance calculation is based on the ultrasonic sensor, it is important to know that the module has two eyes like projects in the front which forms the Ultrasonic transmitter and Receiver. The ultrasonic transmits an ultrasonic waves which travels in air and reflects back when objected by any material. The sensor works with the formula of

$$Distance = Speed \times Time$$

This goal is achieved by using the ultrasonic sensor and the calculation to find the distance using the echo transmission duration.

$$Duration = pulseIn(echoPin, HIGH)$$

$$Distance = (duration/2) / 29.1$$

3.5 OUTPUT

OUTPUT1:

At a case, when the switch is ON and there is no obstacle in front of the user then we don't get any buzzer sound or alerts.

OUTPUT 2:

At a case, where the switch is ON and there is an obstacle In front of the user. The output screen shows the distance calculated between user and the hurdle.
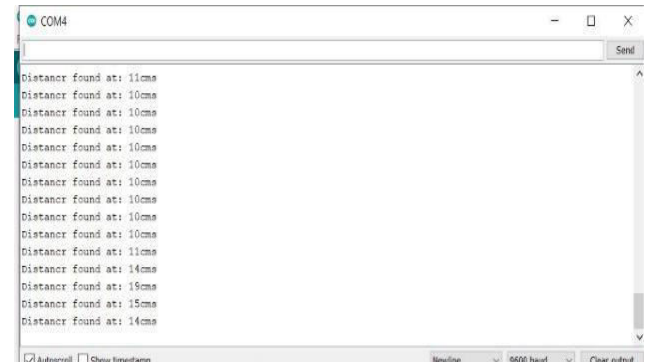

Fig 4.2: When the obstacle is there(Detects distance)

OUTPUT 3:

If we OFF the switch. It won't work

IV.   Advantages of the System

- This gloves can be useful for both blind and deafblinded people.
- Cost effective and easy to maintain by everyone.
- Vibrations can make a person to react faster if they were thinking out of mind. gjch
- The detection and alerts given to the user regarding the barriers The proposed system helps to detect the obstacles on the way using the ultrasonic sensor. The control of the device is solely handled by the blind/deaf people with respect to the situations re totally depended upon the distance between the person and the barrier.

V.CONCLUSION

This proposed system is an attempt to progress toward the convenient life of impaired people. The designed blind gloves work efficiently with low power rechargeable battery. It can help the visual and hear impaired person appreciably in guiding in their way. It also provides an efficient light weight and low cost with low maintenance device as a wearable to avoid accidents. The main objective of the project is to make the impaired people feel that they are no different with normal people and help them to lead their life independently.

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