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Third Eye for the Blind using Ultrasonic Sensor

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Abstract: *The "Third Eye for Blind with Ultrasonic Glove" is made up of parts such as an Ultrasonic sensor, Watersensor, switch, GSM, buzzer, and vibration motors and is intended to help the blind overcome their lack of vision byemploying other senses like sound and touch. It alerts the user of impending obstacles using audio and vibration cues. The frequency of the auditory and vibration messages rises as the distance between the glove and the obstruction decreases. Consequently, the technologyaids in making navigating easier for thosein need. The sensor module uses ultrasonic waves to calculate an object's length to estimate distance using the SONAR or RADAR principle. The fire is thus discovered by the Flame sensor. The system has a buzzer as well to produce analarm sound. The system also includes a GPS and camera for locating and gathering photos and videos of those who are blind.*

Keywords: Ultrasonic sensor, Global Positioning System (GPS), visuallyimpaired, gloves.

I. INTRODUCTION

One of the most significant features of human physiology is the ability to see. We can see the world around us through oureyes. The estimated 285 million visually impaired people around the world, or 39 million people, are regarded to be blind [1], according to a study published by the WorldHealth Organization (WHO). 82% of blind people are 50 years of age or older [2]. Also, 90% of people who are blind or visually impaired reside in developing countries [3]. The first navigational aid designed exclusively for blind people was a walking stick [4]. GPS is also included inthe glove. However, using it has drawbacks like expense, lengthy training, and a lack of necessary skills. Technical advancements have made it possible to construct and design Smart gloves that allow blind people to freely navigate. To develop such smart gloves, numerous investigations have been carried out.

By detecting obstructions in their path usingultrasonic waves and notifying users with a buzzer sound or vibration, the Third Eye forthe Blind is a technological advancementthat enables blind people to navigate with more confidence and speed. All they need todo is wear it as bracelets. It was intended to assist blind people in making up for their lack of vision by employing their other senses, such as touch and hearing. It alerts the user of impending obstacles using audio and vibration cues. The sensor module isused to estimate the distance using the SONAR or RADAR concept, which usesultrasonic waves to calculate an object's distance. So, technology aids in making navigating easier for those in need. The system has a buzzer as well to produce an alarm sound.

II. PROBLEM STATEMENT

Blind people encounter significant issues throughout the world. Their perception of impairment and how they perceive the world around them is their main issue. Theystruggle with people being hesitant to help them or provide services. A lot of individuals also do not know how to interactwith blind people. Blind people require encouragement to believe in themselves, their capacity for greatness, and their independence from others. To deal with the blind without disclosing their impairment, several nations have created a variety of rules and legislation. Also, certain businesses and organizations have begun to train and hire people who can work with theblind. Also, many businesses have created specialized tools used by the blind to assist them, and a blind person hides a lot of feelings behind his eyelids that we cannot see.

The project's scope is established to meet the goals. Ultrasonic sensors will be employed in the hardware a sensor to identify front-facing obstructions, and it willtransmit a signal to the Arduino UNO, which serves as a microcontroller. After processing the data, the microcontroller will send the signal to the servo motor, which will direct it through vibrational feedback. When it comes to the software, the circuit isdesigned using Fritzing, and the program is written using Arduino, which is installed using the Arduino library. Moreover, this results in Autonomous mobility; an

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accessible location; an easy phone number to use in an emergency; and a better approach to getting to know the neighborhood.

III. LITERATURE SURVEY

EMBEDDED SMART GLOVE USING ULTRASONIC AND FLAME SENSORS FOR HELPING VISUALLY IMPAIRED PEOPLE

Visually impaired is someone's condition oflacking visual observation due to neurological and physiological factors. Also, wildfire and coronavirus cases made the situation worst for visually impaired people. A helping tool is very needed to overcome these problems. Smart glove system prototype based on Arduino UNO microcontroller, The fire/flame sensor also works well when using fire detection mode for detecting the small fire from matches or lighter at a distance of about 15 cm or big fires from burnt paper at a distance of about 20 cm and will be sending a short message to the respected person through SIM800L GSM.

DESIGNING AN ULTRASONIC SENSOR STICK PROTOTYPE FOR BLIND PEOPLE

This tool can be used to detect obstacles for blind people. This tool also uses the HC- SR04 ultrasonic sensor. The method used in the manufacture of blind assistive prototypes in the form of sticks using Arduino and Ultrasonic Sensors for blindpeople with the method obtained by hardware design techniques used consists ofATMEGA328 as the main controller, Ultrasonic sensor, this study has produced a prototype design stick for blind people using sensor technology to help alert and move blind people who can detect objects ata minimum distance of 7 cm with output in the form of sound and vibration. Theresulting stick has a frame consisting of 0.5-inch PVC material consisting of two parts, the stick rod, and the sensor unit.

NAVIGATION FOR THE BLIND USING A WIRELESS SENSOR HAPTIC GLOVE

This blend is based on a wireless sensor network coupled with a haptic feedback glove. The system uses Received Signal Strength Indicator (RSSI) to continuously triangulate the prototype indoor navigation system, the system uses the Received Signal Strength Indicator (RSSI) to continuously triangulate the position of the Vision Impaired (VI) person.Several most relevant destinations can beassigned to pushbuttons on a haptic glove. Upon receiving input from the user via a pushbutton indicating the desireddestination a path is routed. To aid in traversing to the destination the individual wears the haptic feedback glove embedded with vibrational.

IV. PROPOSED SYSTEM

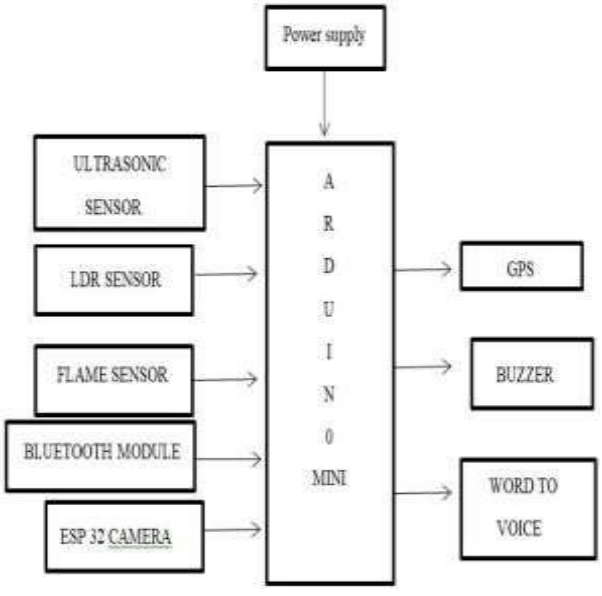

Fig 1. Basic block diagram of an Third Eyefor Blind with Ultrasonic Glove

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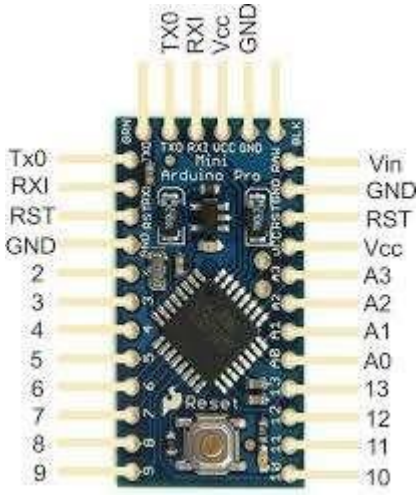
This Glove allows visually challenged people to navigate with ease using today's technology. The glove is integrated with theultrasonic sensor which detects nearby obstacles & also with an LDR sensor & Flame sensor. Here we use the Arduino mini as the microcontroller which processes the data. It sends the signal to the buzzer and the Bluetooth module helps to send the signal to the GPS. Here we use the ESP 32 CAMERA which captures the image and video. There is also a special feature weattached to the glove which converts the word to voice.

4.1 ARDUINO UNO

The Arduino Mini is a small microcontroller board based on the ATmega328P microcontroller. It is similar to the Arduino Uno in functionality, but it is much smaller in size and has a few differences in its features.

The board has 14 digital input/output pins, eight analog inputs, a 16 MHz quartz crystal, a power jack, and an ICSP header. However, it does not have a USB connection, which means that you need an external programmer to upload code to the board. It also has a smaller form factor, making it ideal for projects that require a compact design.



4.2 ULTRASONIC SENSOR

An ultrasonic sensor is a device that uses sound waves to measure distances between objects. It works by emitting high-frequency sound waves (typically around 40 kHz) from a transmitter and then listening for the echo reflected from objects in front of it. The time delay between the transmitted signal and the received echo is used to calculate the distance to the object. Ultrasonic sensors are commonly used inrobotics, automation, and industrial applications for distance measurement.

4.3 GPS

GPS stands for Global Positioning System. It is a satellite-based navigation system that provides location and time information anywhere on Earth. The system consists of a network of 24 satellites orbiting the Earth and a GPS receiver that can communicate withthese satellites.

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4.4 HC 05 BLUETOOTH MODULE

The HC-05 Bluetooth module is a small electronic device that enables wireless communication between two devices using Bluetooth technology. It is commonly used in DIY electronics projects and robotics to wirelessly control or communicate withother devices. The HC-05 module uses Bluetooth version 2.0 and is based on the CSR BC417 chip. It has a range of up to 10 meters and can support data transfer rates ofup to 2.1 Mbps. The module can beconfigured as either a master or slave device, allowing it to connect to other Bluetooth-enabled devices such as smartphones, tablets, and computers.

4.5 BUZZER

A buzzer is an electronic device that produces a buzzing or beeping sound when an electrical current is passed through it. It consists of a piezoelectric element that vibrates when an alternating current is applied to it, producing a sound wave in the audible frequency range. The Buzzers can be found in various types, such as electromagnetic buzzers, piezoelectricbuzzers, and magnetic buzzers, each with its unique features and applications.

4.6 LDR sensor

An LDR (Light Dependent Resistor) sensor is a type of photoresistor that is sensitive to light. It is a passive component, meaning it doesn't require any power to operate, and its resistance changes based on the amount of light it receives When light falls on the LDR, its resistance decreases and when there is no light, its resistance increases. This property makes LDRs useful in many applications where light intensity needs to be measured or controlled. It can be readily incorporated into a variety of electronic projects.

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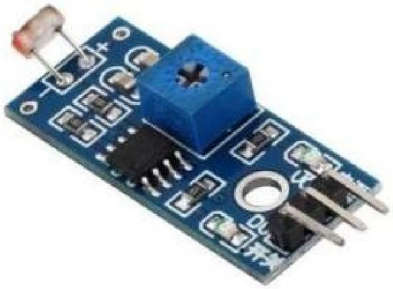

4.7 ESP 32 camera

ESP32-CAM is a small-sized, low-cost development board based on the ESP32 microcontroller and OV2640 camera module. It is designed for applications that require a camera module to capture still or video images and transfer them over a wireless network. The ESP32-CAM board has a built-in Wi-Fi and Bluetooth module that allows it to connect to a wireless network and communicate with other devices. It also has a microSD card slot for storing images and videos, and a 5V power supply port.

V. RESULT AND DISCUSSIONS

A distance glove is a specialized glove that allows blind people use it. people to identify nearby items. These distance glovesare constructed with an Arduino, breadboard, buzzer, servo motor, and ultrasonic sensor. Anyone can create a prototype of an electronic circuit based on a microcontroller using the hardware and software known as Arduino. An input voltage of 7–12V is required for the Arduino Uno board to function. There are
14 digital pins on this board, and six of them serve as pulse width modulation (PWM) pins, which are useful when digital pins need to meet analog needs (Kadir, 2006). The Arduino software allows you to program Arduino; Arduino Sketch is an IDE (Integrated Development Environment) created in the C programming language that you can use to program microcontrollers.

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To compile and upload applications to the Arduino board, utilize the Arduino sketch (Setiawan, 2017). A breadboard is a tiny board made to facilitate the assembly ofelectronic circuits without the use of solder (Kadir, 2006). It is possible to determine the distance between an object and an ultrasonic sensor by employing ultrasonic waves to detect objects nearby. The ultrasonic sensor can measure objects up to three meters awayfrom it (Kadir, 2006). The ultrasonic sensor operates because ultrasonic waves are sent into the air, and when specific things are near the sensor, ultrasonic waves will reflectoff of them. The receiving sensor devicewill pick up the ultrasonic wave reflection.

VI. APPLICATIONS

- Help blind people to easily walk totheir destination..
- Help blind people for obstacledetection.
- Alert blind people about the dig.

VII. CONCLUSION

The results of this research are as follows.

The final distance gloves for blind persons have error percentages of 1.75% forultrasonic sensors or 98.25% accuracy ofdistance accuracy.

The goal of the smart glove for the blind project is to assist the blind in moving around and determining how far obstacles are. An ultrasonic sensor called an Arduino MINI serves as the project's primary component. There are a few benefits andrestrictions to this project based on the experiment that has been done. The utilization of the ultrasonic sensor was one of this project's benefits. Due to its highsensitivity, this sensor will react morequickly to impediments. In addition, this project's development was inexpensive and accessible to blind individuals. This project's restriction was due to the ultrasonicsensor's limited ability to depict the shape ofbarriers; it could only detect them. Moreover, only blind people are permitted to use this assistive glove. Further development can be made to boost this project's performance.

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