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Third Eye for Blind using Ultrasonic Sensor Vibrator Glove

Dr. B. Rambabu, S. Navya, M. Sahithi Vyas, A. Dishendra Sekhar

Department of Electronics and Instrumentation Engineering,
Lakireddy Balireddy College of Engineering, Mylaravam, Andhra Pradesh, India

ABSTRACT

The primary goal of the project is to enable blind people to use an RF remote to find their gloves. This system gives visually impaired individuals walking exceptional security by incorporating a siren and attaching many sensors. Nowadays, individuals prioritize their safety above all else when they are driving, walking, or otherwise moving around. With the help of this system, we can track a blind person's whereabouts using a mobile device and receive emergency alert messages with their precise location. The technology also provides excellent security and shows them how to walk. The system has sensors for stair detection, soil detection, and obstacle recognition so that it may automatically identify impediments and deliver alerts. Using a soil moisture detector is used to find alerts in line with soil moisture levels. So that people may see the proper path while walking on the floor, stairs, and in many other locations, this approach can be very helpful. When an emergency arises, the system can be connected to a microcontroller and notify the appropriate people. A GPS receiver, a microcontroller, and a GSM modem are the components of this tracking system. This information is processed by the microcontroller and forwarded to the appropriate numbers after processing.

KEYWORDS: *blind people, RF remote, security, sensors, emergency alert messages, precise location, stair detection, obstacle recognition, microcontroller, GPS receiver, GSM modem, and tracking system*

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1. INTRODUCTION

Blindness can significantly impact a person's ability to navigate and interact with the world around them. However, recent technological advancements have made it possible to develop devices that can help people with visual impairments to regain some degree of independence. One such device is a third eye for the blind, which uses ultrasonic vibrations to provide sensory information about the surrounding environment.

The third eye for the blind consists of a glove with ultrasonic vibrators attached to the fingertips. The vibrators are controlled by a microcontroller, which receives input from an ultrasonic sensor mounted on the back of the glove. The sensor emits ultrasonic waves that bounce off objects in the surrounding environment and are detected by the sensor. The microcontroller then converts this information into vibrations that are transmitted to the fingertips of the glove.

When a blind person wears the glove, the ultrasonic sensor sends out a signal that bounces off objects in the environment and returns to the sensor. The sensor then sends this information to the microcontroller, which converts it into vibrations. These vibrations are transmitted to the fingertips of the glove, providing the wearer with a sense of the objects in their surroundings. For example, if there is a wall nearby, the wearer will feel a strong vibration in their fingertips, indicating the presence of the wall.

2. LITERATURE SURVEY

Several systems are connected to the development of projects for the blind and are intended to improve the effectiveness of the system. Thanks to this literature research, we have successfully addressed numerous design and software improvements. explains a better method for blind folks to navigate. It's possible that the smart stick can help you get around several obstacles. Blind people are unable to participate in daily activities such as going on walks, exercising,

talking to friends and family, and doing daily activities. The approach can therefore help people participate to show that they are willing to address this pressing issue. to experience a sense of security and freedom from the excitement of an unexpected roadside meeting. A visually handicapped person uses a smart cane. An individual can recognize knee-high obstructions and enhance GPS navigation for the user. The position that the user is holding is fixed to the sensors. The development of wearable ultrasonic obstacle sensors is helping the blind and visually impaired by enabling communication through electronic gloves for deaf and blind people. To communicate with others, they used sign language, which is extremely difficult to use and understand because it entails nearly 6000 movements. The hand movements used by the model to communicate the letters and numbers total 26. This will allow deaf people to interact with others by writing messages on the Liquid Crystal Display (LCD) screen and waving their hands The text is changed into speech for the blind to hear and talk.

3. HARDWARE DESCRIPTION

Components used in the third eye for the blind using an ultrasonic sensor vibrator glove are:

A. Arduino UNO

Arduino UNO is a popular microcontroller board based on the ATmega328P microcontroller. It has 14 digital input/output pins, 6 analogy inputs, a 16 MHz quartz crystal oscillator, a USB connection, a power jack, and an ICSP header. The digital pins can be used for both input and output, and they can also be used to control PWM (Pulse Width Modulation) signals. The analogy inputs can measure a voltage in the range of 0 to 5 volts, and they can be used to read values from sensors such as temperature sensors, light sensors, and potentiometers.

The Arduino UNO board is easy to use and program, even for beginners. It has a built-in programming environment based on the Processing language, which is simple and intuitive. The code is written in the Arduino IDE (Integrated Development Environment) and uploaded to the board via the USB connection. The Arduino UNO can be programmed in C or C++, and there are many libraries and examples available online to help with programming.

The Arduino UNO board is widely used for a variety of applications, including robotics, home automation, and prototyping. It is an affordable and flexible platform that can be customized to suit the needs of different projects. The open-source nature of Arduino also means that the design and code are freely available, allowing for collaborative development and innovation. In conclusion, Arduino UNO is a versatile microcontroller board that can be used for a wide range of applications. Its ease of use, affordability and open-source nature make it a popular choice for hobbyists, students, and professionals alike.

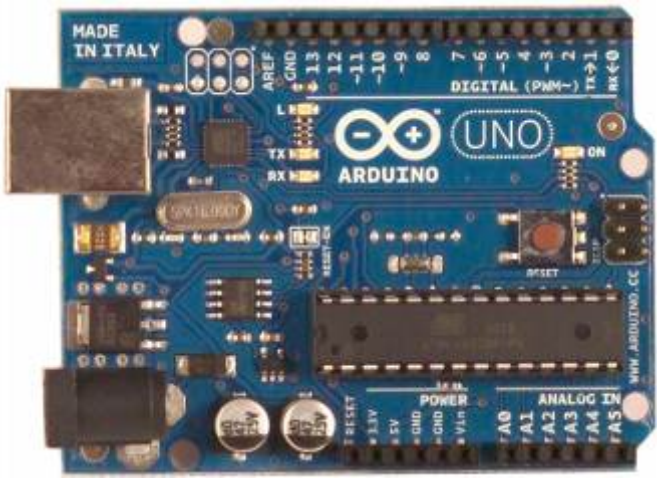

Fig.1: Arduino UNO

B. Ultrasonic Sensor

An ultrasonic sensor is a device that uses sound waves to detect the distance between an object and the sensor. It typically consists of a transceiver, which generates and receives the sound waves, and a control circuit that processes the signal and determines the distance.

The pin configuration of an ultrasonic sensor can vary depending on the specific model and manufacturer. However, a common configuration for a 4-pin ultrasonic sensor is as follows:

- Vcc: This pin is used to provide power to the ultrasonic sensor. It is typically connected to a 5V power supply.
- Gnd: This pin is used as the ground connection for the ultrasonic sensor. It is typically connected to the ground of the power supply.
- Trig: This pin is used to trigger the ultrasonic sensor to send out a sound wave. It is typically connected to a digital output pin of a microcontroller.
- Echo: This pin is used to receive the reflected sound wave from the object being detected. It is typically connected to a digital input pin of a microcontroller.

Fig.2: Ultrasonic Sensor

C. SIM800L GSM Module

- Quad-Band 850/900/1800/1900MHz: It supports a wide range of frequency bands, making it suitable for use in most countries.
- GPRS multi-slot class 12/10: It can handle both GPRS Class 12 and 10 data transfers, which means it can transmit data at up to 85.6 kbps.
- Coding schemes CS 1, 2, 3, 4: The module supports a range of coding schemes for data transfer, which allows for optimized data transmission depending on the network conditions.
- Embedded TCP/UDP stack: The module has an embedded TCP/UDP stack, which allows for easy integration with different types of microcontrollers and systems
- AT command interface: The module has an AT command interface that can be used to send and receive SMS messages, initiate voice calls, and manage data connections.

Fig.3: SIM800L GSM Module

D. Voice Module

A voice module is an electronic device that is used to produce sound or speech in response to an input signal. It typically consists of a microcontroller, a digital signal processor, and a speaker or audio output device.

The voice module can be programmed to play pre-recorded audio files or to generate speech using a text-to-speech algorithm. It can be used in a wide range of applications, including voice alerts, navigation systems, and interactive toys.

The voice module can be controlled using various input methods, including buttons, sensors, and serial communication. It can also be integrated with other electronic devices, such as microcontrollers and computers.

Overall, the voice module is a versatile and useful component for adding audio output to electronic devices and projects.

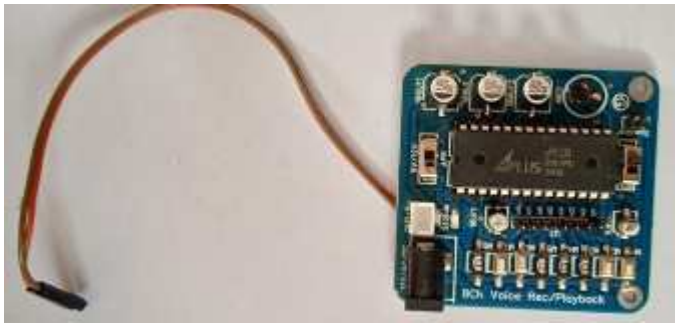

Fig.4: Voice Module

E. Buzzer

A buzzer is an electronic device that produces sound when an electrical signal is applied to it. It is commonly used in various applications, including alarms, musical instruments, and game consoles. The buzzer consists of a piezoelectric transducer that converts electrical energy into mechanical vibrations that produce sound waves. The transducer is typically a small ceramic disc that is sandwiched between two metal plates. When an electrical signal is applied to the buzzer, the disc vibrates at a specific frequency, producing a sound wave. The frequency of the sound produced by the buzzer is determined by the frequency of the electrical signal applied to it. Most buzzers have a resonant frequency that is typically in the range of a few kilohertz to several kilohertz. By varying the frequency of the electrical signal, the pitch of the sound produced by the buzzer can be changed. Buzzers can be activated by applying a voltage to them, either directly or through a transistor or other switching device. They can be driven by a variety of sources, including microcontrollers, timers, or other electronic circuits. In conclusion, a buzzer is an electronic device that produces sound when an electrical signal is applied to it. It consists of a piezoelectric transducer that converts electrical energy into mechanical vibrations that produce sound waves. The frequency of the sound produced by the buzzer can be varied by changing the frequency of the electrical signal applied to it. Buzzers can be activated by applying a voltage to them, and they can be driven by a variety of sources, including microcontrollers and other electronic circuits.

Fig.5: Buzzer

BLOCK DIAGRAM

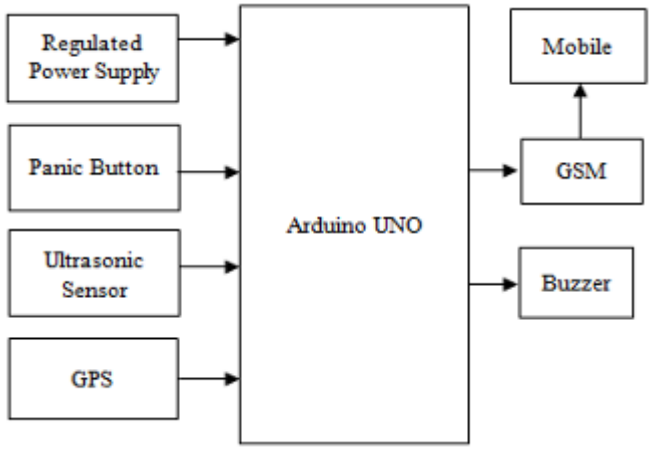

Fig.6: Functional Diagram

WORKING OPERATION

The idea of using an ultrasonic vibrator glove to help blind people "see" through their third eye is based on the principle of echolocation, which is the ability of some animals (such as bats and dolphins) to navigate and detect objects by emitting sounds and analyzing the echoes that bounce back. In this case, the glove would have ultrasonic sensors that emit high-frequency sound waves (above the range of human hearing) and detect the echoes of these waves as they bounce back from nearby objects. The glove would then convert these echoes into vibrations that can be felt by the wearer.

The wearer would wear the glove and move their hand around in the environment. As the ultrasonic sensors detect objects, the glove would generate vibrations on the fingers or hand corresponding to the location and distance of the objects, allowing the wearer to "sense" their surroundings and navigate more effectively. The principle behind this technology is similar to that used in some existing assistive devices for blind people, such as echolocation-based canes or sonar glasses. However, the ultrasonic vibrator glove offers the advantage of being more discreet and providing more detailed feedback through the vibrations, which can be tailored to the user's preferences and needs.

It should be noted that this technology is still in the developmental stage and further research and testing will be needed to determine its effectiveness and practicality.

RESULT

The ultrasonic vibrator glove is a fascinating concept that has been explored by researchers and developers as a tool to help the blind navigate their environment. By emitting high-frequency sound waves, the glove can detect objects in the wearer's surroundings and translate the information into vibrations that are felt by the user. This technology is non-invasive and low-cost, and the use of ultrasonic waves allows for a high level of accuracy in object detection.

Several prototypes of the ultrasonic vibrator glove have been developed and tested, including those from teams at UCLA and the University of Bath. These gloves use ultrasonic sensors and haptic feedback to provide users with a sense of touch and object detection.

The potential benefits of this technology are significant, as it could greatly improve the quality of life for individuals with visual impairments. Continued research and development could lead to the widespread availability and accessibility of the ultrasonic vibrator glove, providing an innovative tool to help the blind navigate their environment.

CONCLUSION

The concept of using an ultrasonic vibrator glove to assist the blind is a promising development in assistive technology. The glove would use ultrasonic sensors to detect objects and obstacles in the user's path, and the vibrating motors would provide feedback on location and proximity. This could potentially improve the independence and safety of blind individuals, enabling them to navigate their surroundings with greater confidence.

Although there are still challenges to be overcome in the development and implementation of such a device, initial testing and research have demonstrated encouraging outcomes. It is imperative that any research or development associated with this technology is conducted with consideration for the experiences and requirements of blind individuals. Furthermore, it is vital that any resulting product is affordable, easily accessible, and safe to use.

FUTURE SCOPE

The future scope of the third eye glove is promising and can be achieved through technological advancements and wider accessibility. Partnerships with organizations and governments can fund and distribute the device to those who need it most. Moreover, potential applications of this technology can extend beyond individuals with visual impairments, such as in construction or industrial work. In conclusion, the third eye glove has significant potential to improve the mobility and independence of visually impaired individuals, and wider distribution and potential applications of the device can enhance safety and accessibility in other industries as well.

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