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Smart Cane for Blind People

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Abstract: ***Through this paper, we are proposing to introduce a smart blind people's stick system for helping the blind community. The system is a suggested solution to enable visually impaired communities to detect obstacles in their path and hazards in front of them while walking. It consists of an ultrasonic sensor, a piezo-buzzer, and a microcontroller (Arduino Uno R3) which will receive the signal from the ultrasonic sensors and transforms it into short pulses to the pins in the microcontroller where the piezo-buzzer is connected. Through this project, our aim is to provide unique and cheap solutions in the form of a stick to the blind community and aid them in their day-to-day tasks. Because of its affordability, it can be made readily available to blind organizations and people in need.***

Keywords: Blind People, Ultrasonic Sensors, Piezo-Buzzer, Smart Cane Stick

1. Introduction

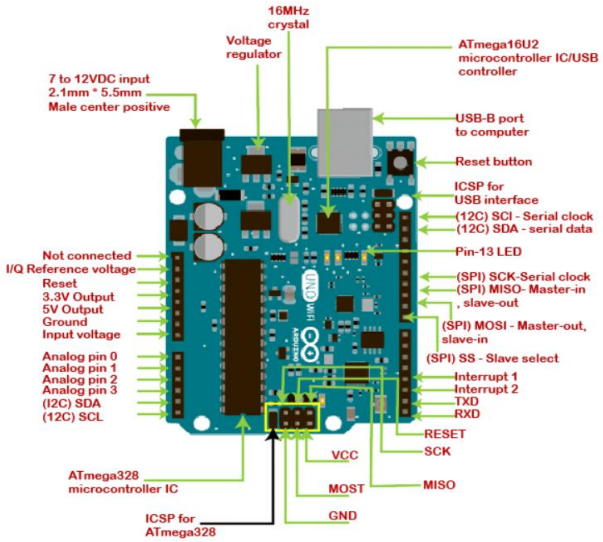
This system for blind people is a cutting-edge stick created for those with visual impairments for better navigation. There are many visually impaired persons in our community, including thousands of people who are permanently blind and countless people who are blind. Daily tasks are problematic for those who are blind or visually impaired because vision is crucial to practically all of our actions. Blind people currently utilize a white stick to guide them as they move or walk. Therefore, we create a tool that is more effective and practical than the typical blind stick and can be used as such.

This will let the blind person walk more easily and will sound an alarm if a hurdle is found within the predetermined distance. A microprocessor, buzzer, and ultrasonic sensor are built into the white cane stick. In the initial step of our suggested project, ultrasonic sensors use ultrasonic waves to find impending obstructions. The sensor sends this information to the microcontroller when it detects impediments. After processing this data, the microcontroller determines whether the impediment is close enough. If the obstruction is not immediately present, the circuit has no effect. The microcontroller sends a signal to activate a buzzer if the obstacle is nearby.

2. Body of Paper

2.1 Hardware

2.1.1Arduino UNO R3

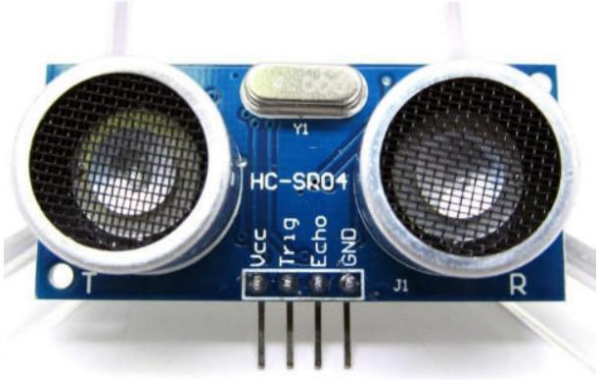


Based on the ATmega328P, the Arduino UNO R3 microcontroller board is used. A 16 MHz ceramic resonator, a power connector, an ICSP (In-Circuit Serial Programming) header, and a reset button add up to 20 digital input/output pins when combined with 6 pins for PWM (Pulse-width modulation) output. It has 1 KB of EEPROM memory, 2 KB of SRAM, and 32 KB of flash memory. The working voltage is 5V, and you may power it by utilising a USB cable to connect to a computer, an AC-to-DC adapter, or even a 9V battery. The word "Uno," which translates to "one" in the Italian language, was chosen to signify the launch of the Arduino IDE 1.0 software. The third and most latest version of the Arduino Uno is called the R3. Due to its friendliness, it is relatively simple to carry out with Arduino and can be used for applications involving light or heavy tasks. In an Arduino, remote pin types like LEDs, a display, motors, speakers, cameras, and sensors can all be used for communication.

It can be used to detect different kinds of objects and generate the appropriate output. The Interaction Design Institute Ivrea (IDII) in Italy is where the Arduino project had its beginnings. The project's objective was to provide easy, inexpensive tools for non-engineers to use in the creation of digital projects. Both a physical programmable circuit board and software used to create and upload

computer code to the board are components of the Arduino platform. With good cause, the Arduino platform has been fairly popular with individuals. A USB cable is all that is required to load the code. One of the more well-liked Arduino boards and a wonderful option for novices is the Uno.

2.1.2Ultrasonic Sensor



An ultrasonic sensor is a piece of technology that uses ultrasonic sound waves to measure a target's distance and then turns the sound that is reflected back into an electrical signal. The speed of the ultrasonic waves is higher than the sound's audible frequency (the sound that humans can hear). The sensor measures the amount of time that passes from the moment the sound is emitted by the transmitter until it makes contact with the receiver in order to determine the distance between the object and the sensor. The Arduino board will notify the user of the things in front of them using the program, and based on the defined distance, this will eventually cause the buzzer to ring. The sensor module will compute the distance and communicate this data to it. Both a transmitter and a receiver are necessary for an ultrasonic sensor. Usually, these are positioned as closely as possible to one another. Sound moves in a straight line from the transmitter to the detected object and back to the receiver when the transmitter and receiver are close to one another.

2.1.3 Piezo Buzzer

A Piezo Buzzer is a piece of technology that generates a tone, alert, or sound. It has a lightweight, straightforward design, and is often a cheap item. Its application was made possible by an inversion of the piezoelectricity principle, which Jacques and Curie discovered back in 1880. They discovered that certain materials could produce electricity when mechanical pressure was applied to them, and the opposite was also true. The piezo buzzer emits an audible sound when piezoelectric materials are subjected to an alternating field of electricity. The buzzer begins warning the user of any obstructions in front of them as soon as sensors pick up any things in front of them.

Piezo buzzers, as opposed to magnetic buzzers, can function between 3V and 250V. In comparison to magnetic buzzers, piezo buzzers use less power.

2.2 Working

We combine an ultrasonic sensor with an Arduino Uno R3 microcontroller, a buzzer, a battery, a switch, and some wires to create this blind stick system. The microcontroller (Arduino Uno R3) is connected to the sensors and other components, and every connection is made through the wire. When an ultrasonic sensor detects an obstruction using ultrasonic waves, the sensor sends the information to the microcontroller. The microcontroller is programmed to detect these signals using the code. This code is easily modifiable for changing the distance to the obstacle before the buzzer starts beeping. The microcontroller then analyses this data and determines whether or not the impediment is close enough. If the obstruction is not immediately visible, the circuit has no effect. The microcontroller sends a signal to sound the buzzer, which subsequently begins beeping if the obstruction is close to it.

3. Conclusions

At this point, it is important to note that the study's primary objective, which was to create and implement "A smart walking white cane for supporting blind persons," was fully accomplished. The Smart Stick serves as a core framework for the next era to support the blind and visually impaired in safely navigating both indoor and outdoor environments. It is both cost-effective and convenient. A cost-effective solution is required in developing nations so that the majority of the population can own the product suggested in this article. They can sense impediments around them and be warned of dangers in their path thanks to the technology built into this work.

Additionally, the system takes precautions to guarantee their safety. The goal of this project is to make it easy for all blind individuals to walk wherever they wish. It is employed to assist blind persons with disabilities in moving more easily and safely. By including sensors that can identify barriers like cars, walls, and other obstructions, we are striving to minimize the issues and challenges faced by blind individuals, which sets our solution apart from other solutions. This stick has many functions, including quick obstacle detection and customizable obstacle detection ranges to suit individual needs. This stick is lightweight, manageable, and simple to employ.

4. Acknowledgement

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of Engineering, Ahmedabad for sharing their pearls of wisdom with us during the course of this research.

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