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SMART STICK FOR ASSISTING BLIND PEOPLE

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ABSTRACT

The project is introduce a smart stick system for assisting blind people. The smart stick comes as proposed solution to enable visually impaired people to find difficulties in detecting obstacles and dangers in front of them during walking and to identify the world around. The system is designed to act like an artificial vision and alarm unit The system consists of two sensors: ultrasonic sensor, and water sensor, microcontroller (NODEMCU) to receive the sensor signals and process them to short pulses to the NODEMCU pins where buzzers, alarms are connected, And also we connect emergency button to a NODEMCU, We seek in our project to provide a smart stick affordable and suitable for most blind people, and also it is light in weight. It can be ma de available to all segments of the society and their families who need them.

INTRODUCTION

When we cannot rely on our own sight, navigating in an unfamiliar area becomes a significant difficulty.

Blind persons improve their sense of hearing to locate dynamic impediments because they frequently make sounds while moving.
The most popular mobility assistance for people who are blind is the white cane. It does not, however, provide information on barriers that are higher than knee level or farther away than 2 metres.
Even though blind people's first companions were guide dogs, technology later on became extremely important. To assist the blind, elbow canes, walking sticks with changeable lengths, were manufactured for the market. These initiatives did not entirely succeed in helping the user, nevertheless.
To alleviate these issues the Smart electronic aid is designed in such a way that it includes an Ultrasonic sensor for Obstacle detection, supported with heat and water detection. In this system buzzer are used to inform about the moving obstacles. The intensity of vibration depends on the speed of the moving obstacles.

HARDWARE SPECIFICATION ULTRASONIC SENSOR

The HC-SR04 ultrasonic ranging module has a range of 2 to 40 cm with a 3 mm precision. Ultrasonic transmitter, receiver, and control circuit are all included in the modules.

1. Using an IO trigger for a high level signal of at least 10us
2. The Module automatically transmits eight pulses at 40 kHz and checks for a pulse response.
3. If the signal is returned through a high level, the time between sending and receiving an ultrasonic signal is known as the output IO duration. Test distance is equal to (high level time x sound velocity (340M/S) / 2)

INTERFACING PINS:

5V source Pulse Trigger Input output of the echo pulse 0V Ground

An ultrasonic wave was generated by an ultrasonic transmitter in a single direction, and timing began as soon as it launched. As ultrasound propagated through the air, it would immediately turn around if it ran into any obstructions. When the ultrasonic receiver finally caught the reflected wave, time would stop. Given that the air's ultrasonic spread velocity is 340 m/s, we may determine the distance (s) between the obstacle and transmitter using the formula s = 340 t / 2, which is known as the "time difference distance measurement principle."

The method for estimating the distance between an obstacle and the transmitter involved using the already-known air spreading velocity, timing the time from launch to reflection when it came into contact with the obstacle, and calculating the distance using the time and velocity. Radar and ultrasonic distance measurement operate on the same principles.
L = C X T is the formula for measuring distance. L stands for the measured distance, C for the air's ultrasonic spreading velocity, and T for time (which is half the time between transmission and reception).

FIRE DETECTOR SENSOR

A flame detector is a sensor created to recognise the presence of a flame or fire and act accordingly, enabling flame detection. Depending on the installation, possible responses to a flame detection include sounding an alarm, turning off a fuel line (such as a propane or a natural gas line), and turning on a fire suppression system. Their function in applications like industrial furnaces is to certify that the furnace is lighted properly; they don't do anything else specifically in these situations other than alert the operator or control system. Due to the techniques it employs to detect the flame, a flame detector frequently has a faster response time and more accuracy than a smoke or heat detector.

WORKING PRINCIPLE

The infrared flame flash method is used in this sensor/detector, which can be constructed using an electronic circuit utilising a receiver like electromagnetic radiation. lets the sensor to operate through an oil, dust, or water vapour layer that would otherwise be frozen.

WATER SENSOR

A switching device that is used to detect rainfall or water flow is a water sensor.

The sensor operates on a switch-like mechanism, with the switch being generally closed whenever it rains or there is water present.

It only displays resistance when exposed to moisture. For instance, when it is dry, it resists more, and when it is wet, it resists less.
The water sensor board and module are displayed below. This board essentially uses the resistance principle and has nickel plated lines. With this sensor module, you may measure moisture using analogue output pins, and when the moisture threshold is exceeded, a digital output is provided.

Because it has a PCB and an electrical module, this module is comparable to the LM393 IC. The raindrops are captured here using PCB. Rain produces a puddle on the board when it hits it. parallel resistance path to calculate through the operational amplifier.

SPECIFICATION

- The double-sided material used in this sensor module is of high grade.
- Oxidation and anti-conductivity with prolonged use
- This sensor's area is 5 cm by 4 cm, and it can be constructed with a nickel plate on the side.
- A potentiometer can be used to change the sensitivity.
- 5V is the necessary voltage
- The little PCB is 3.2 cm by 1.4 cm.

- It uses bolt holes for a straightforward installation.
- A broad voltage LM393 comparator is utilised
- The output of the comparator is a clean waveform and driving capacity is above 15Ma

BUZZER

A buzzer or beeper is a mechanical, electromechanical, or piezoelectric audio signalling device. Buzzers and beepers are frequently used as alarm clocks, timers, and to validate human input such a mouse click or keystroke.

In computers, printers, copiers, alarms, electronic toys, automotive electronics, telephones, timers, and other electronic products for sound devices, buzzers are a common integrated structure of electronic transducers and DC power supplies.

5V active buzzer Rated power can be directly connected to an ongoing sound. This section's sensor expansion module and the board, when used together, can finish a straightforward circuit design, enabling "plug and play."

A buzzer or beeper is a mechanical, electromechanical, or piezoelectric audio signalling device. Buzzers and beepers are frequently used as alarm clocks, timers, and to validate human input such a mouse click or keyboard. It produces a steady single tone sound just by applying D.C voltage.

This type can be employed in situations when huge sound levels are required by using a properly built resonant system. Many of the most popular types are kept in stock at Future Electronics and are arranged by type, sound level, frequency, rated voltage, dimension, and packaging type.

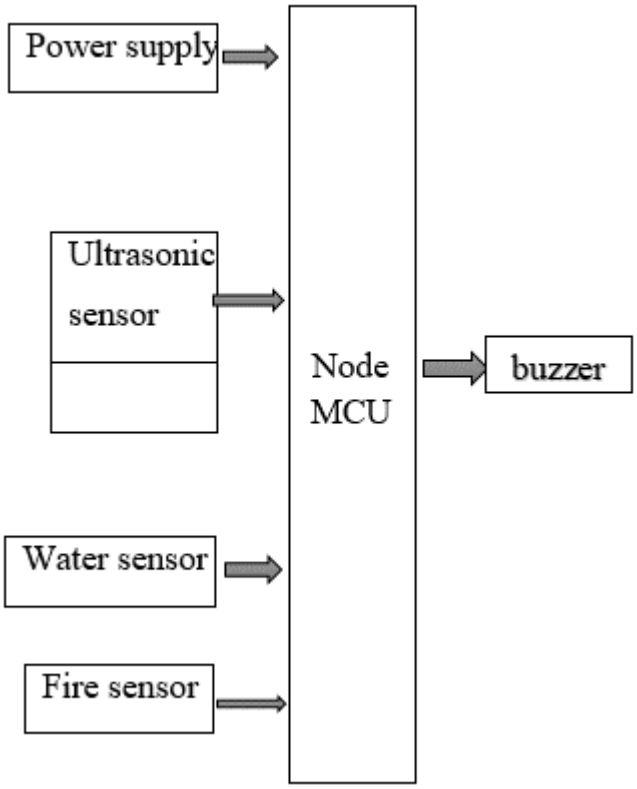
EXISTING SYSTEM

The smart stick is essentially an embedded system that integrates the following: two ultrasonic sensors that can detect impediments up to 400 cm in front of the blind person, from the stick's head level to the ground. The microcontroller will sound a buzzer after processing.

PROPOSED SYSTEM

The suggested smart stick method consists of an embedded system that integrates the following: a pair of ultrasonic sensors to detect obstacles in front of the blind from ground level height to head level height of the stick up to 200 cm ahead, a fire sensor to detect fire, and a water sensor to detect puddles. The microcontroller receives the real-time data from the sensors and processes it. The buzzer will be turned on by the microcontroller after processing.

SYSTEM BLOCK DIAGRAM



WORKING METHODOLOGY OF THIS SYSTEM

The three modules that make up the smart electronic aid are water detection, fire sensor, and obstacle detection. Utilising an ultrasonic sensor, an obstruction in front of the user is detected.

The distance is given in centimetres, and the buzzer warns the blind person in accordance with that measurement.
The purpose of a water sensor is to detect and measure water. connecting a node to a water sensor MCU is an excellent way to find water. degree, etc. It has the ability to detect the presence, the level, and the amount of water. We will attach the water sensor to a digital pin on the node MCU and use an LED to indicate when the water sensor makes contact with a source of water.

We utilise two metallic plates under the stick as the water sensor, and when water meets the stick, the buzzer turns on. The fire sensor is used to locate fires since it is highly sensitive to heat and can locate fire from great distances.

The buzzer will start warning if the sensor detects heat radiation and sends an electrical signal to the controller.

CONCLUSION & FUTURE SCOPE

A new concept for a smart electronic guiding stick for the blind was suggested in the project, along with its design and architecture. The system's advantage is that it may prove to be a very affordable option for millions of blind people around the world.

The proposed integration of multiple functional elements creates a real-time system that offers feedback, enhancing the security and safety of navigation. Flame detector sensors can be added to the system to inform people to flee fire mishaps.
The long-range target objects can be found using the radar's basic operating principles. A blind individual can take the tablet for his health problems by recognising the colour of the tablet package. Using colour recognition software will help you accomplish this.

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