

Arduino Based Smart Blind Stick

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Abstract: *In today's world, there are a huge number of visually impaired people who find difficulties detecting obstacles in front of them, while walking in the street, which makes it dangerous. The smart stick comes as a proposed solution to enable them to identify the world visually impaired people suffer from serious visual impairments preventing them from travelling independently. Accordingly, they used a variety of tools and techniques to provide assistance in their mobility. One of these techniques is to get trained by orientation and mobility specialist who help them to move on their own independently and safely depending on their other remaining senses. Which is very costly and not all can afford. Many techniques have been developed to enhance the mobility of blind people which rely on signal processing and sensor technology. These devices have a similar operation the radar system that uses ultrasonic waves or sonar in order to detect the obstacles. The distance between the person and the obstacles is measured by the time the wave travelled. However, all these pre-existing systems just informs the blind person of the presence of an object which is present at a certain distance in front of or near to them. Information about the object characteristics would provide an additional knowledge to the blind..*

Keywords: Blind Stick

I. INTRODUCTION

According to the World Health Organization (WHO), 285 million people are visually impaired worldwide, 39 million are blind and 246 have low vision. About 90% of the world's visually impaired live in developing countries.

Blindness is a very common disability throughout the world. This smart stick comes as a proposed solution to recognize the world. Now a days, visually impaired person are suffering from various critical visual impairments which are preventing them from travelling independently. Accordingly, they need to use a wide range of tools and techniques to help blinds in their mobility. One of the technique is orientation and mobility specialist who helps the visually impaired and blind people and trains them to move on their own safely depending on their other remaining senses.

Recently, various ways have been created to improve the portability of visually impaired individuals that depend on signal handling and sensor innovation. In any case, all current frameworks illuminate the visually impaired regarding the presence of an item at a particular distance before or close to him. Data about the article qualities can make extra information to improve space sign and memory of the visually impaired. To conquer the previously mentioned constraints, this work offers a straightforward, proficient, configurable electronic direction framework for the visually impaired and outwardly impeded people to help them in their portability paying little mind to where they are, open air or indoor.

The creativity of the proposed framework is that it uses an implanted vision arrangement of three basic ultrasonic sensors and unites all intelligent signs to classify a snag through PIC microcontroller (Arduino Uno). Consequently, notwithstanding distance the proposed direction framework empowers the assurance of two fundamental attributes of the hindrance which are material and shape.

II. AIM OF THE PROJECT

There are many devices for visually impaired people. This project is also an attempt to develop an aid for visually impaired persons. This project is a smart stick which is capable of detecting any obstacle, detect water and corners and even allow the user to find the stick if anyhow missed by the user by pressing a remote switch. The device is designed with an intention to sort out common issues faced by the blind people while using traditional sticks. With the electronics embedded within the stick, it became a smart stick with the functionalities mentioned stated as:

- To assist the visually impaired individuals with exploring the course at their best.
- To lessen the gamble of wounds and losses for the outwardly disabled individual.
- To make practical programming for the outwardly impeded individual.

III. WORKING

The Arduino board at the smart stick manages the functionality of the entire device. The board manages the following four functions implemented in the project.

3.1 Obstacle Detection

The deterrent identification is finished by the Ultrasonic sensor. For perusing information from the ultrasonic sensor, an initial heartbeat must be shipped off the trigger pin of the sensor, and afterward, the simple voltage is perused from the reverberation pin. The simple voltage is changed over entirely to computerized perusing utilizing the inbuilt ADC channel and switched over completely to separate estimation utilizing the formulae expressed previously. On the off chance that the distance estimated by the ultrasonic sensor is identified under 10 cm, a HIGH heartbeat is passed at the pin associated with the bell. The beat goes on for a limitless time frame until the client moves away from the obstruction.

3.2 Light Detection

The light recognition is finished by the LDR sensor and is utilized to recognize the dull spots. The sensor associated with a voltage divider circuit yields an analog voltage at the connection point regulator pin. The simple voltage is perused and digitized utilizing an inbuilt ADC channel. The analog Read() capability is utilized to peruse simple voltage at the regulator pin.

3.3 Water Detection

The moisture sensor works by setting off the foundation of the exchanging semiconductor. At the point when the stick steps on water, the metal strips are short circuited by the water setting off a heartbeat at the foundation of the semiconductor. As the semiconductor is set off, the VCC at the gatherer pin is shorted to the ground through the producer pin and a LOW logic is passed at the pin 3 of the Arduino.

3.4 Stick Location Detection

If in any case, the user loses the stick, he can press the remote switch which set the D3 piece of the RF encoder to HIGH. A similar rationale is handed-off at the D3 piece of the RF decoder and passed to stick 8 of the Arduino. On getting a HIGH rationale at the pin, the Arduino sends a heartbeat at the ringer which goes on for a variable span contingent on the distance of the remote from the stick.

IV. TECHNOLOGICAL SPECIFICATION

- Arduino Uno
- Ultrasonic Sensor
- Moisture Sensor
- LDR Sensor
- Buzzer

4.1 Arduino Uno

The Arduino Pro Mini is a microcontroller board in light of the ATmega328. It has 14 computerized input/output pins (of which 6 can be utilized as PWM yields), 6 simple information sources, an onboard resonator, a reset button, and openings for mounting pin headers. A six-pin header can be associated with an FTDI link or Sparkfun breakout board to give USB power and correspondence to the board. The Arduino Uno is planned for semi-super durable establishment in items or shows. The board comes without pre-mounted headers, permitting the utilization of different sorts of connectors or direct patching of wires.

It is modified by Arduino IDE utilizing implanted. The Hardware board is advanced via Italy-based absolutely equipment association, Arduino.

Every one of the 14 computerized pins on the Pro Mini can be utilized as info or result, utilizing pinMode, digitalWrite, and digitalRead capabilities. They work at 3.3 or 5 volts (contingent upon the model). Each pin can give or get a limit of 40 mA and has an inner draw-up resistor (separated naturally) of 20-50 kOhms.

4.2 Ultrasonic Sensor

The ultrasonic sensor deals with the rule of reverberation of sound waves. At the point when a HIGH beat of 10 u sec is passed to the trigger pin of the sensor, it sends eight 40 KHz rushes of HIGH Sonic Pulse shots one after the other. A High heartbeat signal is out from the reverberation pin as the ultrasonic wave is sent. This wave, while crashing into a hindrance, is reflected back and recognized by the sensor.

On distinguishing the wave once more, the High heartbeat signal from 16 the reverberation pin of the sensor is ended. The sign got from the reverberation pin is simple in nature. The separation from the snag can be estimated by estimating the high season of the reverberation pin. This is the time between the transmission and reflection back of the sonic wave.

4.3 Moisture Sensor

It is built on the principle of water being a good conductor of electricity. Two strips of metal connected to the stick base and also 1 mm above the stick base. The metal strip over the foundation of the stick is associated with the foundation of a BC-548 exchanging semiconductor and one more metal strip joined at the foundation of the stick is associated with a potentiometer interfacing with the ground. The potentiometer helps in aligning the moisture sensor.

The collector pin of the semiconductor is associated with the pin 3 of the Arduino board and the VCC. The producer of the semiconductor is grounded. At the point when the water is identified, the foundation of the semiconductor is set off and the VCC at the pin 3 of Arduino is short circuited to the ground. In any case, the pin continues to get a HIGH logic.

4.4 LDR

The LDR sensor is utilized to distinguish the dim and lit places. The LDR sensor is associated with the A0 pin of the Arduino board. The sensor is associated in a voltage divider circuit. The LDR gives a simple voltage which is changed over completely to advanced pursuing by the inbuilt ADC of the regulator.

4.5 Buzzer

The buzzer is activated as any obstacle is detected by the ultrasonic sensor, the wet place is detected by the water sensor, dark spots are detected by the LDR sensor or the missing alert is passed by the RF circuit.

V. ADVANTAGES OF PROPOSED PROJECT

Portability: Due to its compact structure and light weight, it can be easily be carried around.

Cost: It consists of very basic components making it cost effective.

Simple: Maintenance as the Project deals with the software embedded C, so maintenance will be easy.

VI. CONCLUSION

The proposed system can reduce the number of risk and injuries for the visually impaired person when walking at public. Nowadays, even at a young age experience the visually impairment. This thing cannot be taken so lightly as they know how much risk it could be. If the number of risk and injuries increase rapidly, the kid or the person will lose their spirit to walk independently. The Modern Blind Stick acts as a basic platform for the coming generation of more aiding devices to help the visually impaired to navigate safely both indoor and outdoor. It is effective and affordable. It leads to good results in detecting the obstacles on the path of the user in a range of two meters. However the framework is permanently set up with sensors and different parts, it's slight in weight. Further parts of this framework can be improved through remote network between the framework parts, hence, expanding the scope of the ultrasonic sensor and executing an innovation for deciding the speed of moving toward impediments.

VII. FUTURE SCOPE

The Smart Stick goes about as an essential stage for the approaching age of additional supporting gadgets to help the outwardly hindered to be more protected. It is successful and bear. It prompts great outcomes in distinguishing the obstructions lying in front of the client in a scope of four meter. This framework offers a minimal expense, solid, convenient, low-power utilization and hearty answer for route with clear short reaction time. However the framework is permanently set up with sensors and different parts, it's light in weight. Further parts of this framework can be improved through remote network between the framework parts, hence, expanding the scope of the ultrasonic sensor and carrying out an innovation for deciding the speed of moving toward obstructions. While growing such an engaging arrangement, outwardly debilitated and blind individuals in all non-industrial nations are on top our need.

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