Smart Blind Stick

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Abstract: *The project describes ultrasonic blind walking stick with the use of Arduino uno. According to World Health Organization (WHO), 30 million people are permanently blind and 2.85 million people with vision impairment. If you notice them, you can very well know about it they can't walk without the help of other. One has to ask guidance to reach their destination. They have to face more struggles in their life daily life. Using this blind stick, a person can walk more confidently. This stick detects the object in front of the person and give response to the user either by vibrating or through command. So, the person can walk without any fear. This device will be best solution to overcome their difficulties. We are going to upgrade the project by increasing its application. In this project, we are going to use one ultrasonic sensors. So now, this smart stick will have an ultrasonic sensor to sense distance from any obstacle.*

Keywords: Arduino UNO, Ultrasonic Temperature Sensor, Smoke Detector

I. INTRODUCTION

Nowadays, visually impaired person suffer from serious visual impairments preventing them from travelling independently. Accordingly, they need to use a wide range of tools and techniques to help them in their mobility. One of these techniques is orientation and mobility specialist who helps the visually impaired and blind people and trains them to move on their own independently and safely depending on their other remaining senses. Recently, many techniques have been developed to enhance the mobility of blind people that rely on signal processing and sensor technology. According to the literature, the mainly classified into two major aspects: sonar input (infrared signals, or ultrasonic signals). The way these devices operate just like the radar system that uses ultrasonic sensor to detect the obstacle of fixed and moving objects. The distance between the person and the obstacles is measured by the time of the wave travel. Temperature sensor are used to detect the temperature and smoke detector used for detecting toxic gases. However, all existing systems inform the blind of the presence of an object at a specific distance in front of or near to him. Information about the object characteristics can create additional knowledge to enhance space manifestation and memory of the blind. To overcome the abovementioned limitations, this work offers a simple, efficient, configurable electronic guidance system for the blind and visually impaired persons to help them in their mobility regardless of where they are, outdoor or indoor. The originality of the proposed system is that it utilizes an embedded vision system of three simple ultrasonic sensors and brings together all reflective signals in order to codify an obstacle through PIC microcontroller (Arduino Uno R3).

II. PROPOSED SYSTEM

In the proposed methodology, one ultrasonic sensors are used for object detection in front of the blind and distance calculation. By using these ultrasonic sensors, the distance from the object to the user is measured. The lesser the distance is the more the vibrator vibrates. Distance is calculated by ultrasonic sensor. Whenever the a blind person want to check the distance from the object he or she will press the button then the result is calculated by the Arduino UNO using output of ultrasonic sensor. According to distance embedded system will creates some intelligent voice instructions which can guide the user to move safely. Smoke detector detect the toxic gases.

2.1 Sensors

A. Ultrasonic Sensor

There are one ultrasonic sensor placed on the stick in order to detect different obstacle like any vehicle or a wall in a room or poles in the road and for distance calculation. First ultrasonic sensor is use for the closed object detection. If any object is very close and camera not detect it then this ultrasonic sensor will send alert signals to vibrator so the blind person will move side. Second ultrasonic sensor is used for the distance calculation. HC-SR04 is a commonly used module for non-contact distance measurement for distances from 2cm to 400cm. It uses sonar (like bats and dolphins) to measure distance with high accuracy and stable readings. It consists of an ultrasonic wave transmitter, receiver. The transmitter transmits short bursts which gets reflected by target and are received by the receiver. The time difference between transmission and receiving of ultrasonic signals is calculated. Using the speed of sound and Speed = Distance/Time equation, the distance between the source and target can be easily calculated. Fig 5. Ultrasonic Sensor □ Distance Calculation Time taken by pulse is actually for to and from travel of ultrasonic signals, while we need only half of this. Therefor time is taken as time/2.

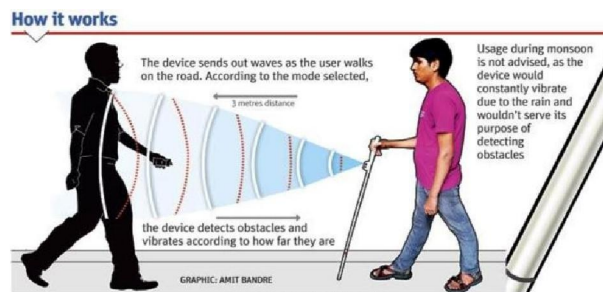$$Distance = Speed * Time/2$$

Fig 1 Working of blind stick

B. Temperature Sensor

LM35 is a temperature sensor that outputs an analog signal which is proportional to the instantaneous temperature. The output voltage can easily be interpreted to obtain a temperature reading in Celsius. The advantage of lm35 over thermistor is it does not require any external calibration. The coating also protects it from self-heating. Low cost (approximately $0.95) and greater accuracy make it popular among hobbyists, DIY circuit makers, and students. Many low-end products take advantage of low cost, greater accuracy and used LM35 in their products.

C. Smoke Detector

A gas sensor is a device which detects the presence or concentration of gases in the atmosphere. Based on the concentration of the gas the sensor produces a corresponding potential difference by changing the resistance of the material inside the sensor, which can be measured as output voltage. Based on this voltage value the type and concentration of the gas can be estimated. The type of gas the sensor could detect depends on the sensing material present inside the sensor. Normally these sensors are available as modules with comparators as shown above. These comparators can be set for a particular threshold value of gas concentration. When the concentration of the gas exceeds this threshold the digital pin goes high. The analog pin can be used to measure the concentration of the gas.

D. Arduino UNO

Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

III. CONCLUSION

The Smart Stick acts as a basic platform for the coming generation of more aiding devices to help the visually impaired to be more safe It is effective and afford. It leads to good results in detecting the obstacles lying ahead of the user in a range of four meters, detecting stairs and water pits. This system offers a low-cost, reliable, portable low-power consumption and robust solution for navigation with obvious short response time. Though the system is hard-wired with sensors and other components, it's light in weight. Further aspects of this system can be improved via wireless connectivity between the system components, thus, increasing the range of the ultrasonic sensor and implementing a technology for determining the speed of approaching obstacles. While developing such an empowering solution, visually impaired and blind people in all developing countries were on top of our priorities

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