

Smart Baton

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Abstract

Smart baton is deliberated for blind people for easy steering. The system consists of a microcontroller interfaced with an ultrasonic sensor, water sensor, and also includes an IR module. Ultra sonic sensor which was to detect and estimate the distance of obstacles around the blind and to guide them towards the obtainable path. Water detecting module is designed to identify the presence of water and prevent the water damage. Output is in the form of series of beep sound along with a vibrator. An additional module feature is provided to the system in such a way that even though the stick is lost, blind can find out it by using an IR.

Keywords: Baton, Water sensor, Ultrasonic sensor, IR sensor

1. Introduction

The research which was done by the World Health Organization (WHO) in 2016 says that there are 39 billion of people are blind in the world and in that 15 million people are in India. So in order to help the blind people by providing an artificial vision, blind stick with improved feature has been introduced. In this paper we are telling about improved features of the blind stick which consists of the ultrasonic sensor (21kHz-50 kHz), moisture sensor, buzzer, vibrator and ATMEGA328 micro controller which was placed in arduino

2. Literature Review

For many years external assistance were provided to visually impaired people by means of trained dogs, humans or white cane.

Abhishek Bhokare [1] introduced a system with ultrasonic sensors, it provide a beep sound when an obstacle is detected.

Kher Chaitrali S [2] implemented an intelligent walking stick with RFID technology. With the help of RFID and Bluetooth device the blind get voice navigation. In this system RFID tags are installed into public buildings and also in the blind stick.

Mohammad Hazzaz Mahmud [3] designed a smart walking stick with sonar sensor, proximity sensor and micro pager motor. It detects the obstacle in front of the blind person.

Ankit Agarwal [4] proposed an ultrasonic blind stick with three side of ultrasonic sensor along with the camera. The sensors can find obstacle in three directions.

Rohit Sheth *et al.*, [5] The smart white cane uses the ultrasonic sensors arranged in such a way that it detects its, potholes, downfalls, a staircase (up and down), low lying and knee level obstacles and even those above the waist. The user is notified about the same by the pre-recorded sound messages and a haptic feedback in form of vibrations.

Osama Bader AL-Barrm *et al.*, [6] proposed a portable stick is design and developed that detects the obstacles in the path of the blind using ultrasonic sensors. It consists of these sensors to scan three different directions, a microcontroller, buzzer and DC vibration motor. The buzzer and vibration motor is activated when any obstacle is detected. In addition, the stick is equipped with GPS and SMS message system. GPS system provides the information regarding the location of the blind person using the stick to his family members. SMS system is used by the blind to send SMS message to the saved numbers in the microcontroller in case of emergency.

Koley *et al.*, [8] described focused on the development and evaluation of a Navigation system that makes use of GPS (the Global Positioning System), voice and ultrasonic sensor for obstacle detection.

Apan Dastider *et al.*, [9] proposed a device based on robotics with an improved and unique algorithm of object detection by Ultrasonic sensors to detect objects placed in front of the user and down on the floor precisely and accurately. To detect objects, a high frequency sound wave is produced and the reflected sound wave is received by the ultrasonic sensor. A microelectromechanical system (MEMS) based gyroscope is used in our prototype so that the position of ultrasonic sensor to detect the objects placed down on the floor can remain fixed even when the users move his hand holding this prototype. Whenever an object comes in front of a user, a piezoelectric beeper gives alarm to user to be cautious about his/her movement. Moreover, our prototype tells the user how far the object is and where it is placed-whether in front of him and or on the ground. An interesting part of this project is that the language to give commands to the user can be any language of this world. They used here only Bengali language.

3. Proposed Methodology

Walking stick has been developed to provide a support for the visually impaired person. Because of the improvements in technology the conventional sticks are being replaced with smart blind sticks. Our system aims to provide an easy navigation for the blind people. The system detects the presence of obstacle and water and can also find out the stick if it has been lost.

4. Block Diagram

This system gets the output mainly based on the micro controller and also it will get efficiently. The various blocks attached to this controller are ultrasonic sensor, GSM

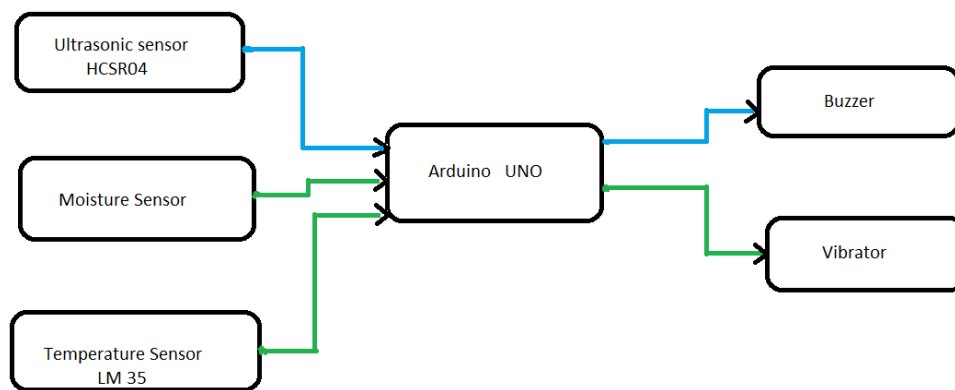


Figure 1. Block diagram of Smart Baton

module water sensor, buzzer, vibrator, IR module. In this system the ultrasonic sensor is used to sagacity the obstacle (if there is any). Ultrasonic sensor provides easy method of distance (300cm) measurement. The sensor output is used to operate vibrator and buzzer. Water detecting module is designed to detect the presence of water and provide an alert to avoid water damage. When the water is detected, buzzer is activated. Vibrator also provided to indicate the obstacles. There is one more advantage of this system. Sometimes the blind person may lose his stick or forgot where it placed. For this purpose, an IR module is provided. To transmit the signals between any two devices we use the IR sensor.

5. Circuit Diagram

The method consists of two input devices and two output devices interfaced with Arduino microcontroller.

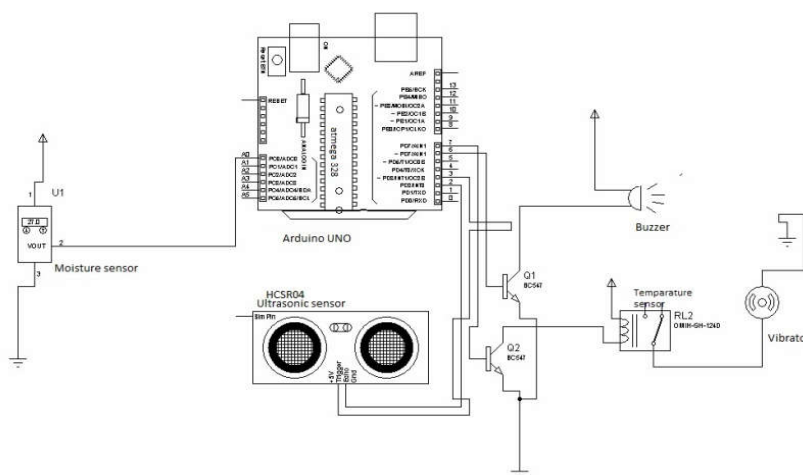


Figure 2. Circuit diagram of Smart Baton

The ultrasonic sensor is connected to the digital pins 12 and 13 and the water detector is connected to the analog pin A5. The vibrator and buzzer are connected to pins 2 and 4 respectively. The buzzer and vibrator will activate by using micro controller based upon sensor. Since it has not interconnection with microcontroller so it will operate separately.

6. Flow Chart

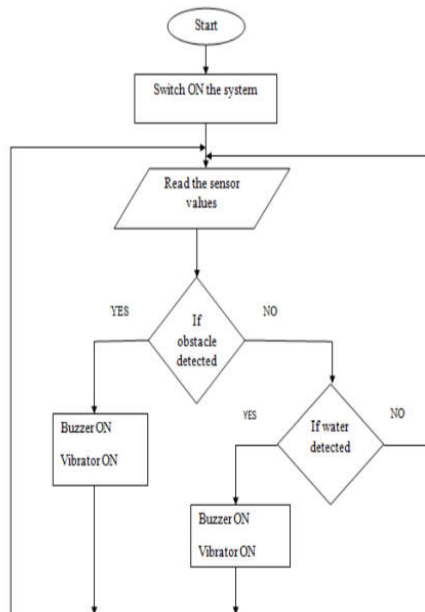


Figure 3. Flow Chart of Smart Baton

When the switch is ON the system starts working. It continuously monitors the presence of obstacle and water, and if detected then provide an alert by using buzzer and vibrator.

7. Conclusions & Future work

The technologies behind smart baton are upgrading day by day. Our Project ensures that the task of moving of a blind person easy and comfortable. The stick is also very light and handy to carry. The components or parts that we used in the stick are also easily available and economic. Besides all that the manufacturing cost is also quite low, that makes the stick affordable for people of all classes and age. In future, if further improvement and investment is carried out with the stick then it will be an even more effective device for the future world. Along with vibration, voice can be included for easy accessing & recognition for directing the people in a comfortable manner.

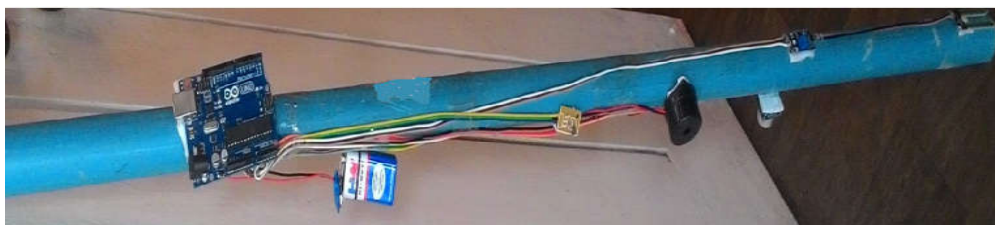


Figure 4. Smart Baton

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