A Microcontroller Based Smart Electronic Stick for Visually Impaired

Anna Kurian[1], Anu K Iype[2], Aswathy Jayakumar[3], Sneha Kuriakose[4], Ann James[5]

B.Tech Student, Dept. of ECE, HKCET, Pampakuda, Ernakulam, Kerala, India[1,2,3,4]

Asst. Professor, Dept. of ECE, HKCET, Pampakuda, Ernakulam, Kerala, India[5]

ABSTRACT: Blind stick is designed for visually impaired people for easy navigation. The system consists of a microcontroller interfaced with an ultrasonic sensor, water sensor and also includes an IR module. Ultrasonic sensors are used to detect the obstacles around the blind and calculate the distance of obstacles from the blind person to guide them towards the available path. Water detecting module is designed to detect the presence of water and prevent the water damage. Output is in the form of sequence of beep sound along with a vibrator. We provide an additional feature to the system in such a way that even though the stick is lost, blind can find out it by using an IR module.

KEYWORDS: Ultrasonic sensors, water sensor, visually impaired person, Microcontroller.

I. INTRODUCTION

The research by the World Health Organization (WHO) in 2011 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. Before that a simple cane was used as helping aid for blind people.But this device is able to detect objects on the floor, but it will not detect the objects that are at a certain depth, or obstacles above waist level or stairs. This paper introduces a stick with improved features for blind people. Ultrasonic sensor is used to detect objects, which helps in identifying the obstacle by calculating the distance. And a water detector is used to detect the presence of water, and also we can find the stick if it is lost using an IR module.

II. LITERATURE SURVEY

For many years external assistance were provided to visually impaired people by means of trained dogs, humans or white cane. Although white canes become a well known attribute to blind person's navigation, they find it difficult while walking on the street or stairs.

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 ultrasonic sensors and camera. The sensors can find obstacle in three directions. Rohit Sheth [5] designed a smart white cane which detects pits, potholes, staircase and also the system provide alert in the form of vibrations.

III. 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.

A. *Block Diagram*

The main component of this system is Arduino microcontroller. The various blocks interfaced to this controller are ultrasonic sensor, water sensor, buzzer, vibrator, IR module. In this system the ultrasonic sensor is used to sense the obstacle (if there is any). Ultrasonic sensor provides a very low-cost and easy method of distance 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. An IR module is an electronic device used to transmit and/or receive radio signals between two devices.
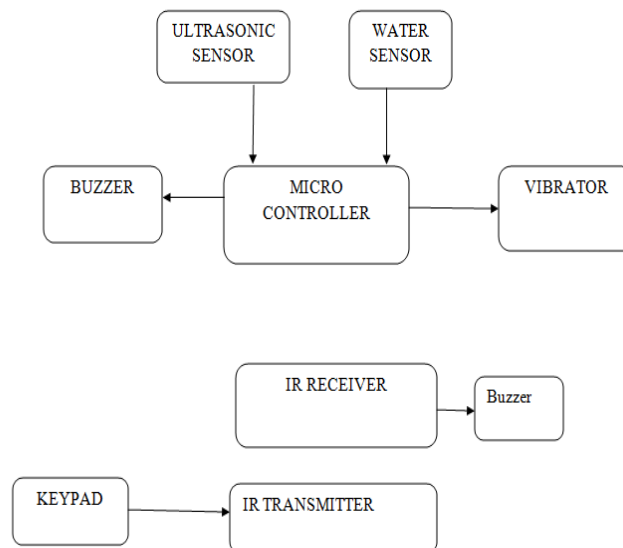

Fig.1. Block diagram

B. *Circuit Diagram*

The system consists of two input devices and two output devices interfaced with Arduino microcontroller. 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. Based on the sensor and detector input the microcontroller will activate the buzzer and vibrator. The IR module is operated separately, it do not have interconnection with the microcontroller.
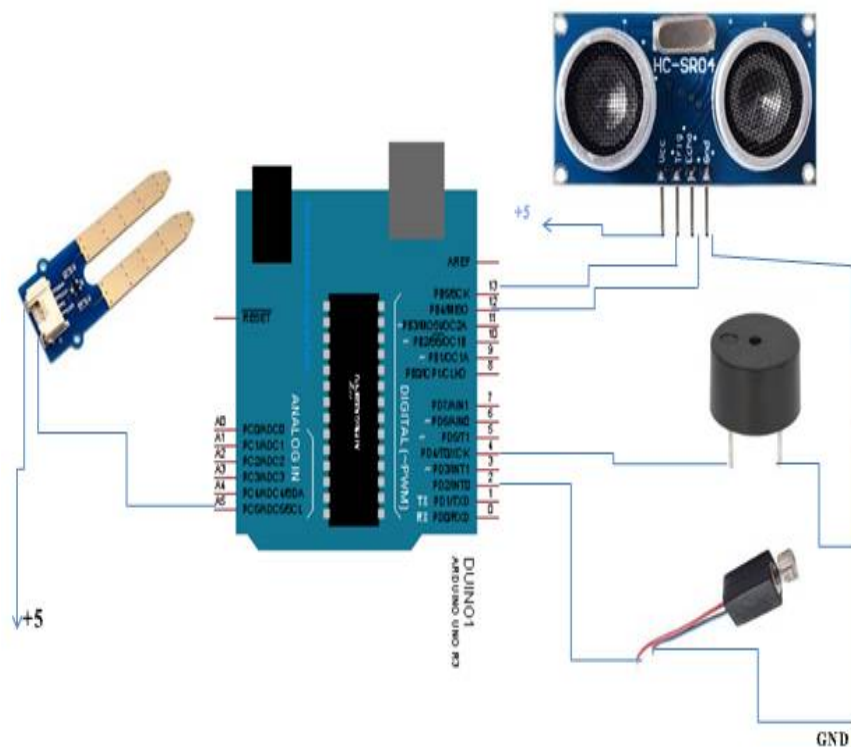
Fig.2. Circuit diagram

C. *Software*

We used the Arduino Integrated Development Environment (IDE) which is open source software that makes it easy to write code and upload it to the board. Basic structure of program consists of 2 main functions. Program code that execute only once are included void setup ( ) function. Program codes required to execute continuously are included in void loop ( ) function. Both functions are inbuilt functions in program. This programming language is easy to use. The standard library functions of arduino for ultrasonic sensor was used.

D. *Flowchart*

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.
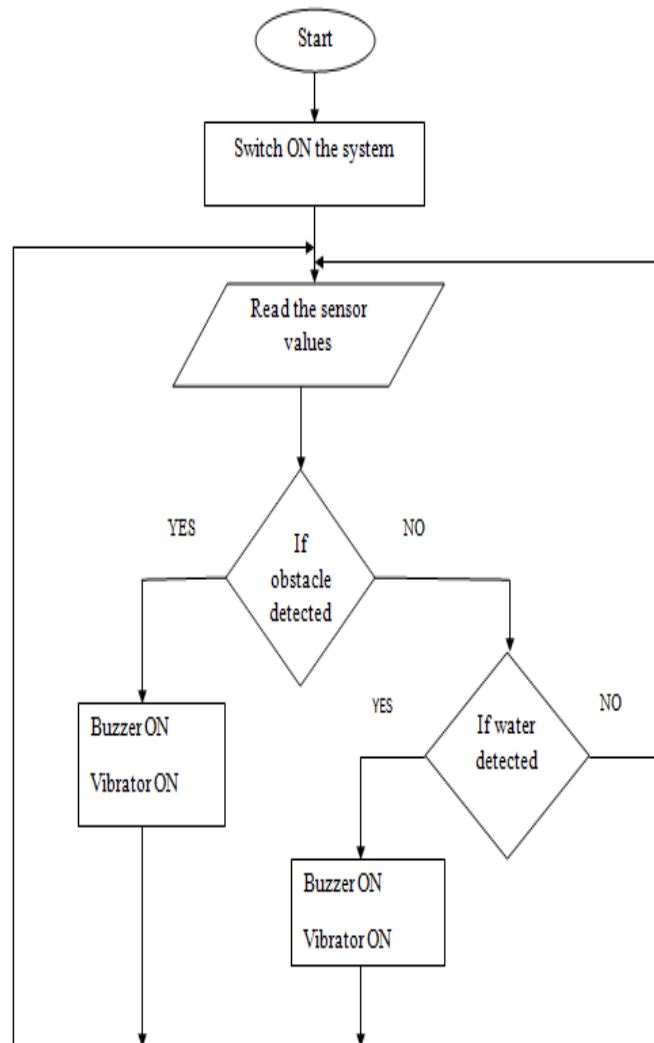
Fig.3. Flowchart

IV. RESULTS AND DISCUSSION

This is the model of proposed system. It consists of an Arduino Uno board interfaced with an ultrasonic sensor and water detector. The stick is designed in such a way that it detects obstacle within 100cm and also buzzer frequency increases as the obstacle approaches closely.

Fig.4. Prototype

V. CONCLUSION AND FUTURE WORK

The proposed system aims to solve the problems faced by the blind people in their daily life. The system also takes measures to ensure their safety.

The system can be supplemented with actual GPS MODULE used in cars and also we can provide a voice commands for the blind person.

REFERENCES

1. Abhishek Bhokare, "Ultrasonic Blind Walking Stick", International Journal on Recent and Innovation Trends in Computing and Communication, Volume 4, Issue 1 ,January 2016
2. Kher Chaitrali S, " An Intelligent Walking Stick for the Blind ", International Journal of Engineering Research and General Science Volume 3, Issue 1, January-February, 2015 .
3. Mohammad Hazzaz Mahmud, " Smart walking stick - an electronic approach to assist visually disabled persons", International Journal of Scientific & Engineering Research, Volume 4, Issue 10, October-2013
4. Ankit Agarwal, "Ultrasonic Stick for Blind" , International Journal Of Engineering And Computer Science , Volume 4, Issue 4 ,April 2015
5. Rohit Sheth , " Smart White Cane – An Elegant and Economic Walking Aid ", American Journal of Engineering Research ,Volume-03, Issue-10,2014