



Ultrasonic Based Smart Blind Stick For Visually Impaired Persons

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ABSTRACT-Blind stick is an innovative stick designed for visually disabled people for improved navigation. We here propose an advanced blind stick that allows visually challenged people to navigate with ease using advanced technology. The blind stick is integrated with ultrasonic sensor along with motors. Our proposed project first uses ultrasonic sensors to detect obstacles ahead using ultrasonic waves. On sensing obstacles the sensor passes this data to the microcontroller. The microcontroller then processes this data and calculates if the obstacle is close enough. If the obstacle is not that close the circuit does nothing. If the obstacle is close the microcontroller sends a signal to rotate the motor which in turn rotates the wheel when obstacle is detected so that the blind will not get frustrated due to continuous alarming sound of buzzer and he/she can navigate easily along the path. The system has one more advanced feature integrated to help the blind find their stick if they forget where they kept it. A wireless RF based remote is used for this purpose. Pressing the remote button sounds a buzzer on the stick which helps the blind person to find their stick. Thus this system allows for obstacle detection as well as finding stick if misplaced by visually disabled people. [3]

Keywords: Ultrasonic sensor, Motors, Microcontroller, Buzzer, RF Module.

I. INTRODUCTION

Blindness is a very common disability among the peoples throughout the world. 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. For the indigents blindness is a curse. They need help to walk outside and all other daily essential works. So the paper glows a system that tries to remove the curse of blindness and make them self- dependent to do their daily chores. It is a walking stick, normally used by the blinds. But it is fully automated as well as manually operated, easy to maintain, cheap and it is very comfortable to use. The power consumption is low and can be operated easily. Above all the stick is very economic over the conventional one. The walking stick mentioned above is a stick that consists of a circuit board that contains a PIC micro controller, different sensors, and buzzer. The entire project is designed using micro-controller based upon its reliability. The micro-controller is code protected so its security bridge cannot be override except the vendor or owner. Here one micro-controller is used, that is PIC16F676. All sensors data are taken by the micro-controller and it produces the sensors of output. [2]

II. SYSTEM INFORMATION

The block diagram depicts the proposed design of a smart stick. The system elements consist of various subsystems. The sensor based circuitry consisting of sensors such as ultrasonic sensors. The feedback system has motor interface. The microcontroller, control buttons and power circuitry (preferably battery-based) are the crucial systems. The proposed system can be designed to take of form of a detachable and portable device, which can be unconditionally mounted on a simple white cane or blind stick. This requires a clear vision of the desired system goals. Various system



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parameters are thus needed to be evaluated based on the design to be practically implementable. [6]

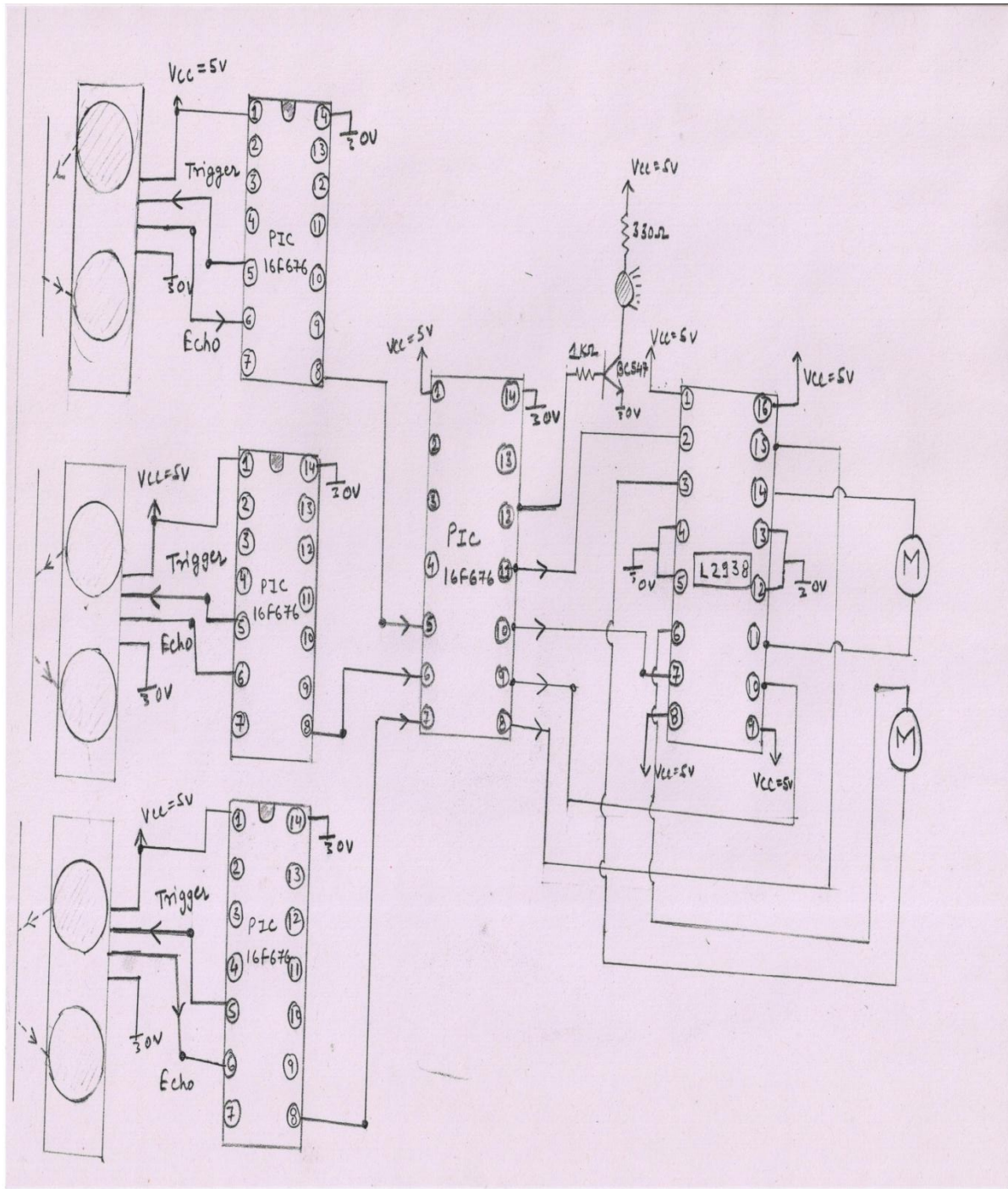
III. LITERATURE SURVEY

1. Smart walking stick - An electronic approach to assist visually disabled persons by Mohammad Hazzaz Mahmud, RanaSaha, and Sayemul Islam in this paper are the sensor based circuitry consisting of sensors ,Ultrasonic Sensor is used to detect obstacles, A PIC16F690 microcontroller reads these sensors and drives a buzzer, a LED and a motor with PWM. An audio output is designated by a buzzer alarm[1]

2. Arm7 Based Electronic Travel Aid System for Blind People Navigation and Monitoring V. S. M. Madulika S #1, M. S. Madhan Mohan#2, CH.Sridevi#3, T. V. Janardhana rao#4 .This paper aims at the development of an Electronic Travelling Aid (ETA) kit to help the blind people to find obstacle free path. This ETA is fixed to the stick of the blind people. When the object is detected near to the blinds' stick it alerts them with the help of vibratory circuit (speakers or head phones)[4]

The system consists of ultrasonic sensor, GPS Module, GSM Module and vibratory circuit (speakers or head phones). The location of the blind is found using Global System for Mobile communications (GSM) and Global Position System (GPS).

IV. BLOCK DIAGRAM

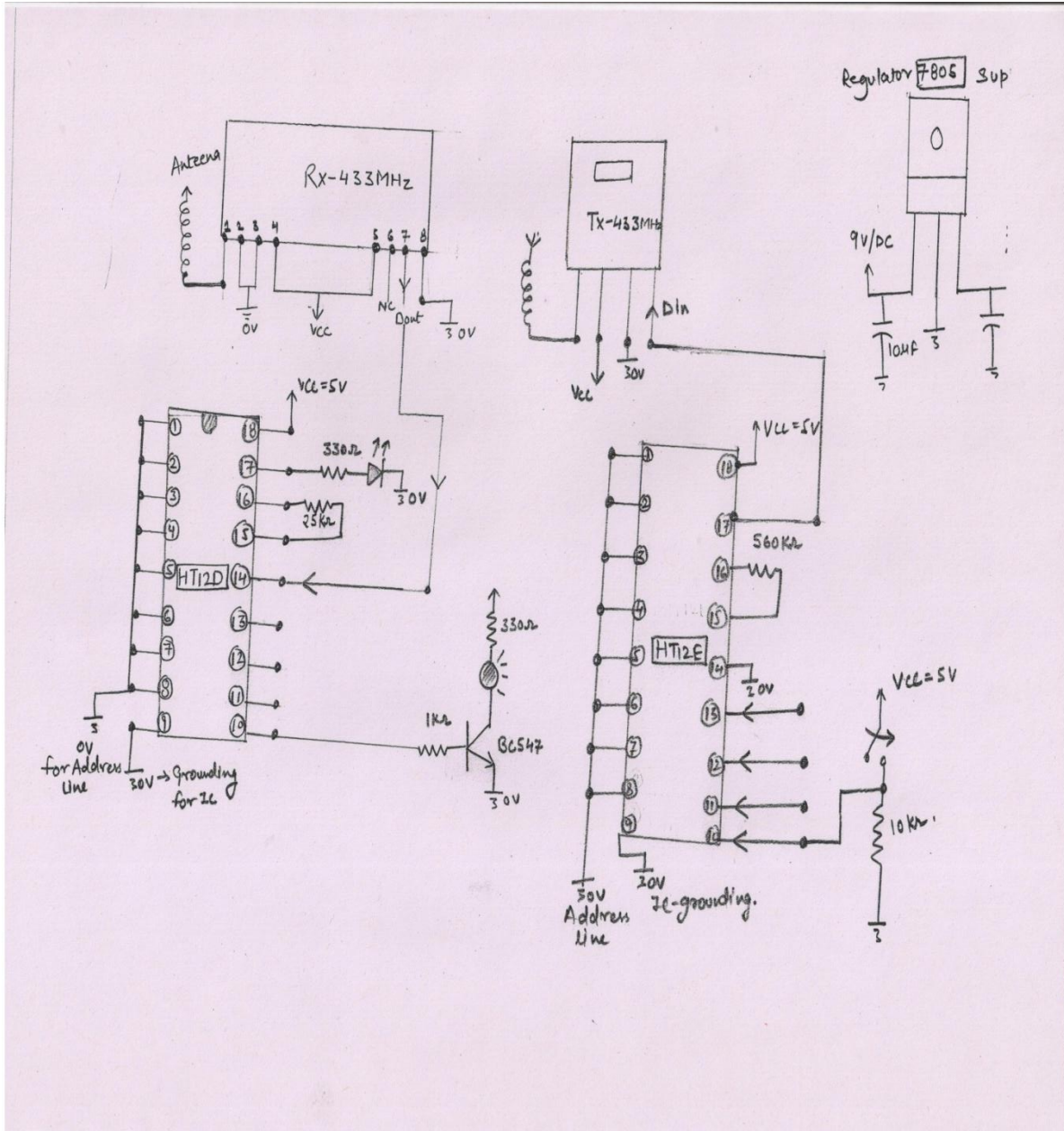


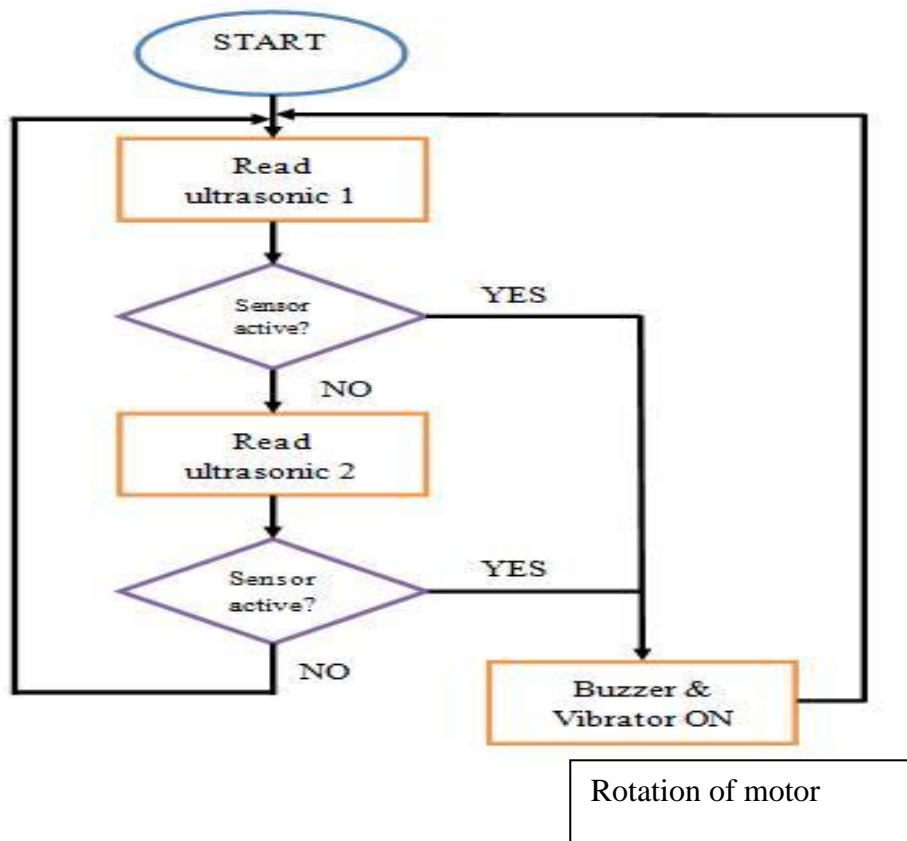
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V. WORKING OF SYSTEM

Blind stick is an innovative stick designed for visually disabled people for improved navigation. We here propose an advanced blind stick that allows visually challenged people to navigate with ease using advanced technology. The blind stick is integrated with ultrasonic sensor along with RF module. Our proposed project first uses ultrasonic sensors to detect obstacles ahead using ultrasonic waves. On sensing obstacles the sensor passes this data to the microcontroller. The microcontroller then processes this data and calculates if the obstacle is close enough. If the obstacle is not that close the circuit does nothing. If the obstacle is close the microcontroller sends a signal to rotate the motor which finally is connected to the wheels which drives the stick. It also detects and sounds a buzzer if it is lost and alerts the blind. The system has one more advanced feature integrated to help the blind find their stick if they forget where they kept it. A wireless RF based remote is used for this purpose. Pressing the remote button sounds a buzzer on the stick which helps the blind person to find their stick. Thus this system allows for obstacle detection as well as finding stick if misplaced by visually disabled people.

VI. CONCLUSION

Smart blind walking stick using PIC16F676 is successfully developed. This paper proposed the design and architecture of a new concept of Smart Stick for blind people. The advantage of the system lies in the fact that it can



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prove to be a very low cost solution to millions of blind person worldwide.

The sensor emits high frequency of ultrasonic waves and give an analog value at the output. The sensor is able to detect objects at ranges between 2-400 *cm* long. Table 1 shows the performance analysis of ultrasonic sensor in obstacle detection.

Table 1 Performance Analysis of Ultrasonic Sensor

Range (cm)	Measured (mV)
5	46
10	95
15	144
20	196
25	247
30	296

The experiments are conducted to evaluate the performance of the suggested methods. The ultrasonic sensor used gives the information about the distance within a specific range. The circuit has been designed to investigate the response of the sensor for various objects in *cm* . Table 2 shows the detection range for 4 types of objects.

Table 2 Detection Range for Various Object in centimetre (cm)

Obstacle	Test 1	Test 2	Test 3
Wall	198	210	203
Human Body	100	114	122
Plastic	115	124	145
Metal	210	199	215

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