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Design and Development of Smart Blind Stick using Arduino

Trupti Deore[1], Gagan Warade [2], Saurabh Shingare[3]
[1, 2]*UG Students,* [3]*Professor, Department of Electrical Engineering, AISSMS Institute of Information Technology, Pune*

Abstract: ***Visually impaired person finds it difficult to interact and feel their environment. They do not get any particular help from other individual in any specific way. They are unable to reach their destination without any gadget. In this paper, we introduce a smart stick prototype to help blind people. This stick is designed to perform an alarming unit and artificial unit. This system includes following important parts: Arduino Uno, ultrasonic sensor, infrared sensor, GPS module, water sensor and switch.***

Keywords: Smart blind stick, GPS module, ultrasonic sensor, Arduino Uno.

I. INTRODUCTION

About 253 million of world's population is visually impaired, 36 million people cannot see properly and 217 million of people have severe or moderate blindness. People of 50 years and above constitute to 81% of total visually impaired people according to WHO estimation, also according to the organization this number is expected to increase. Therefore, a cost-effective device should be brought in to the market as soon as possible to help visually impaired people walk comfortably. A smart solution is necessary in order to help the people in daily usage. The project proposes on design and development of cost-effective smart blind stick.

II. OBJECTIVES

These are the objectives which are obtained by competition of the project: -

A. Upgrading the conventional blind stick
B. Efficient working while use
C. Cost Effective
D. Reduction in efforts made by blind person while walking
E. Human friendly appearance

III.WORKING OF BLOCK DIAGRAM

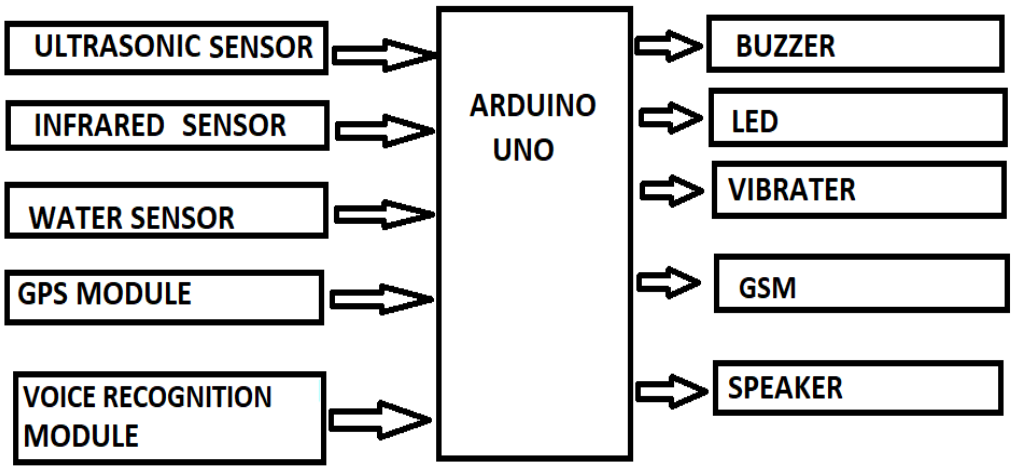


Fig. I: Block Diagram of Smart Blind Stick

Above figure consist of important parts of stick: first is Arduino Uno which is main part of blind stick, all the sensors are connected cordially to the Arduino Uno.

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IV.METHODOLOGY

The stick consists of number of sensors such as ultrasonic sensor, infrared sensor, water sensor. For GPS tracking we have included GPS module. When any obstacle comes in a way of blind person, all the sensors gets invoked and they give the output as alarming sound (buzzer) and vibrator (vibrating motor), and GPS module will give the current location of blind person.

Components	Name of component
1. Development board	Arduino Uno
2. Ultrasonic sensors	1. HC-SR04
	2. HC-SR04
3. buzzers and vibrator	1. Piezo-electric buzzer
	2. Vibrating motor
4. GPS Module	Ublox NEO-6M GPS Module

V. SPECIFICATIONS

A. Ultrasonic Sensor

The ultrasonic sensor (transducer) consist of two pair of eyes, first is transmitter and second one is receiver.it uses sound wave to detect an obstacle. Transmitter sends the sound waves, then after colliding with obstacle receiver receives back the signals.



B. GSM: Sim 800C

1) SIM 800 : A quad-band GSM/GPS module which works on the following frequencies:

a) GSM850MHz
b) EGSM900MHz
c) DCS1800MHz
d) PCS1800MHz
e) PCS1900MHz.

SIM800C consists of GPS multi slot class 12/ Class 10(optional) and supports the GPRS coding CS1, CS2, CS3, CS4.
It has tiny configuration of 17.6 x 15.7 x 2.3 mm , SIM800c can meet almost space requirements in customer applications.

Module Information

Information	SIM800C
GSM	850,900,1800 and 1900MHz
BT	Support
Flash	24 Mbit
RAM	32 Mbit

C. Infrared Sensor

IR sensor detects the smaller obstacle within less range like staircase, pits, holes. Level detection is main purpose of infrared sensor. It works by calculating the distance from the obstacle by reflection of infrared beam.

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D. GPS Module

For detecting the current location of blind person GPS module is used. When the blind person wants to go places, the GPS module will give the direction to go to the places. For communication purpose Ublox NEO-6M GPS Module is used. The module series is a family stand-alone GPS receiver featuring the high performance Ublox 6 positioning engine. It is dynamically flexible, user friendly and cost-effective receiver. It offers numerous connectivity options in a miniature 16 x 12.2 x 2.4 mm package. There compact architecture and power and memory option make neo 6 modules ideal for battery operated mobile devices with very strict cost and space constraints.

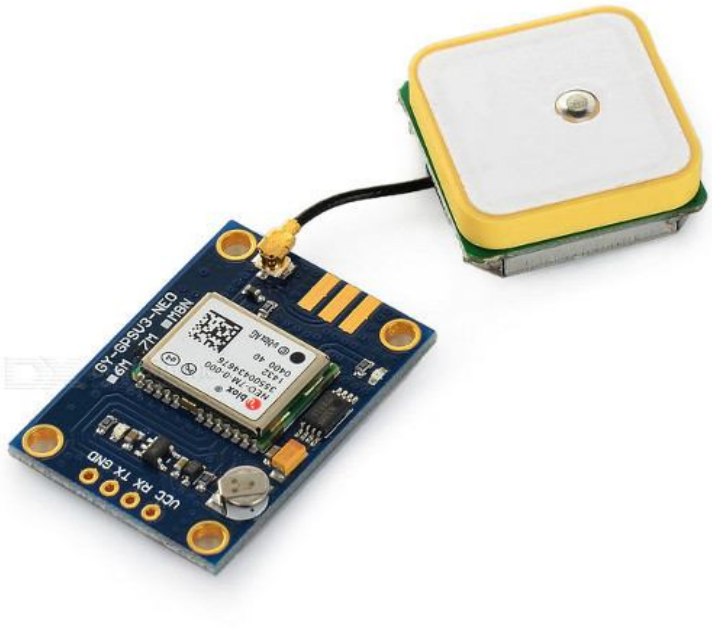


Fig: Ublox Neo 6-M GPS

E. Water Sensor

Water sensor is used to detect the wet surface around the stick. It consists of two metallic strips, when comes in contact with wet surface or water it gives signal to the Arduino Uno and alarming signal will be given to the blind person.

F. Switch

Switch is used for triggering the alarming unit of stick. To stop beeping of buzzer switch is used. For switching a toggle switch is used.

G. Alarm Unit

Person is informed using a buzzer in case of danger. It consists of two types of alarm unit.

1) *Buzzer:* It is a transducer which is used to convert electrical energy into mechanical energy. It typically operates on the audible frequency range between 20 Hz to 20KHz. It can be achieved when electric oscillating frequency of audible range is converted into mechanical energy in the form of audible waves.
2) *Vibrator:* If an obstacle is too close to the person the warning signals are enhanced by the vibrator. A vibrating motor can be used as vibrator. Vibrator is placed on stick where blind person can easily reach.

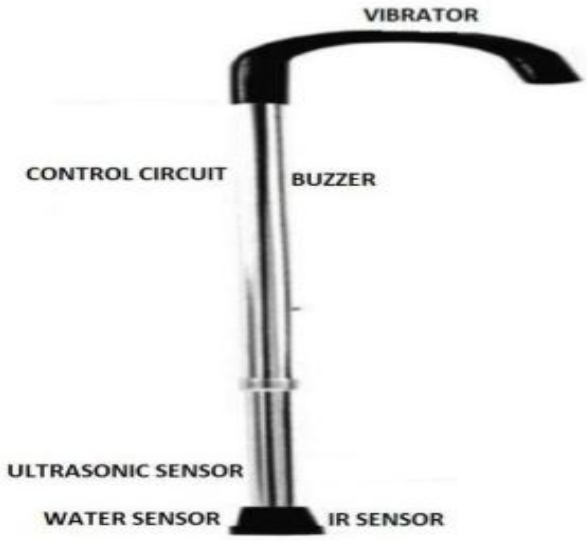
VI.FUTURE SCOPE

A. Useful for visually impaired people.
B. With more improvements blind people can live life more independently.
C. Making more compact device will make it easy to take more places.

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VII. EXPECTED PROTOTYPE



VIII. ACKNOWLEDGMENT

The designed blind stick works efficiently with low capacity battery. It can help the person appreciably in guiding the way for a visually impaired person. Model can be further improved by various modifications like including a GPS system, a GSM system for phone calling relatives in case of emergency.

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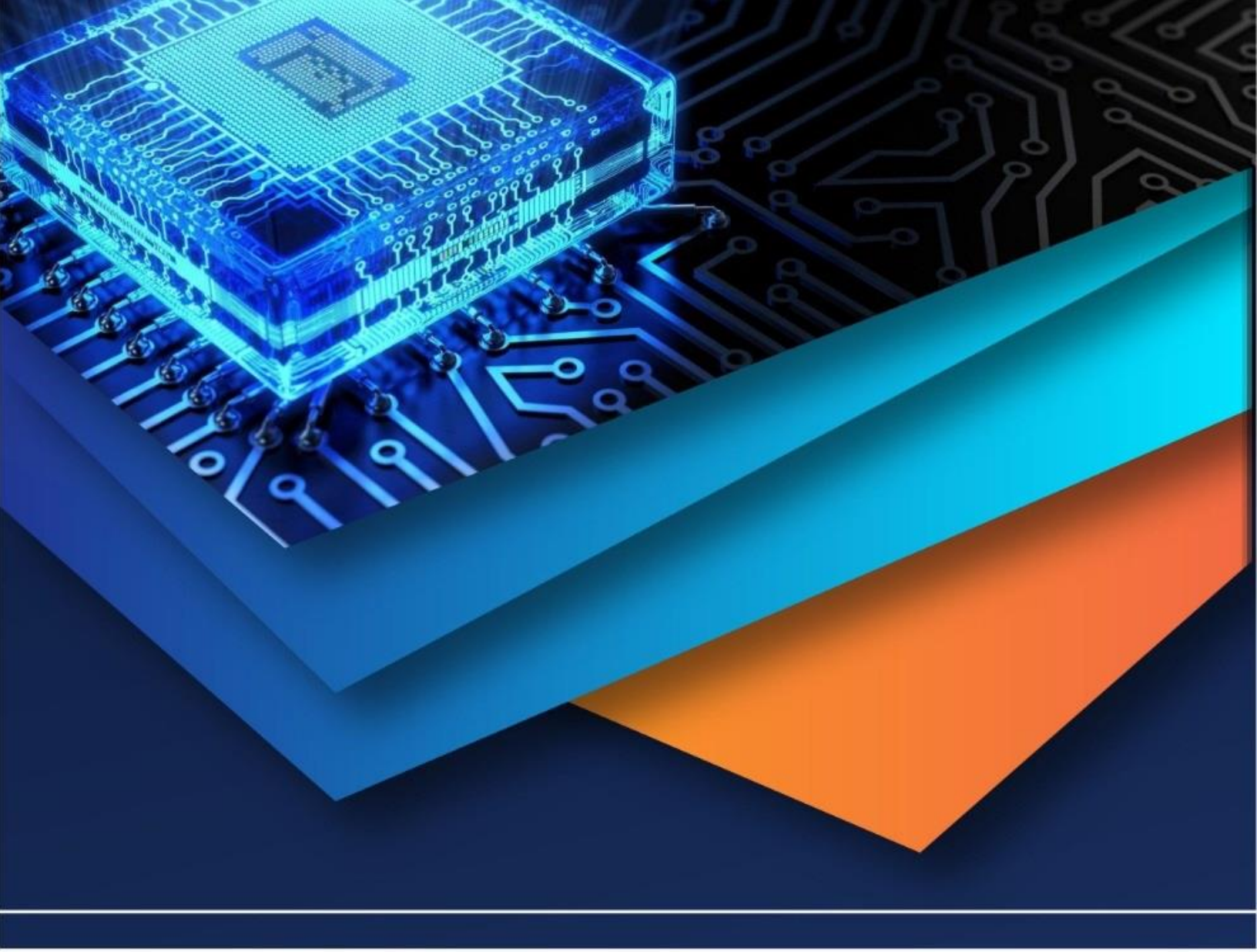
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