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A Smart Stick for Assisting Blind Peoples

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***Abstract:** In this paper, we introduce a smart stick system for assisting blind people. The smart stick comes as a proposed solution to enable visually impaired people to find difficulties in detecting obstacles and dangers in front of them during walking and to identify the world around. The system is designed to act like an artificial vision and alarm unit. The system consists of three sensors: ultrasonic sensor, water sensor, and heat flame sensor, microcontroller (Arduino Uno R3) to receive the sensor signals and process them into short pulses to the Arduino pins where buzzers and led bulb are connected. We seek in our project to provide a smart stick affordable and suitable for most blind people, and also it is light in weight. It can be made available to all segments of the society and their families who need them.*
***Keywords:** SMART STICK, BLIND PEOPLE, ARDUINO UNO, ULTRA SONIC SENSORS, HEAT FLAME SENSOR.*

I. INTRODUCTION

A smart stick for assisting blind peoples is an innovative stick designed for visually disabled people for improved navigation. There are several numbers of people around us which are visually impaired, and among them millions of people are blind and there are thousands of people those who are irreversibly blind. For visually impaired people, performing daily activities is a difficult task since vision plays a central role in almost every activity of ours. Presently, blind people use a white stick as a too, for directing them when they move or walk. Here, we develop a tool, which can serve as a blind stick being more efficient and helpful than the conventional one. This will assist the blind person during the walking and provides an alarm alert if any hurdle is detected within the set range.

A blind stick is integrated with ultrasonic sensor along with water sensor, heat flame sensor, buzzer and led bulb. Our proposed project first uses ultrasonic sensors to detect obstacles ahead using ultrasonic waves and the uses water sensor and heat flame sensor. On sensing obstacles, the sensor passes this data to the microcontroller. Then microcontroller 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 sound a buzzer. It also detects and sounds a different buzzer if it detects water or heat flames and alerts the blind. Our proposed project first uses ultrasonic sensors to detect obstacles ahead using ultrasonic waves and also uses water sensor and heat flame sensor. On sensing obstacles, the sensor passes this data to the microcontroller. It also detects and sounds a different buzzer if it detects water or heat flames and alerts the blind.

II. HARDWARE COMPONENTS

A. *Arduino UNO R3*

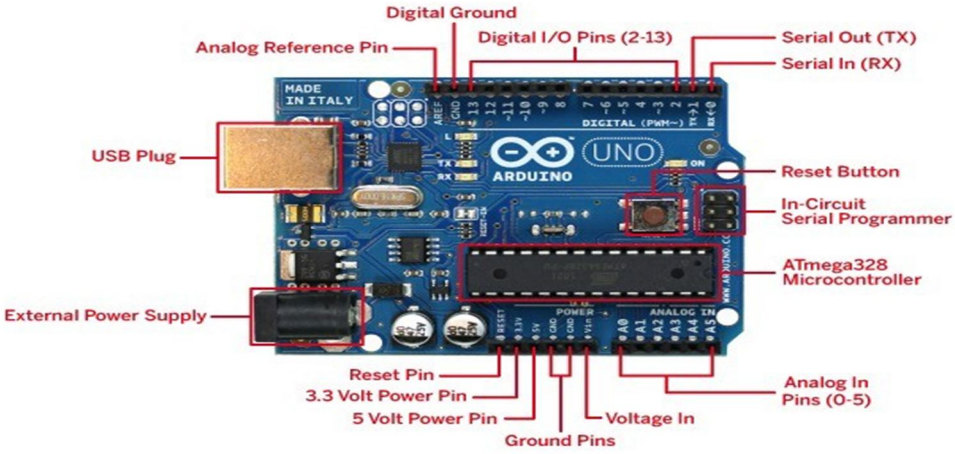


Fig 1. Arduino Uno R3

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Arduino UNO R3 is a microcontroller board based on ATmega328p. It has 20 pins out of which 16 digital input and output pins and 6 analog input pins, 16MHZ Quartz crystal, power jack, ICSP header and reset button compare to PIC microcontroller, it is very easy to perform with Arduino since it is user friendly, The Operation Voltage is 5V, you can directly connect it to computer with USB cable, power it with AC-DC adapter or battery. Arduino is a free, open-source programmable circuit board that may be used in both basic and complicated makerspace projects. This board has a microprocessor that may be designed to detect and control physical items. The Arduino can communicate with a wide range of outputs, including sensors, LEDs, motors, and displays, by responding to sensors and inputs. Arduino is a popular choice for makers and maker spaces wanting to develop interactive hardware projects because of its versatility and inexpensive cost. Arduino turned into delivered returned in 2005 in Italy through Massimo Bansi as a manner for non-engineers to have to get the right of entry to a low-cost, easy device for growing hardware projects. Since the board is open-source, it's far launched beneath Neath a Creative Commons license which permits each person to provide their very own board. If you seek the net, you'll discover there are masses of Arduino well-matched clones and versions to be had however the most effective professional forums have Arduino in its name. One of the maximum famous Arduino forums out there may be the Arduino Uno. While it turned into now no longer the primary board to be launched, it stays to be the maximum actively used and maximum extensively documented at the market. Because of its excessive popularity, the Arduino Uno has a ton of mission tutorials and boards across the net that allows you to get commenced or out of a jam. We're huge lovers of the Uno due to its super capabilities and simplicity of use.

B. Ultrasonic Senior



Fig 2. Ultrasonic Sensor

The ultrasonic sensor module will read the distance between the sensor module and the obstacle surfaces, and it will send that data to the Arduino Uno microcontroller which will according to the programming will detect the position of the obstacles in the front of the blind user and according to the set range it will calculate the distance and alert the user it has to move in the necessary direction or not if obstacle detect in the front of the blind user then microcontroller(Arduino Uno) will received the signal's according to the programming and buzzer will start alert alarming or alert sound.

Ultrasonic sensing elements (sometimes called transceivers when they all send and receive data, but more frequently known as transducers) function in the same way as measuring or navigational devices, decoding echoes from radio or sound waves to calculate the properties of a target. Inaudible sensors generate high-frequency sound waves and analyze their echoes. Between the sign's cause and obtaining the echo to seek an object's gap, sensors calculate the c programming language. A device uses many detectors to calculate speed and direction based on relative distances between obstacles. The sensing device calculates the distance between the obstacles and blind user. After hearing the echo, the sound waves are converted back into electrical energy using an electrical device that turns voltage into sound in the inaudible range, over 18,000 hertz.

C. Water Sensor

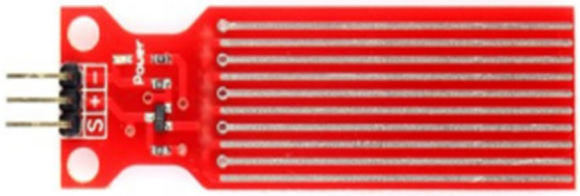


Fig 3. Water Sensor

This is simple and small portable water level/water droplet identification, detection sensor water that have high-cost performance. Complete water yield and analog conversion, the output value apply to your custom function. It is low power consumption and high sensitivity. It can make better performance with Arduino 328 controller and sensor relay shield. Water Sensor water level sensor is an easy-to-use, cost-effective high level/drop recognition sensor, which is obtained by having a series of parallel wires exposed traces measured droplets/water volume in order to determine the water level. Easy to complete water to analog signal conversion and output analog values can be directly read from Arduino development board to achieve the level alarm effect. The water sensor module will read the water level/water, and it will send that data to the Arduino Uno microcontroller which will according to the programming will detect the water in the front of the blind user, and alert the user it has to move in the necessary direction or not if water detect in the front of the blind user, then microcontroller (Arduino Uno) will receive the signal's according to the programming and buzzer will start alert alarming or alert sound.

D. Heat Flame Sensor

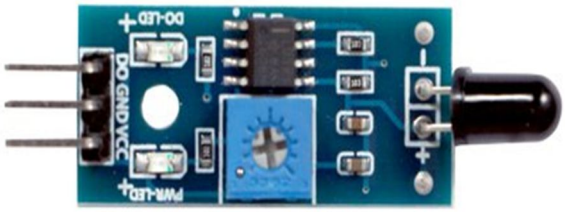


Fig 4. Heat flame Sensor

Heat flame Sensor which is used as obstacle detector where it transmits the infrared waves and hits the object and reflected back the signal to sensor. It ranges from 700nm to 1mm. IR output various depending on infrared rays that have been received. Since, this variation cannot be analyses as such, output provide for comparative circuit. If IR receiver does not receive any signal, the output of the compactor goes low and LED does not glow whereas if it receives any signal, the output goes high and LED Starts Glowing.

E. Buzzer



Fig 5. Buzzer

An Arduino buzzer is also called a piezo buzzer. It is basically a tiny speaker that you can connect directly to a Microcontroller (Arduino Uno). It's works as an alarm unit when sensors (ultrasonic sensor, water sensor and heat flame sensor) detect any obstacles in front of the blind user and through this alarming unit or buzzer blind user get alert when buzzer starts sounding after sensors detecting any hurdle in front of the user. You can make it sound a tone at a frequency you set. The buzzer produces sound based on reverse of the piezoelectric effect.

III. WORKING

In this blind stick there are three sensor's ultrasonic sensor, water sensor and heat flame sensor with microcontroller Arduino uno R3, buzzer, led blub, battery, switch and some jumping wires. All the sensors and other components are connected with microcontroller (Arduino Uno R3) and all the connecting done through jumping wires.

If Ultrasonic sensor detect any obstacles ahead using ultrasonic waves. On sensing obstacles, sensor passes this data to the microcontroller and other sensors (water sensor and heat flame sensor) work as same as ultrasonic sensor. Then microcontroller 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, then sends a signal to sound a buzzer and buzzer start alarming.

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IV. CONCULSION

It is worth mentioning at this point that the aim of this study which is the design and implementation of "A smart walking stick for assisting blind peoples" for the blind has been fully achieved. The Smart Stick acts as a basic platform for the coming generation for more aiding devices to help the visually impaired peoples to navigate safely both indoor and outdoor. It is effective and affordable. In a developing country like India, there is a need of cost-effective solution so that most of the people can't have an effective device as proposed in this paper.

The device constructed in this work is capable of detecting obstacles, heat flames and water. The system also takes the measure to ensure their safety. This project will operate to help all the blind people in the world to make them easier to walk everywhere they want. It is used to help the people with disabilities that are blind to facilitate the movement and increase safety.

Our solution is different from the other is because we are trying to minimize the problems and difficulties of the blind peoples by adding more aiding sensors which is capable for detecting heat flame, water and obstacles. This stick is very affordable in price with lot of features reacting time is too quick, sensor sensing is also fast and the range of detecting the obstacle is adjustable according to the requirement/need of the persons. This stick light in weight, easy to handle, easy to use, and with rechargeable or removeable battery. This is a future gadget/product and project idea for the blind peoples.

V. ACKNOWLEDGEMENT

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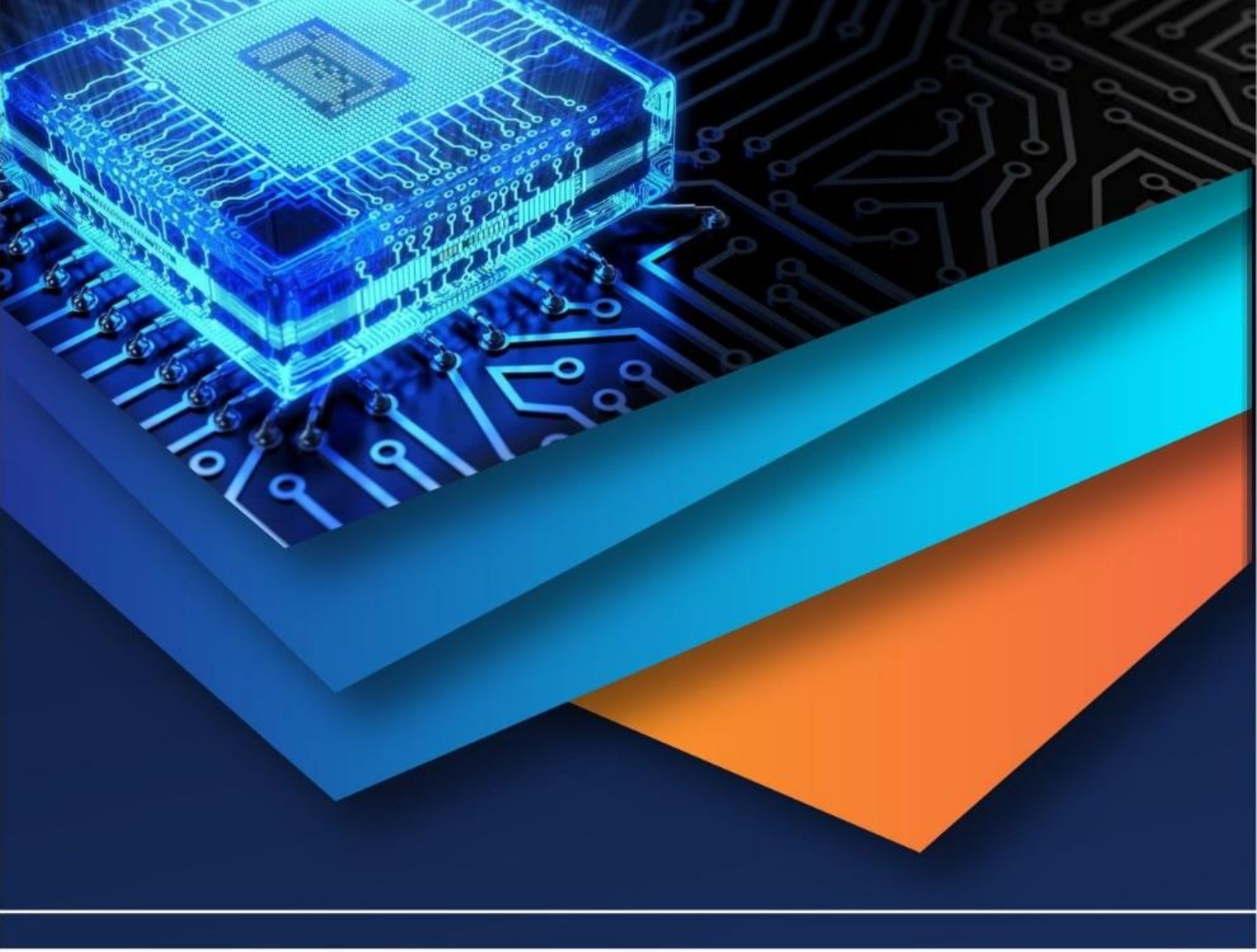
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