Sahayak – "An Eye"

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Abstract— There are different people living in our society, many of them are differently able as well. The vision of technology is to develop the society keeping in mind the comfort zone of the society. We the visually able people can observe everything and take decisions appropriately but did we look at the other side of the coin? The blind people face so many problems while finding the obstacles in coming in their way. The only thing they use is the blind stick. Is it a proper assistant? We hope no. This made us think to develop intelligent blind assistant using sensors. That can detect the object distance and can also indicate the dimensions of the obstacle. The focus of this paper is to create a blind assistant 'Sahayak-"an eye" V-1' and this is vastly going to help the blind. It is expected to bring little comfort in their life.

Index Terms— Blind assistance tool, Arduino microcontroller, Ultrasonic Sensor, Jump wires, Bread Board, LED, Resistor, Buzzer.

1 Introduction

The blind people of the society faces the biggest challenge while walking on the road. They need someone to assist them to cross the jam packed roads even though they have the stick to assist them find the suitable path. The stick is not reliable enough for him that he can trust if completely as it cannot detect other objects around the man at that instant. There comes the need of intellectual assistance which can be provided by human being. But, in today's era, where we talk about technologies that completely surrounds us, the human effort can be replaced by smart devices, that depends on artificial intelligence depending on machine learning.

Now, this is what "Sahayak - An Eye" is designed for. This is an intelligent device that can replace a blind stick in order to help blind people travel around, while knowing about the things that come in front of him. The device can specifically identify each and every object coming in the way or the geographical variations by the means of machine learning. The device can be installed in a blind stick or any other blind assistance.

2 Feasibility Study

The artificially intelligent device is capable of getting adjusted into any blind assistant tool. Need of device is such that it ensures the optically challenged person to know exactly about his surroundings. It will assist the challenged person to travel rather safely than the present situation.

3 Methodology

Step 1- First of all we need to do the feasibility test, where we need to find out all the troubles we may need to face.

Step 2- In this step, we need to gather the requirements for carrying out those challenges.

Step 3- We need to Design the model for Sahayak and also prepare code for it.

Step 4- Then we need to code for Sahayak both in high level language as well as in micro controller

Step 5- Then we test the device.

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In this entire process of development of Sahayak we will follow the iteration process.

4 Tools Used

1. Arduino Uno SMD R3 micro controller.
2. Ultrasonic HC-SR04 Sensor.
3. Bread Board.
4. 330ohm - 1/4 W Resistor.
5. 3mm LED Light.
6. Electric buzzer.
7. Breadboard Jumper Cable.

4.1 Arduino Uno SMD R3 Microcontroller

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to

Fig. 1- Arduino Uno SMD R3 Microcontroller Front

Fig. 2- Arduino Uno SMD R3 Microcontroller Back

read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing. [1]

Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software, too, is open-source, and it is growing through the contributions of users worldwide. [1]

4.1.1 Arduino Uno R3 Specifications

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328P) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328P)
EEPROM	1 KB (ATmega328P)
Clock Speed	16 MHz
LED_BUILTIN	13
Length	68.6 mm
Width	53.4 mm
Weight	25 g

4.1.2 Pin Mapping

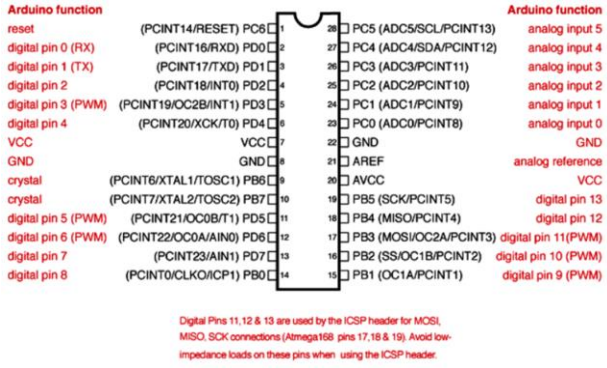

Fig. 3- ATmega 328- Arduino Pin Mapping

4.2 Ultrasonic HC-SR04 Sensor

An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the sonar sensor and the object. [4][3]

Since it is known that sound travels through air at about 344 m/s (1129 ft/s), you can take the time for the sound wave

Fig. 4- Ultrasonic HC-SR04 Sensor Back [3]

to return and multiply it by 344 meters (or 1129 feet) to find

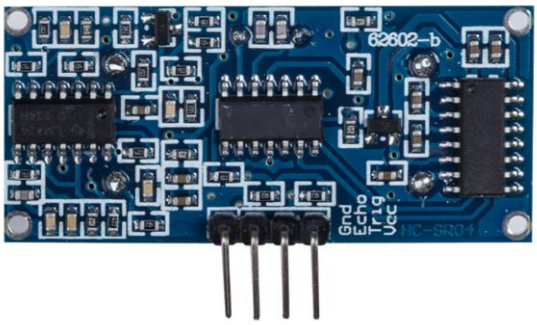

Fig. 5- Ultrasonic HC-SR04 Sensor Back [3]

the total round-trip distance of the sound wave. Round-trip

means that the sound wave traveled 2 times the distance to the object before it was detected by the sensor; it includes the 'trip' from the sonar sensor to the object AND the 'trip' from the object to the Ultrasonic sensor (after the sound wave bounced off the object). To find the distance to the object, simply divide the round-trip distance in half.

4.3 Bread Board

A bread board is a solder less device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate. The bread board has strips of metal underneath the board and connects the holes on the top of the board. Note that the top and bottom rows of holes are connected horizontally and split in the middle while the remaining holes are connected vertically. [2]

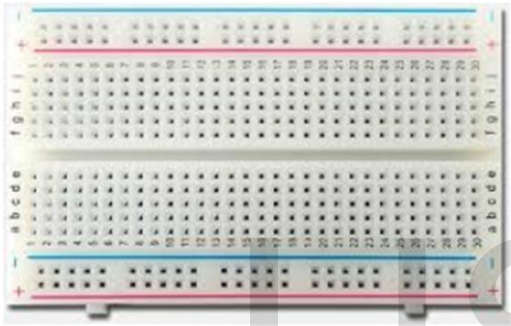

Fig. 6- Bread Board

4.4 Resistors

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for generators. [2]

Fig. 7- Resistors

4.5 Light Emitting Diode (LED)

Light emitting diodes (LEDs) are semiconductor light sources. The light emitted from LEDs varies from visible to infrared and ultraviolet regions. They operate on low voltage and power. LEDs are one of the most common electronic components and are mostly used as indicators in circuits. They are also used for luminance and optoelectronic applications.

Based on semiconductor diode, LEDs emit photons when electrons recombine with holes on forward biasing. The two terminals of LEDs are anode (+) and cathode (-) and can be identified by their size. The longer leg is the positive terminal or anode and shorter one is negative terminal. [2]

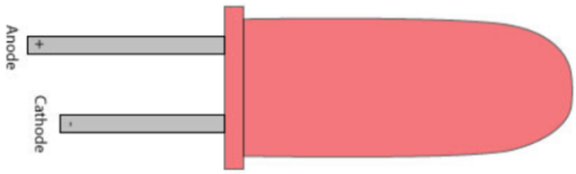

Fig. 8- Light Emitting Diode

The forward voltage of LED (1.7V-2.2V) is lower than the voltage supplied (5V) to drive it in a circuit. Using an LED as such would burn it because a high current would destroy its p-n gate. Therefore a current limiting resistor is used in series with LED. Without this resistor, either low input voltage (equal to forward voltage) or PWM (pulse width modulation) is used to drive the LED. [2]

4.6 Electric Buzzer

A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances, devices, etc. [5]

Fig. 9- Electric Buzzer

4.7 Jumper Wires

A jump wire is an electrical wire or group of them in a cable with a connector or pin at each end , which is normally used to

Fig. 1- Jump Wires

interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.

5 Advantages and Disadvantages

5.1 Advantages

1. It will assist the blind to have an idea about the distance of object in front of them.
2. It will reduce the possibility of road accident for blind people.
3. It will be more reliable than other blind assistances.

5.3 Disadvantages

1. It will be a little costly than normal blind sticks or blind assistant gadgets.

6 Application

The device will be made feasible to any environment for its application. It can be adjusted in front of ear, with eye glasses or with the blind stick or any wheel chair or any apron to wear.

7 Conclusion

At the conclusion we want to state that the technology we are upbringing, is to help the blind people to travel. The present technology is mainly focusing on advancement of normal people. There are many things that assist us in our daily life. So thi simple effort on “Sahayak” may bring change the life of blind people. They may feel more reliable on a device than to be pleading for other’s help. The device is an IOT based intelligent device that will improve with process cycle. The device is made projected to be made so feasible that it can be adjusted with the eye glass or on shin pad or even in jackets or blind stick or a wheel chair in case. Thus it will be an important step in advancement of technology that will look after the suppressed or underprivileged section of the society.

8 Acknowledgment

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