HELPING HAND FOR BLIND

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ABSTRACT

The "Helping Hand for Blind", is designed to help the blind to overcome the lack of visual sense, by using other senses like sound and touch. It uses audio and vibration signals to notify the user about upcoming hurdle. As the distance between glove and obstacle decreases, frequency of both audio and vibration signals increases. Thus, the system helps to ease the navigation process for the needy. A study that helps those people to walk more confidently is proposed. The study theorizes a smart walking glove that informs visually-impaired people over obstructions, depths thus this device could help them in walking with less accident. Lots of blind people suffer in their own lives because of their vision loss. Vision is one of the five important senses in the human body. People with Vision loss have their own incapacity. Many countries around the world provide special support to these needed people to improve their life quality as good as possible. They provide them with special tools for their disability to improve their daily life like voice message service, electronic stick that guide them while moving around and other specialized equipment. This paper presents a project idea to establish and provide ultrasonic gloves to blind people for supervisory them to their right roads without the need for other people assistant. This Can be done through Ultrasound waves that will be sent to the surrounding then it will be collected by detector in the gloves then to be sent as vibration or Audio signals to the blind's so they can be aware of their surroundings and they can choose their own road and way without other people assistant.

Introduction

Nowadays, technology and human life cannot be separated as it has become the phenomenon of the world. But how the technology can help people that visually impaired? Blind people usually can estimate the obstacle in front them without knowing the actual distance of the obstacle from them. Mobility for the blind people can be defined as mobility to move with safety and ease through environment without rely on other. Most commonly mobility aid used by the blind are cane and guide dogs to facilitate their movement. But there are problems for this navigation supports. The cane provides limited preview for the user and as a result, user has to be more careful to walk and mobile very slowly. As for the guide dogs, the training and coordinating the dogs with blind people are difficult task and the result are minimal. Suffering from blindness is not temporary for certain time it's being blind the whole day the whole time every second and every minutes. Once the blind person wakes up from his bed in the morning his suffering start and his daily needs start. Blind people need more care to avoid risk of injuries and that affect people around them; people need to be near for them to avoid being injured. People around them will be exhausted from being attention to them and giving them all what they need. So Blind people must depend on themselves, this paper propose gloves which helps Blind people to depend on themselves. Blindness can be caused by physiological dysfunction, anatomical or neurological dysfunctions. Each blind person has his own blindness type. Many scores have been established to assess the extent of blindness. In order to overcome this problem, research on the assistant devices for the blind has been done by many people to help reduce the limited ability of the blind people. The assistive glove for the blind is a device that can help visually impaired to facilitate movement and to perform daily activities without relying too much on others. The glove with the integration of ultrasonic sensor, Arduino UNO microcontroller will help blind to facilitate movement and give alert to user if there are obstacle in front of them in the range 2 cm to 300 cm.

IDEOLOGY

As per the definition of blindness, we mean the person without sense of sight. A blind person has no ability to see anything. While struggling for the different levels of comforts of the general population, we have reached to a point where we have started to completely ignore the people who are living a miserable life due to lack of vision. They face enormous challenges in their daily lives and hence end up living a dependent life. They experience a completely different life from the normal people and experience detached and uninterested conduct towards them for being physically disabled. They need other individuals for their movement from one place to another. Sight is the basic sense of life and therefore a person's movement from place to place in this condition is a major challenge for the visually impaired.

METHODOLOGY

With the improvement of the living standards of the people, we have become so materialistic that we have forgotten how the physically disabled people live a tough life. They undergo rigorous, apathetic and indifferent behavior towards them for being physically disabled. They become dependent on other people in a way for their day-to-day routine chores. Blind and impaired persons always depend on other people for their locomotion. Eye are prime sense of organ in perceiving the outside environment; dysfunction of such prime sense organ severely effects the knowledge perceiving capability of the outside environment. Therefore, going around to places in such environment is a very big challenge because the blind people cannot depend on their own eyes and thus face many difficulties. The objective of this paper is that the Helping hand for the Blind is to design a product which is very much useful to those people who are visually impaired and those who often have to rely on others. Helping Hand for Blind project is an innovation which helps the visually impaired people to move around and go from one place to another with speed and confidence by knowing the nearby obstacles using the help of the wearable band which produces the ultrasonic waves which notify them with buzz sound or vibrations. It allows the user those who are visually impaired to walk freely by detecting the obstacles. They only need to wear this device as a band or cloth on their body.
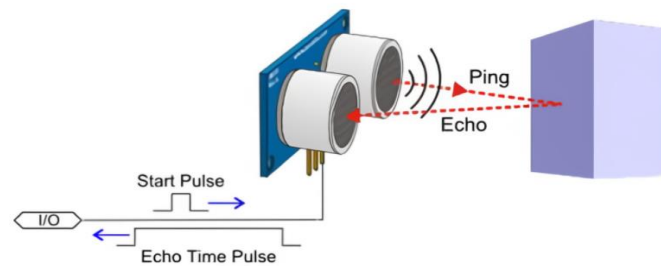

Fig: working of ultrasonic sensor 2

WORKING PRINCIPLE

When an electrical pulse of high voltage is applied to the ultrasonic transducer it vibrates across a specific spectrum of frequencies and generates a burst of sound waves. Whenever any obstacle comes ahead of the ultrasonic sensor the sound waves will reflect back in the form of echo and generates an electric pulse. It calculates the time taken between sending sound waves and receiving echo. The echo patterns will be compared with the patterns of sound waves to determine detected signal's condition.

Distance is directly proportional to the time these waves require to come back at the receiving end. The more the time taken, more the distance will be. Following formula is used to calculate the distance of the object.

S = (V x t)/2

Where S is the required distance, V is the speed of sound and t is the time sound waves take to come back after hitting the object. We need to divide the value by 2 because time will be double as the waves travel and bounce back from the initial point. Dividing it by 2 will give the actual distance of the target object.

CONSTRUCTION OF ULTRASONIC

Sensor Piezoelectric crystals are used for this conversion process. Piezoelectric crystals will oscillate at high frequencies when electric energy is applied to it. The reverse is also true. These piezoelectric crystals will generate electrical signals on receipt of ultrasound. These sensors are capable of sending ultrasound to an object and receive the echo developed by the object. The echo is converted into electrical energy for onward processing by the control circuit. HC -SR04 Characteristics are Supply voltage: 5V (DC), Supply current: 15mA, Modulation frequency: 40Hz, Output: 0 – 5V (Output high when obstacle detected in range), Beam Angle: Max 15-degree, Theoretical measuring Distance: 2cm – 400cm, Accuracy: 0.3cm. HC-SR04 (Specifications) are: It provides 2 - 400 cm non-contact measurement function, Operating Voltage: 5V, Working Frequency: 40 KHZ, Trigger Input Signal: 10μs TTL pulse
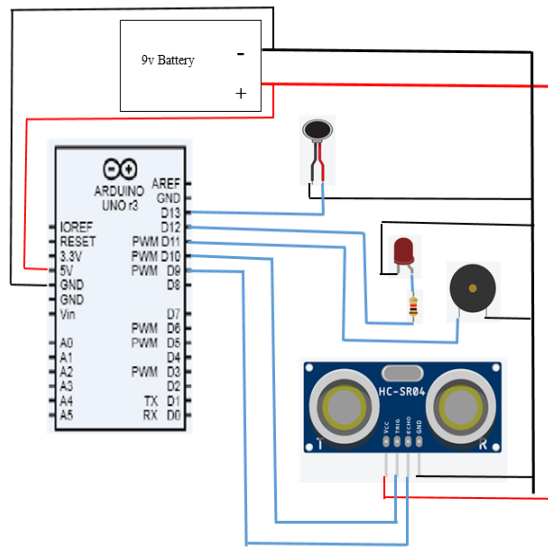
CIRCUIT DIAGRAM

Fig: Circuit Diagram

According to Circuit Diagram, understand that, battery is connected to the 5V pin and GND pin of Arduino board, Vibration Motor connected to the D13 pin, led connected to D12pin, Buzzer connected to D11 pin, Ultrasonic sensors have 4 pins, Vcc and GND connected to battery for power supply, TRIG is connected D10 pin and ECHO pin to D9 pin of Arduino.
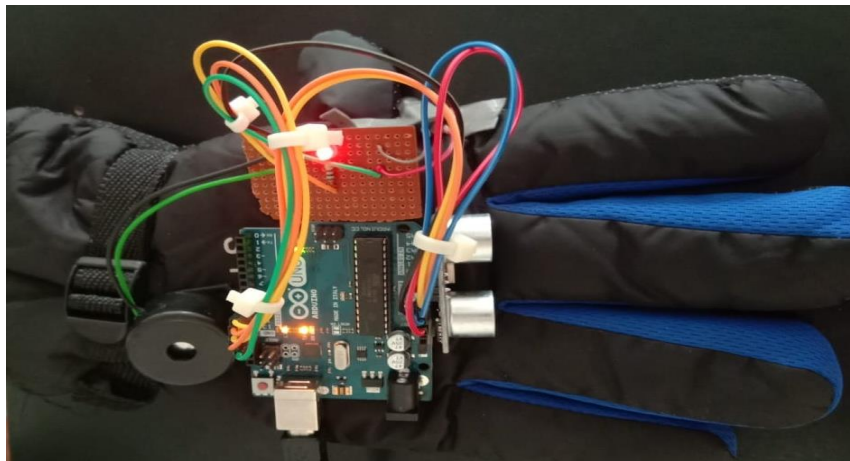
OPERATING PROCEDURE

Fig: Helping Hand for blind

Connect the circuit According to the circuit diagram. Then using Arduino IDE upload the program into Arduino by connecting USB cable. As mentioned earlier, the sensor gives information about objects surroundings and the environment around the user and alerting through vibration, where it made about the accuracy of 1 meter, from the user's real surrounding areas.

The overall result of the experiment gloves, came as follows:

→The highest response was whenever it is closer to the object.

→Middle respond was found in middle distance from the object.

→ No respond was found on far distance.

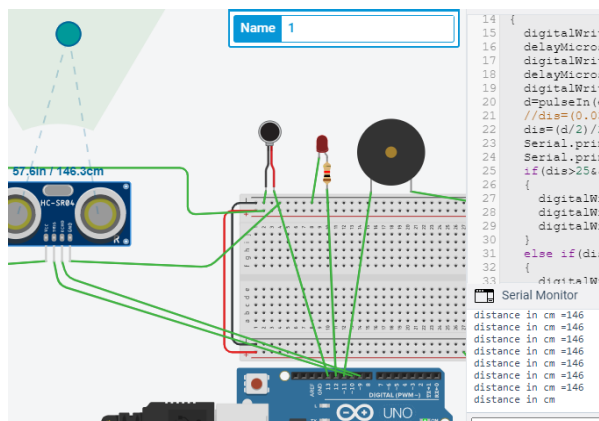| Obstacle	Response
More than 50cm	No response→led, Vibration Motor and Buzzer are OFF
Between 25cm to 50cm	Led-ON, Vibration Motor-ON and Buzzer-OFF
Less than 25cm	Led-ON, Vibration Motor-ON and Buzzer-ON

RESULT

Fig: Result 1, Response more than 50cm distance

Response of the circuit more than 50cm distance
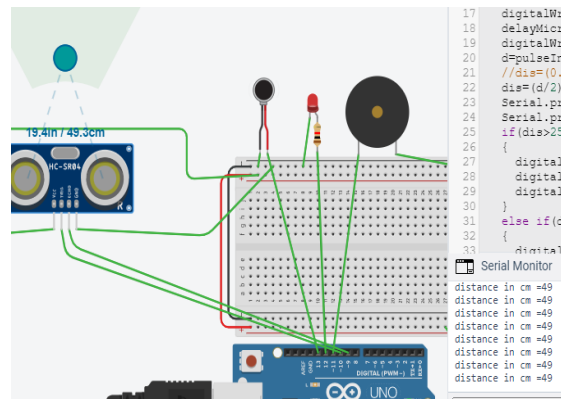
→led-OFF

→Vibration Motor-OFF

→Buzzer-OFF

Fig: Result-2, Response of the circuit between 25cm to 50cm distance

Response of the circuit between 25cm to 50cm distance

→led-ON

→Vibration Motor-ON

→Buzzer-OFF

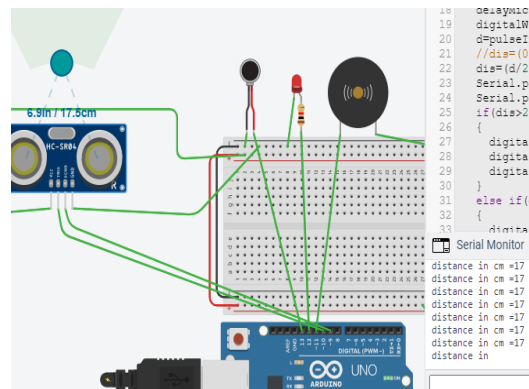Fig: Result 3, Response of the circuit less than 25cm distance

Response of the circuit less than 100cm distance

→led-ON

→Vibration Motor-ON

→Buzzer-ON

CONCLUSION

Helping Hand for the blind project is to help blind people walk and estimate the distance from obstacles. Main component for this paper is Arduino UNO, Vibrator motor and ultrasonic sensor. One of the advantages of this paper was the use of ultrasonic sensor. This sensor was very sensitive and will trigger faster when it detects obstacles. Besides that, the cost to develop this project was low and can be afforded by blind people.

The paper, Helping Hand for blind people is made sightless individuals to live independently, so as to perform their daily activities easily and more confidently with high level of safety. This Arduino based concept for the blind people is simple, cheap and can be easily carried and maintained. This system is able to scan and detect the hindrances in all directions irrespective of the height or depth the object lies at. With this idea, if the construction is done properly, the blind can enjoy the taste of sight and can move freely from one place to another without assistance of the other individual.

REFERENCES

Arduino IDE - JavaTpoint

WHAT IS TINKERCAD? ARDUINO BLOCK PROGRAMMING (pijaeducation.com)

Introduction to HC-SR04 (Ultrasonic Sensor) - The Engineering Projects

China 6mm Micro Vibration Motor with 15.1mm Length Lead Wire - China Vibration Motor, Cylinder Motor (made-in-china.com)

Ultrasonic sensor specification and working principle (nandantechnicals.com)

(PDF) ULTRASONIC SENSORS GLOVES FOR BLIND PEOPLE USING LILYPAD ARDUINO (researchgate.net)

Advance Glove for Blind (ijsr.net)