A Prototype Model of Arduino Based Obstacle Detection System for Blind People

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Abstract- The visually impaired or blind people are facing trouble due to their disability. It is difficult for blind people to pass their day-to-day life with their disabilities. They are being met with accidents; in the worst-case scenario, their life is also in danger. Rather than using the stick to find the obstacles, we have come up with a smart device using technology to help blind people in detecting the obstacles around them and indicate the danger. To overcome this issue obstacle detection system for the blind (ODSB) is adopted to help them in dangerous situations, by sensing the surrounding obstacles using the ultrasonic sensor. The buzzer is used in producing a sound alarm, to indicate the obstacles and the vibration sensor alerts them by producing little vibrations to sense the danger. These components are interconnected to the Arduino. The battery is used as a power source for the system.

Whenever an obstacle is detected by the ultrasonic sensor within the confined range the signal will be sent to the Arduino which processes the input into output and sends it to the buzzer and vibration sensor to produce alerting sounds and vibrations respectively.

Key Words:

Arduino, Ultrasonic sensor, Arduino, Buzzer, Vibration sensor, and Obstacle Detection System.

I. INTRODUCTION

Blindness is defined as a person who has lost their ability to see. A blind person is incapable of seeing anything. While battling for various levels of comfort for the public, we have come to the point where we have begun to utterly disregard those who are living in misery due to a lack of vision. They confront significant challenges in their daily lives, and as a result, they become dependent. They live a life that is very different from that of regular people, and they are treated in a disconnected and uninterested manner because they are physically disabled. They require the assistance of others to move from one location to another. The various approaches are given in [1] - [6]

Because sight is the most basic sense, moving from one place to another in this condition is a big difficulty for the Dr. P. Sudheer Department of Electrical and Electronics Engineering, KITSW, Warangal Telangana, India. <u>Sudheerp309@gmail.com</u> <u>Sudheer.eee@kitsw.ac.in</u>

visually impaired. This project for the blind or visually impaired will create a device that will benefit them as well as others who rely on others due to their loss of vision.

The obstacle detection system for the blind could be a breakthrough for the blind; it will allow them to move around with confidence, knowing where the nearest obstacles are while wearing a band that emits ultrasonic waves that alert the user with a beep sound and vibration. It can help someone who is unable to move or see or discern even snags because of visual loss. They simply need to wear the device as a band/bracelet or adapt it to their body's apparel.

According to the WHO (World Health Organization), 2.2 billion individuals have eyesight problems. They face numerous difficulties in their daily life. This technology could be a breakthrough for people who are physically crippled or blind. People with physical disabilities formerly relied on the white cane, which was effective but had a number of drawbacks.

We can also go with having trained pet animals like domestic animals cats or dogs which can guide us through our journey without any troubles. But the cost of domestic animals would cost more it must be trained and get habituated with the person having a disability so that the pet can be his journey partner. The device is a blinds breakthrough that helps to solve any problems. Currently, enormous approaches and creative innovations are accessible for physically challenged individuals; practically all of these gadgets are solving some of the challenges for the blind, but there are a number of drawbacks, such as the fact that they require extensive preparation and costly maintenance.

The gadget functions similarly to radar in that it collects ultrasonic waves to determine the object's altitude, direction, and velocity. The wave's travel is used to determine the distance between the object and the human. Nonetheless, all current technologies alert the individual to the proximity of a protest at a specific location in front of or near them.

II.SYSTEM ARCHITECTURE



Fig. 1.Block Diagram (1) of the Device



Fig. 2. A detailed circuit diagram (2)

III. PROPOSED WORK

The device is structured in the way of a band which can be worn by the person to be carried out in any situation, making the ultrasonic sensor face the obstacles as opposed to the man, the blind people must be trained a little bit to use this device in holding the device to detect the obstacles so that they can travel with confidence around the new places using the device [3] - [4].

The Functioning of different components used:

Ultrasonic sensor:

The ultrasonic sensor will be tracking down the distance by the emitted ultrasonic waves which hit the obstacles and returning to the sensor which is carried out by the transmitter and receiver.

Arduino Nano:

The Arduino takes the input from the ultrasonic sensor processes the output according to the requirements and code have given then passes the output to the buzzer and vibration motor.

Buzzer:

The buzzer is an alarm that produces a sound to alert the person indicating the danger.

Vibration motor:

The vibration motor gives vibration which helps the person to sense the obstacle by alerting.

IV. WORKING OPERATION

The device consists of components like PCB, ultrasonic sensor, Arduino nano, buzzer, vibration motor, and battery. A few other things like switches, resistors, transistors, and jumper wires, and this device is made into a structural band by arranging them on PCB and soldering the connections.

The connections are given as in ultrasonic sensor the ground pin is connected to Arduino nano ground pin and echo pin is connected to D2 in Arduino nano. Then the trig pin is connected to D3 in Arduino nano and the Vcc is connected to 5V of Arduino nano.

The connections for the battery are given as a positive terminal to $V_{\rm in}$ of Arduino nano and a negative terminal to the ground of Arduino nano.

The connections for the buzzer are given as a positive terminal to D13 in Arduino nano and a negative terminal to the ground of Arduino nano.

The connections for the vibration motor are given as a positive terminal to D8 of Arduino nano and a negative terminal to the ground of Arduino nano.

The connections are given in an above-mentioned way on PCB using jumper wires and soldered perfectly for accuracy and precision to avoid errors and process the output.

Then the code is given to Arduino nano for different ranges to get the output to alert the person. The obstacle ranging far distance has the low buzzer sound, as the distance decreases the buzzer sound increases, and at the nearest distance, we will be able to get the high buzzer sound along with the vibrations from the vibration motor to alert the person to indicate more danger [5] - [6].



Fig.3. Prototype model of the device (3)

V. RESULT AND DISCUSSION

The method was constructed keeping visually challenged persons in mind. This technology assists visually impaired persons in a variety of situations and reacts to the user in any setting. The blind person can easily meet all of the conditions by using an ultrasonic sensor and an Arduino board.

The device will be able to sense the obstacles which are in the direction of the ultrasonic sensor within the predefined range and the alerting system is structured in a way having different ranges which will be helpful for the person to estimate the obstacle easily by hearing to the buzzer sound and the nearest obstacles will be having the vibration along with the buzzer to indicate the utmost danger to the blind people carrying out the device.

VI. CONCLUSION

As a result, the obstacle detection system for blind projects has enabled blind people to live freely, allowing them to carry out their everyday activities with ease and confidence while maintaining a high level of security. This Arduino-based solution for blind people is simple, affordable, and easy to transport and maintain. This technology can search for and detect obstructions in all directions, regardless of the object's height or depth. If the building is done properly, the blind will be able to have the taste sight and travel freely from one location to another without the assistance of others.

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