Vel Tech
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R&D Institute of Science and Technology
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IOT BASED BLIND ASSISTANCE

1156EC701 - MAJOR PROJECT
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VIVA VOCE

COMMUNICATION DOMAIN

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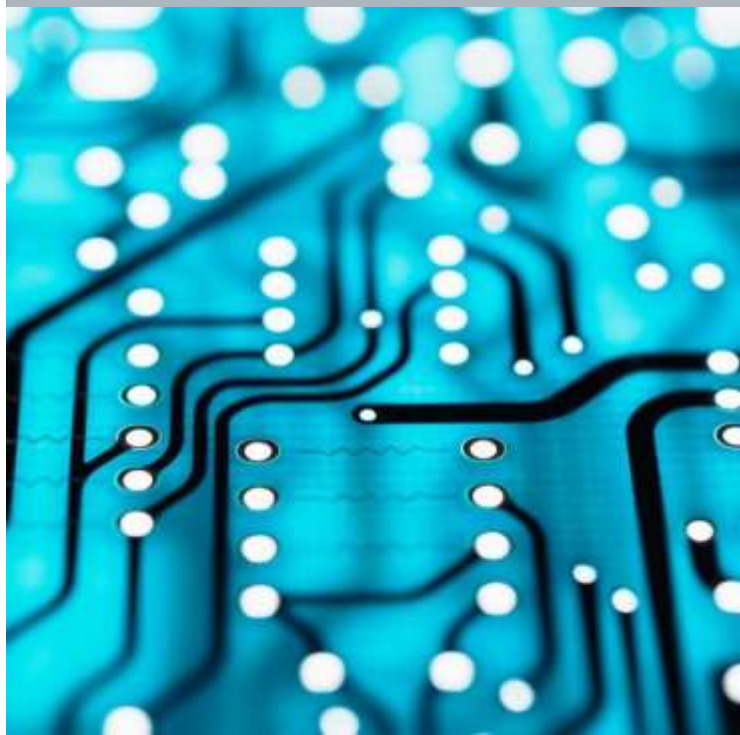


ABSTRACT

- Blindness is one of the more feared affliction in this evolving world. It is very difficult to travel to a desired distance and to find the desired object which is present in front of the blind people. Blind people relay on some people for their work to be done.
- On a daily basis, they struggle with navigation. The usage of walking sticks has become customary for the same reason. Although, there are a lot of limitation of just relying on a blind stick.
- A more suitable method is needed which will alert the user about the obstacle and should also be of assistance in guiding the user to their location.
- As per the above requirements we proposed a system that provides a virtual eye in the form of smart stick to the blind people so that they can lead their own life without the help of the other people.
- The proposed system is designed to detect obstacles using a combination of sensors including Ultrasonic, Fire, Water, Temperature, and LDR. The system includes an Arduino Nano and a speaker that produces an output sound alerting the user about the obstacles ahead.
- The integration of fire and water sensors is crucial in detecting potential hazards in the user's path, such as a fire or water puddle, providing alerts through the speaker. Temperature sensors identify the temperature of air in the surroundings, and LDRs detect changes in light levels. The vibration motor provides additional feedback for obstacle detection.

OBJECTIVE

- To develop a system that can detect obstacles and other surrounding things in the path of a visually impaired individual using ultrasonic sensors and other sensors like fire, water, temperature sensor.
- To provide the user with audio or tactile feedback to indicate the distance and location of obstacles.
- To improve the user's independence and confidence by providing a reliable tool for navigation.
- To develop a low-cost and accessible solution that can be easily deployed in a variety of settings.

INTRODUCTION

- According to World Health Organization (WHO), there are over 1.3 billion people who are visually impaired across the globe, out of which more than 36 million people are blind. India being the second largest population in the world, contributes 30% of the overall blind population.
- Navigation and traversing is an essential activity that these people struggle with on a daily basis, To assist them with the same, in this work we propose a system that uses a glove/glasses to replace the use of a navigation stick.
- The goal is to provide a “secondary sight” until they have enough resources required to treat them. People with untreatable blindness can use this to make their everyday tasks much easier and simple.
- This project is helps blind people to map their world using the sense of hearing. It’s a visual based project consisting of few main components such as sensors, Arduino and speaker mounted together.
- The input of the project will be an obstacle, when the object is detected in the range of the sensor the vibration motor will send the signals to the buzzer through microcontroller, that an object is detected in the given range. Hence the object is detected and audio information is conveyed to the blind person through buzzer.

EXISTING SYSTEM

The fear of blindness is prevalent in today's evolving world. For blind people, the traditional cane stick has been the primary means of mobility and navigation. Despite being a useful tool, it has several limitations :

- One of the significant drawbacks was that it only detected obstacles when the blind person physically touched them, leaving room for accidents and collisions.
- Additionally, the cane stick could not detect low-lying objects, making it difficult for the user to navigate around them.
- This often resulted in an increased level of dependence on others and lower confidence levels.
- To overcome these limitations, we proposed a system that utilizes ultrasonic sensors to detect obstacles. This system aims to provide an additional layer of protection to the visually impaired individuals, enhancing their independence, confidence and mobility.

LITERATURE SURVEY

S.NO	Title of the Paper	Journal Name with Year	Inference
1.	Varalakshmi and Mr. S. Kumarakrishnan, “Navigation System for Visually Challenged Using Internet of Things”,	IEEE International Conference vol. 12 no 3, 2019	• Develop a smart walking stick using ultrasonic sensor which is used as navigational tool. • IOT sensors (UV, Infrared) are used to detect the obstacles and provide the alternate way to the visually impaired through GSM and also calculates the shortest distant to the destination for their convenience.
2.	JinqiangBai, “Virtual-Blind-Road Following Based Wearable Navigation Device for Blind People, indoor navigation and tracking”,	IEEE Transaction vol.12 no. 5, 2019	• To help the blind people walk to the destination A wearable navigation device is proposed. • To guide the users to the destination and help them bypass obstacles at the same time

S.NO	Title of the Paper	Journal Name with Year	Inference
3.	N. S. Mala, S. S. Thushara, and S. Subbiah, “Navigation gadget for visually impaired based on iot”.	IEEE Comp. and Comm. Tech. Conf. IEEE, 2021	• Developing a gadget that is, a walking stick and a Bluetooth headset (wearable), for blind people. • This Device is mounted with GPS tracker which helps in finding the person. • The headset and the proposed stick are paired using Bluetooth Stick
4.	Arnesh Sen Kaustav, Sen Jayoti Das, “Ultrasonic Blind Stick For Completely Blind People To Avoid Any Kind Of Obstacles”	IEEE Conference, vol. 12 no. 7, 2020	• To design an artificial navigating system with the help of ultrasonic proximity sensor and a GPS module to assist these blind persons. • This system can detect any type of upcoming obstacles and potholes using the reflection properties of ultrasound.
5.	Milios Awad, Jad El Haddad, Edgar Khneisser, “Intelligent Eye: A Mobile Application for Assist-ing Blind People”	IEEE Conference vol.15 no.12,2018	• The Intelligent Eye android mobile application presented the application provides assistance to visually impaired people by providing a set of useful features: light detection, colour detection, object recognition, and banknote recognition.

WORKING PRINCIPLE

- The project uses five different sensors, including the ultrasonic sensor, flame sensor, water sensor, LDR sensor, and temperature sensor. Each sensor sends a signal to a microcontroller Arduino, which processes the data and provides feedback to the user through speaker.
- The data collected by the sensors is processed by the microcontroller, which then provides feedback to the user. For instance, the fire sensor detects the presence of fire and sends a signal to the microcontroller, which triggers an alarm to alert the user.
- Similarly, the water sensor detects the presence of water and sends a signal to the microcontroller, which can be used to alert the user of potential slippery surfaces.
- The LDR sensor measures the ambient light level, and the microcontroller can use this information to adjust the feedback device's brightness level, making it easier for the visually impaired to see the feedback.
- The temperature sensor detects the temperature of the environment and sends a signal to the microcontroller, which can be used to adjust the feedback device's temperature indicator.
- Finally, the ultrasonic sensor detects objects in the path and sends a signal to the microcontroller, which triggers the vibration motor or LED to alert the user of potential obstacles.

METHODOLOGY

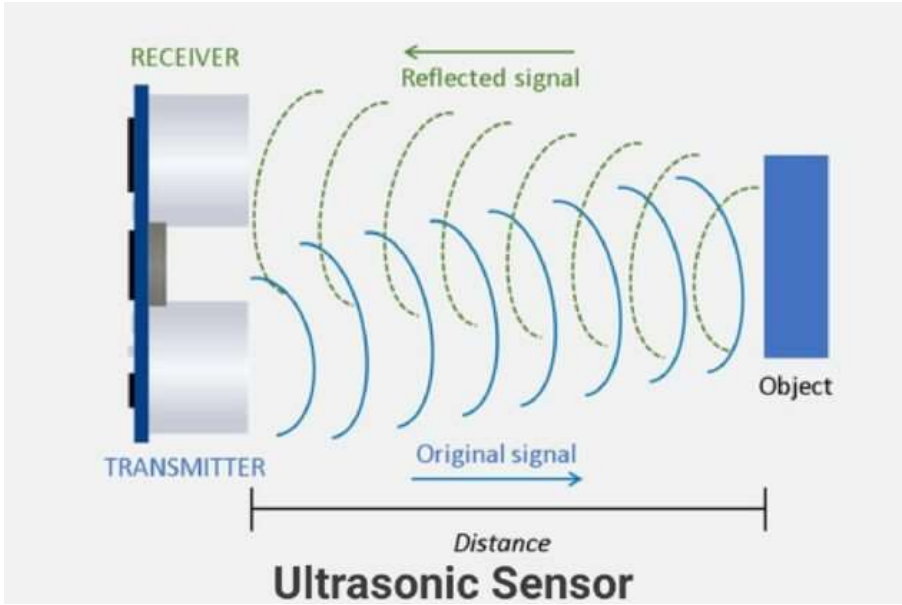
- We propose an innovative system for visually impaired individuals, consisting of a smart stick that utilizes five different sensors to detect and alert the user of potential obstacles in their surrounding environment. The system aims to enhance user safety, promote independence and enable better mobility.
- The system comprises a flame sensor that can detect fire and send a signal to the microcontroller, alerting the user of any potential fire hazards.
- A water sensor is also integrated to detect the presence of water, which can alert the user of potential slippery surfaces.
- The Light Dependent Resistor (LDR) sensor measures the ambient light level, and the microcontroller uses this information to adjust the feedback device's brightness level, making it easier for the visually impaired to see the feedback.
- The temperature sensor detects the temperature of the environment and sends a signal to the microcontroller, which can be used to adjust the feedback device's temperature indicator. This feature can be particularly helpful in extreme weather conditions, where users may need to adjust their clothing or take extra precautions.

METHODOLOGY

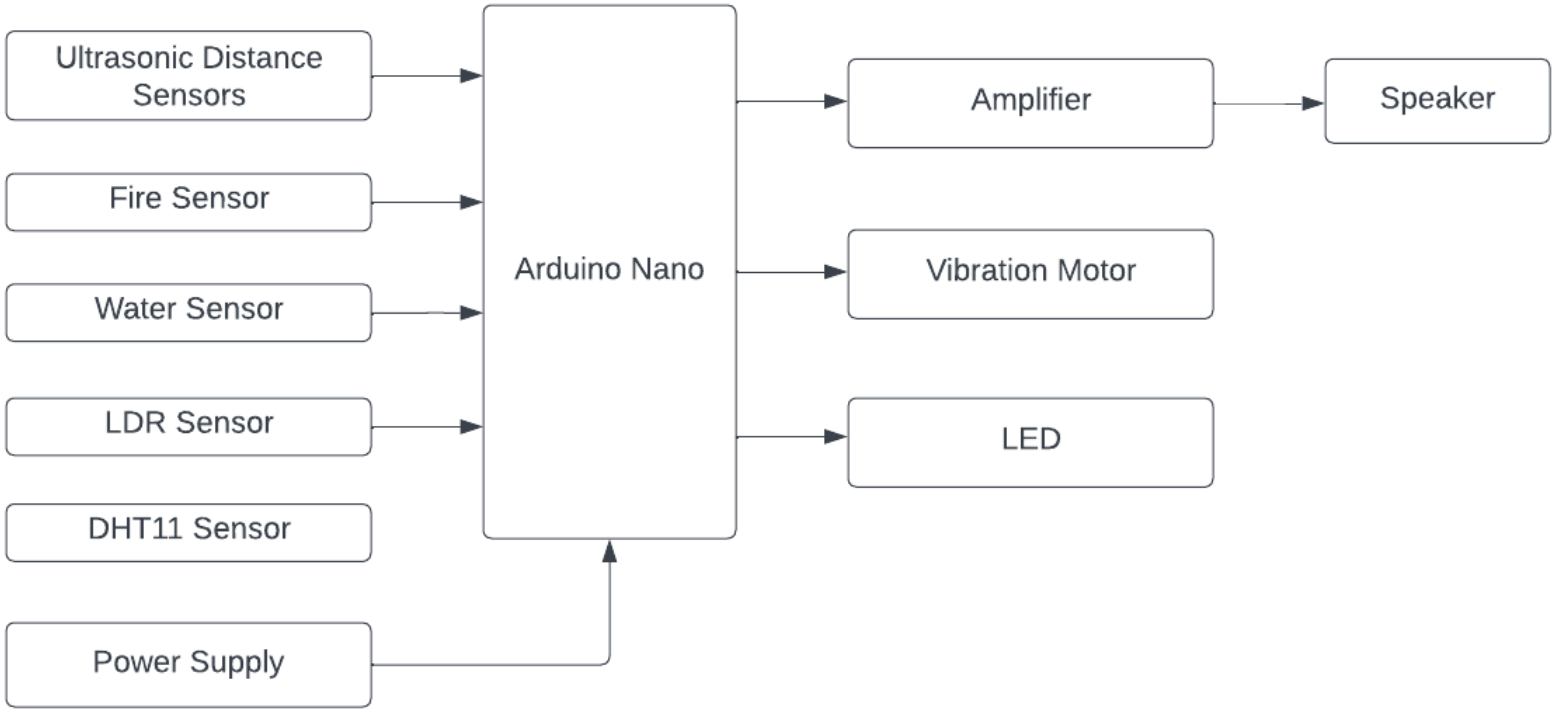
- Finally, three ultrasonic sensors are paired with a vibration motor and buzzer to detect objects in the user's path. The sensors cover left, front, and right directions, allowing for maximum coverage.
- When an obstacle is detected within a range of 0-25cm in a particular direction, the respective vibration motor vibrates, and the buzzer sounds to alert the user.
- The smart stick provides users with real-time feedback on their environment, enabling them to navigate their surroundings more safely and effectively.
- The system's ability to detect potential hazards such as fire, water, and obstacles, coupled with its customizable features, makes it an affordable and accessible solution for visually impaired individuals, promoting their independence and autonomy.

WORKING OF ULTRASONIC SENSOR

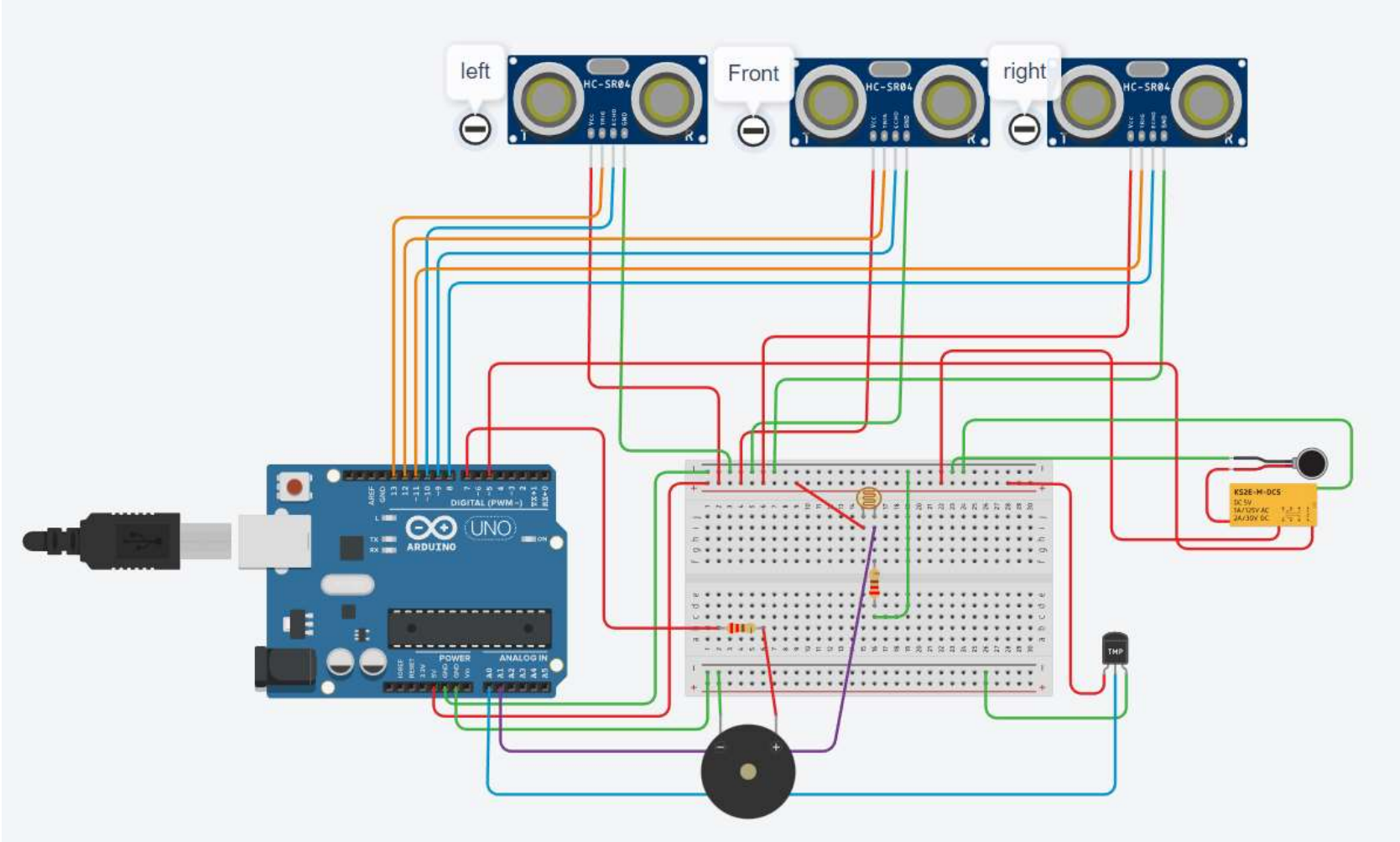
- The HC-SR04 Ultrasonic sensor is equipped with a transmitter and receiver module that operates on ultrasonic sound waves with a frequency of 40Khz.
- The transmitter emits the sound wave, which travels through the air until it reaches an object or obstacle. The sound wave then bounces back and is captured by the receiver.
- By measuring the time it takes for the signal to bounce back, the distance between the object and the sensor can be calculated, since the speed of sound is a known value.
- To generate the ultrasonic sound, the Trig Pin must be set to a high state for 10 µs, which sends out an 8-cycle burst of sound waves. These waves travel at the speed of sound and are bounced back, eventually being received by the Echo pin.



BLOCK DIAGRAM



CIRCUIT DIAGRAM

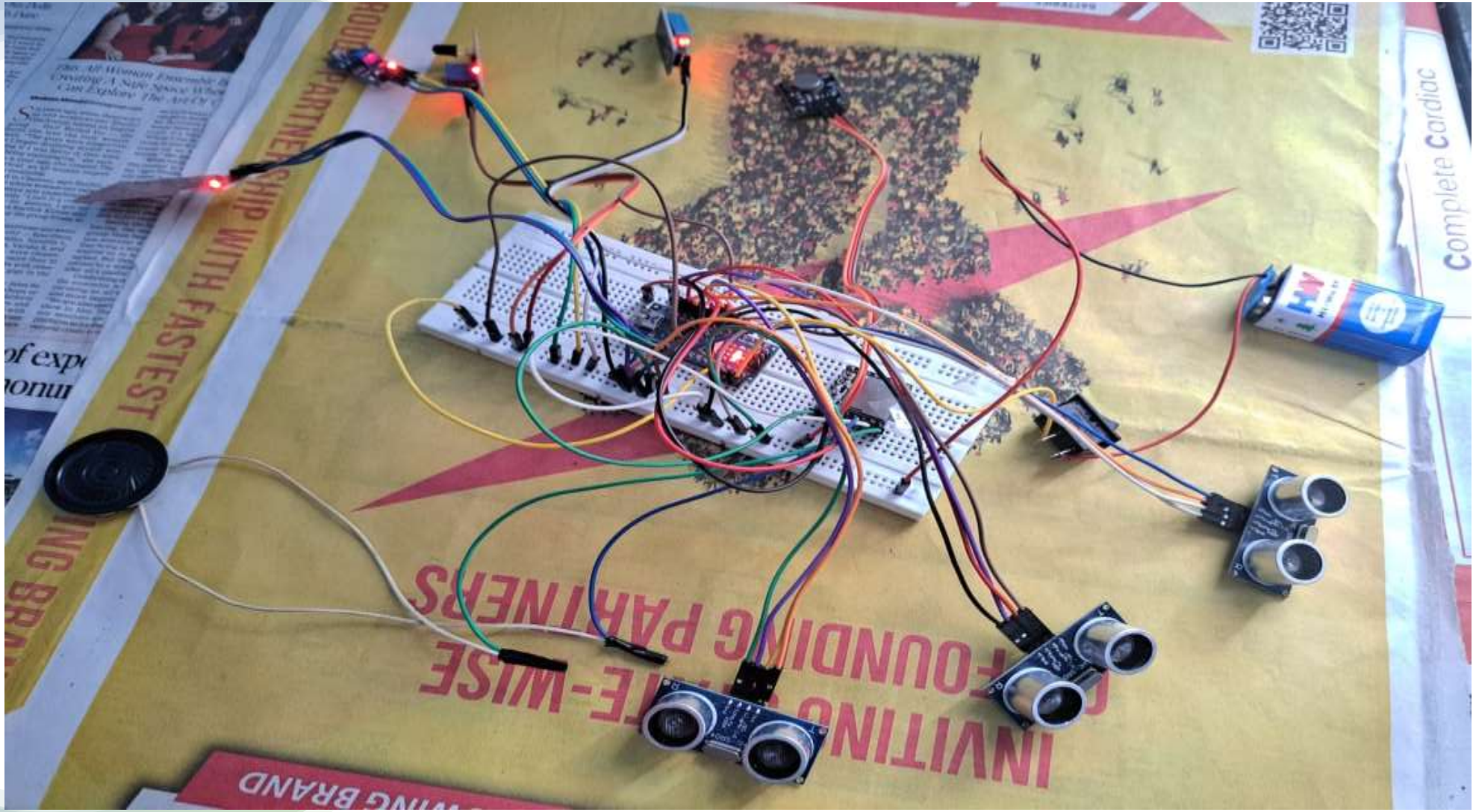


SOFTWARE USED

HARDWARE COMPONENTS

- Arduino Nano
- Breadboard
- Ultrasonic Sensor
- Fire Sensor
- Water Sensor
- DHT11 Temperature Sensor
- LDR Sensor
- Vibration Motor Module
- Speaker
- HW 9 Volt battery
- Resistors

COMPLETED CIRCUIT CONNECTION



ADVANTAGES OF OUR PROPOSED SYSTEM

- The project helps detect fire, water, light, and temperature levels for hazard avoidance and adapting to different environments.
- The project is affordable, with a total cost of less than 2000 INR. The components needed are readily available and inexpensive, and the instructions for assembly and programming are simple, making it accessible to those with limited technical knowledge or resources.
- The project also offers scalability and customization options. Additional sensors can be added to provide a broader range of detection, and the location and intensity of the vibration motor can be adjusted to fit the user's preferences. This allows for the project to be tailored to the individual user's needs, providing a more effective solution for their specific situation.
- The project is flexible and can be personalized to meet the user's unique requirements. The vibration motor's triggering threshold and the LED's position and intensity can be modified based on the user's preferences and specific circumstances.
- Additionally, the project can be adapted to suit the specific needs and preferences of the user, and promotes independence and autonomy, allowing the visually impaired to move around more freely and confidently.

CONCLUSION

- The proposed system is an innovative solution to address the challenges faced by visually impaired individuals. The system utilizes five sensors, including ultrasonic, fire, water, light, and temperature sensors to provide comprehensive feedback to the user. The ultrasonic sensors detect obstacles in three directions, while the fire, water, light, and temperature sensors provide crucial environmental information. The system is customizable, allowing users to adjust the threshold for triggering vibration motors and the location and intensity of the LED. Moreover, the system is cost-effective, scalable, and easy to assemble, making it accessible to a wide range of users. By providing a tool to help visually impaired individuals navigate their environment safely and independ-ently, the system promotes greater autonomy and confidence. Overall, the proposed project with five sensors offers several advantages over existing blind assistance systems, including its comprehensiveness, affordability, and ease of use.

FUTURE SCOPE

- One possibility for future scope of our project is to integrate machine learning and artificial intelligence techniques to improve the accuracy of obstacle detection and provide more advanced assistance for visually impaired individuals.

- By collecting and analysing data from the ultrasonic sensors, vibration motors, and other sensors, you can train a machine learning model to better identify different types of obstacles and provide more specific and personalized feedback to the user. This can be achieved by using deep learning algorithms to analyse and classify different types of objects based on their shape, size, and texture.

- Additionally, integrating GPS technology and mapping software can provide users with more comprehensive guidance and information about their surroundings. By combining the information from ultrasonic sensors and GPS, the system can provide more detailed descriptions of landmarks, intersections, and other relevant information to help visually impaired individuals navigate their environment more safely and efficiently.

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