

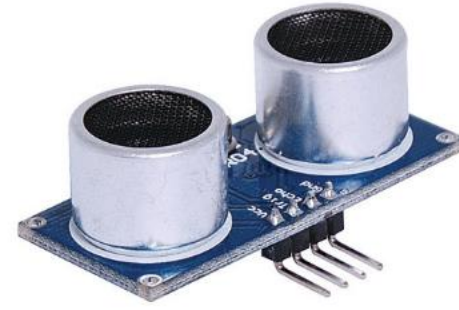


Arduino avengers
Squad

Third eye for blind community using Arduino



● Part 1: Introduction

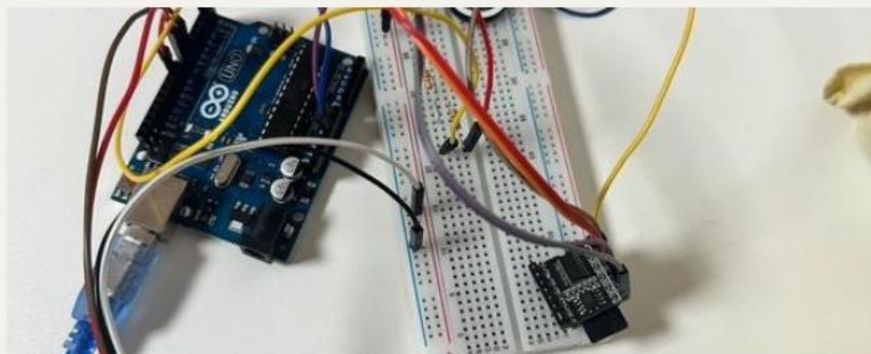


Goals

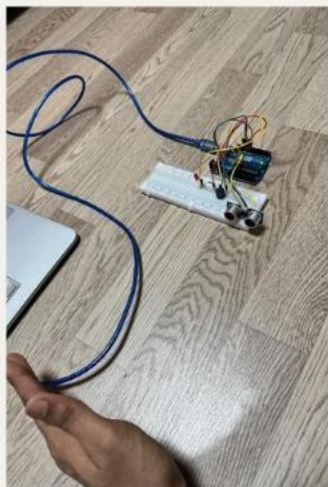
To create a cost-effective, assistive device for the visually impaired using Arduino Uno that detects obstacles and alerts users through vibrations or audio feedback, enhancing their mobility and safety.

Key achievements

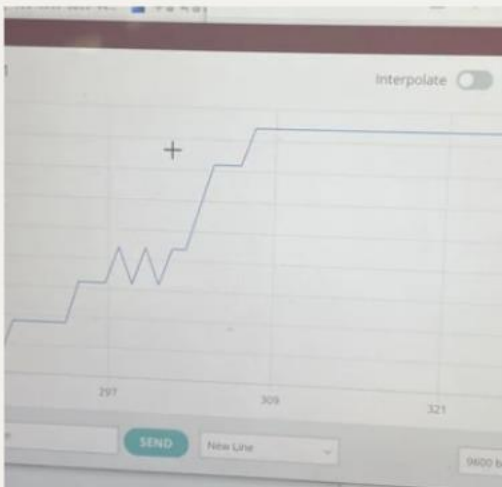
- Project Proposal and Roadmap: Finalized project plan and goals
- Prototype Design: Developed a working prototype with obstacle detection
- Sensor Integration: Implemented ultrasonic sensors for accurate distance measurement
- Testing and Validation: Conducted extensive testing to ensure device reliability



Ultrasonic Prototype



Testing



Part 1: Introduction

Key Achievements:

- **Ultrasonic Sensor (HC-SR04):** Accurate obstacle detection within a specific range
- **Buzzer Module:** Provides audio feedback when an object is detected
- **Vibration Motor:** Delivers tactile feedback for immediate user response
- **Arduino Uno Integration:** Central control for all sensors and modules



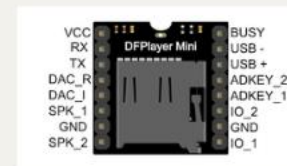
Ultrasonic



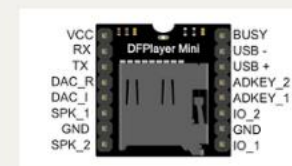
Speaker



Servo motor



Df Mini Player



Sd card

Part 1: Introduction

Limitations

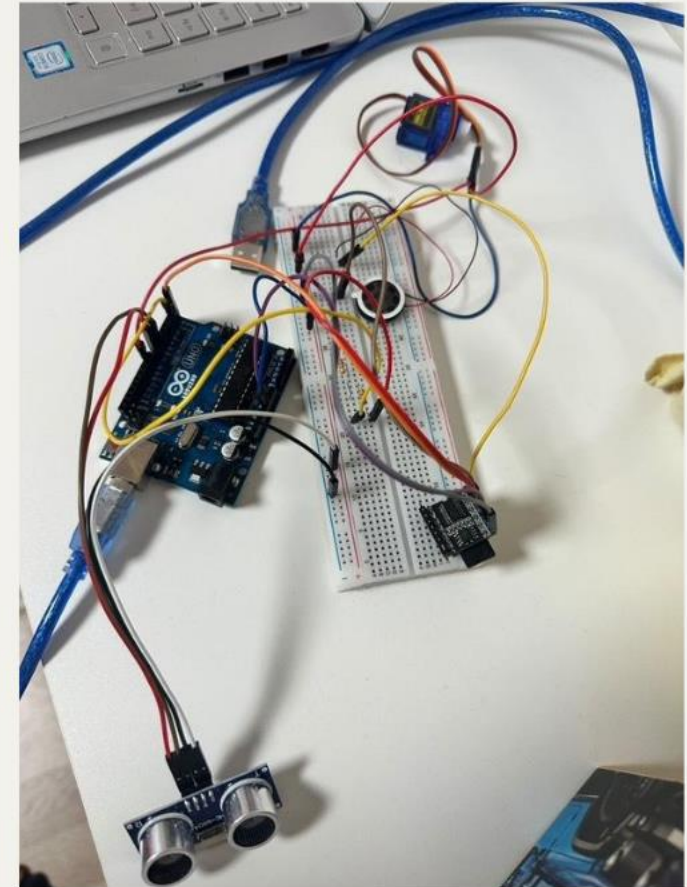
- Limited detection range due to sensor constraints
- Environmental factors like rain may affect sensor accuracy
- Limited audio output due to a basic buzzer module
- Audio speaker functional error.
- Only limited command programming language.

Part 2: Summary

Purpose

Our Solid Goal

To enhance the independence of visually impaired individuals by providing real-time obstacle detection and feedback using cost-effective hardware components.



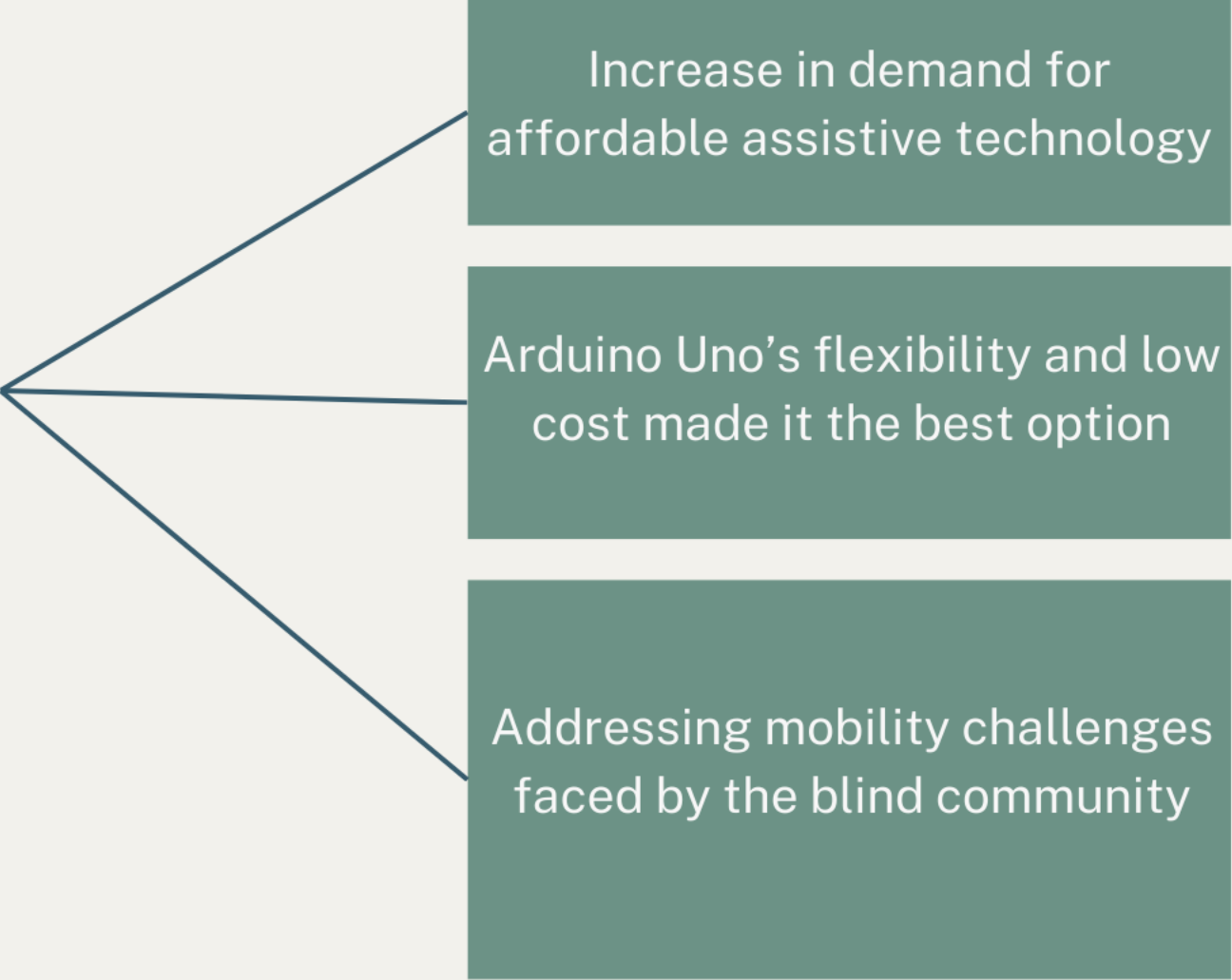
Part 2: Summary

Background

In order to enhance the mobility and safety of visually impaired individuals in real-world environments, we decided to create an assistive device using Arduino Uno that provides real-time obstacle detection and alerts through vibration and audio feedback.

Given Task:

- Use more sensors
- Develop a reliable obstacle detection system
- Integrate Arduino Uno as the central controller
- Provide real-time audio and vibration feedback
- Perform live-demo during the presentation



Increase in demand for affordable assistive technology

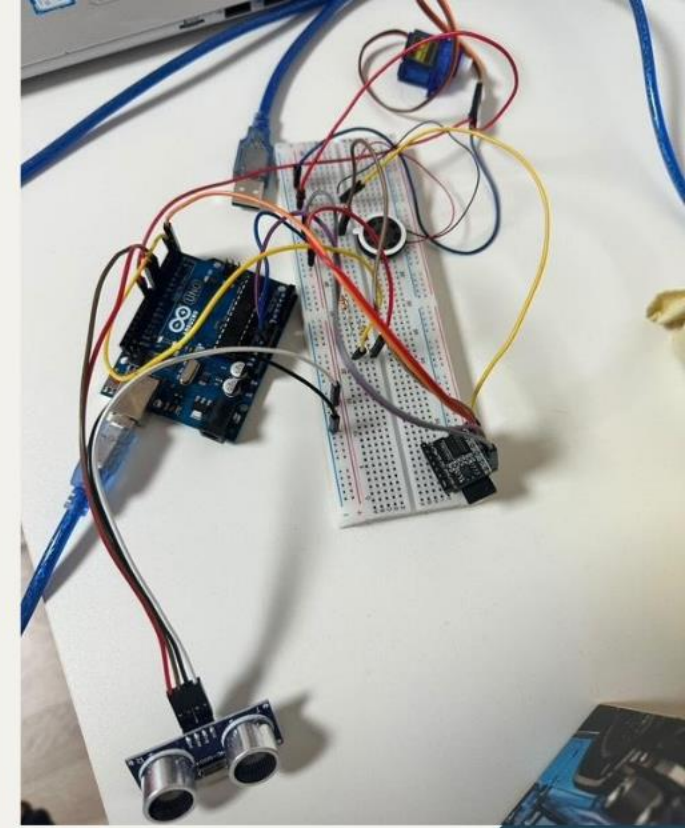
Arduino Uno's flexibility and low cost made it the best option

Addressing mobility challenges faced by the blind community

Part 2: Summary

Project Scope

- **Hardware Integration:**
- Use Arduino Uno as the central control unit.
- Integrate ultrasonic sensors for obstacle detection.
- Connect a buzzer and vibration motor for feedback.
- **Software Development:**
- Develop an Arduino-based program for obstacle detection.
- Implement real-time response triggers for audio and vibration alerts.
- **Testing and Validation:**
- Conduct multiple tests in different environments.
- Ensure accurate obstacle detection and reliable feedback.
- **Deployment:**
- Create a portable, user-friendly device.
- Perform a live demonstration during the project presentation.



Part 2: Summary Milestone

Milestones	Description
Milestone 1: Circuit design and hardware assembly	<ul style="list-style-type: none">◦ Identify the project and create a design.◦ Project discussion◦ Role Distribution
Milestone 2: Sensor integration and testing Date: November 9,2024	<ul style="list-style-type: none">◦ Identify the sensor that are suitable for the project use case◦ Conduct a throughly research of the selected sensor and its capability◦ Research about the cloud providers (df player, Hcsr04)
Milestone 3: Initial Set Up Date: November 16, 2024	<ul style="list-style-type: none">◦ Seperately testing each sensor to ensure every components are working

Part 2: Summary Milestone (Cont)

Milestones	Description
Milestone 3: Data processing and feedback mechanisms Date: November 17,2024	<ul style="list-style-type: none">◦ Every time testing with changing codes
Milestone 4: Project Kick-Start Date: November 20, 2024- December 10, 2023	<ul style="list-style-type: none">◦ Connecting Df player◦ Using sensor◦ Using Speaker◦ Visualizing Data◦ Data processing and feedback mechanisms
Milestone 5: Project Completion Date: December11, 2024	<ul style="list-style-type: none">◦ Documented final project progress◦ Project Completion Presentation◦ Field testing and final adjustments

A close-up photograph of an Arduino Uno microcontroller board mounted on a white breadboard. The board is populated with several integrated circuits, including a black IC with '74VHC04' printed on it. A small, round, silver-colored buzzer is connected to the board with jumper wires. Numerous colorful jumper wires (red, yellow, blue, black, white) are connected between the breadboard's power rails and various pins on the Arduino. The background is a plain, light-colored surface.

Part 3: Execution

Project Design

- **Arduino Circuit:** Connect sensors, buzzer, and vibration motor
- **Power Supply:** 9V battery for portable operation
- **Feedback Mechanisms:** Audio and vibration alerts for obstacle detection

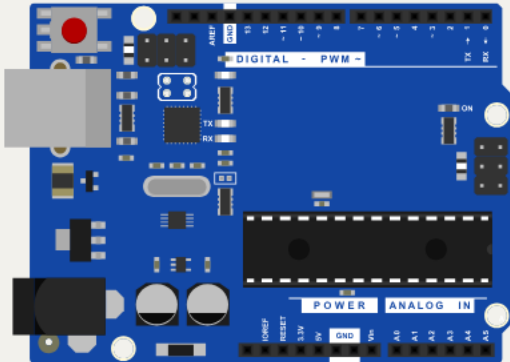


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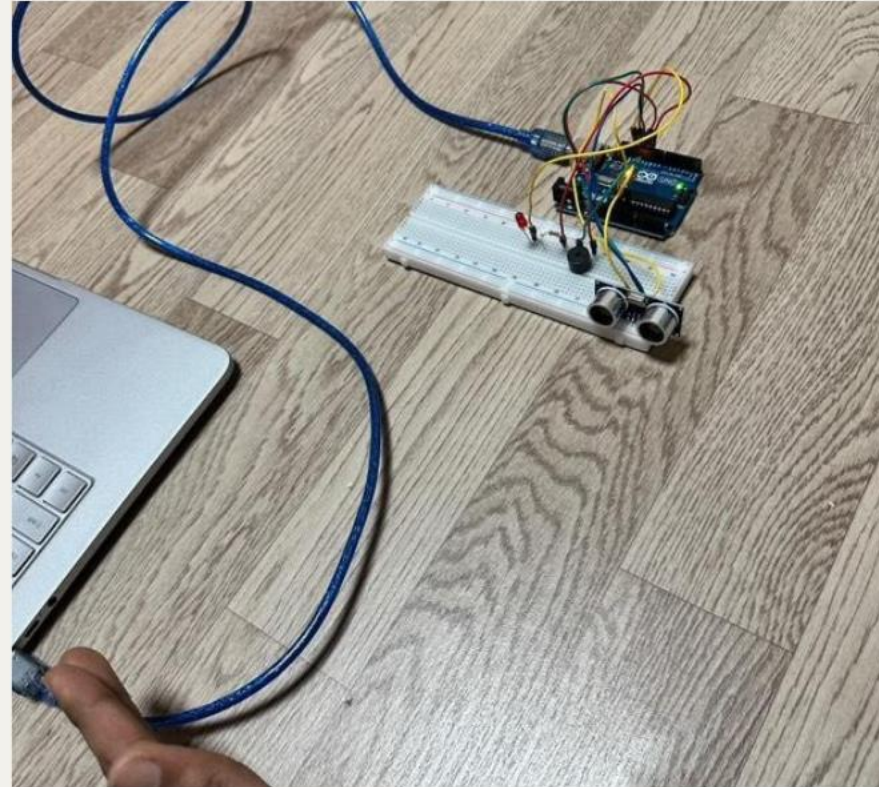
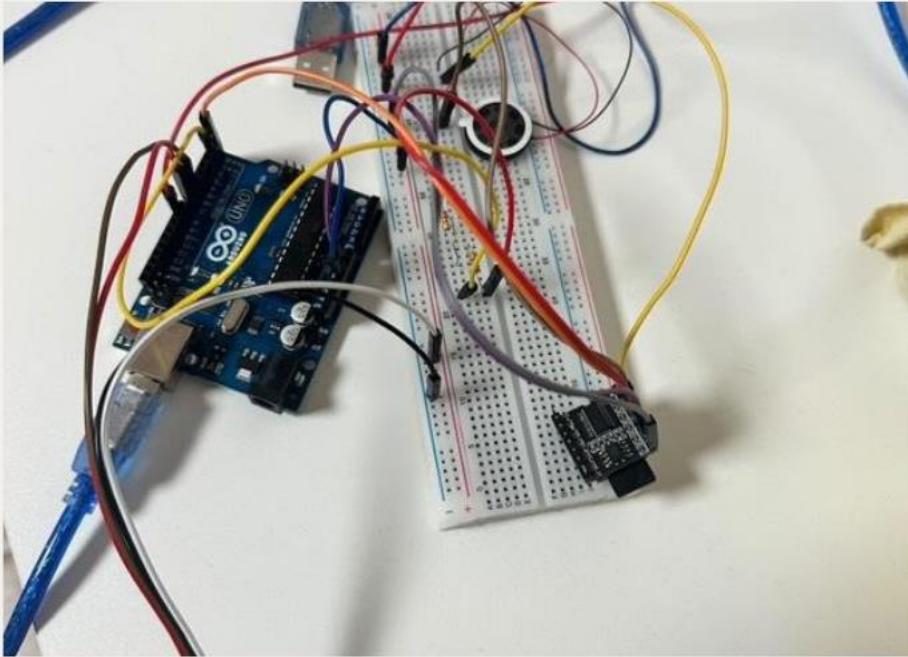
Project Design

Model Workflow

- Assemble Arduino circuit and connect sensors
- Detect objects using the ultrasonic sensor
- Trigger buzzer and vibration motor when obstacles are detected
- Provide real-time feedback to the user
- Further addition.



Step 1. Assemble Arduino Circuit and Connect all Sensors



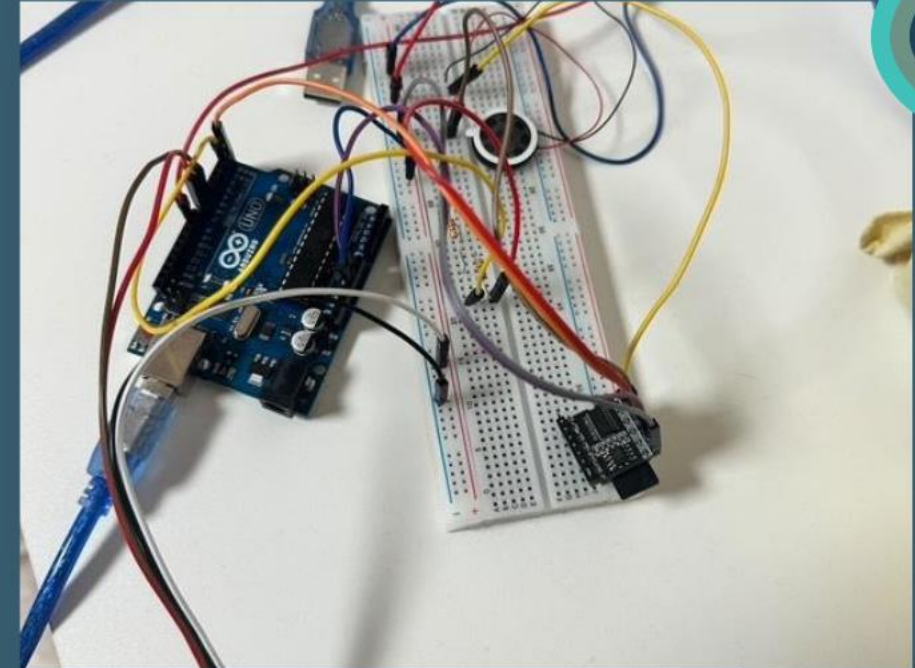
Decision:

- To choose HCSR04, Df player and speaker for voice assistance

Reason:

- For measuring distance and then giving the command by vibration or voice assistance they are fruitful.

Step 2. Detect objects using the ultrasonic sensor



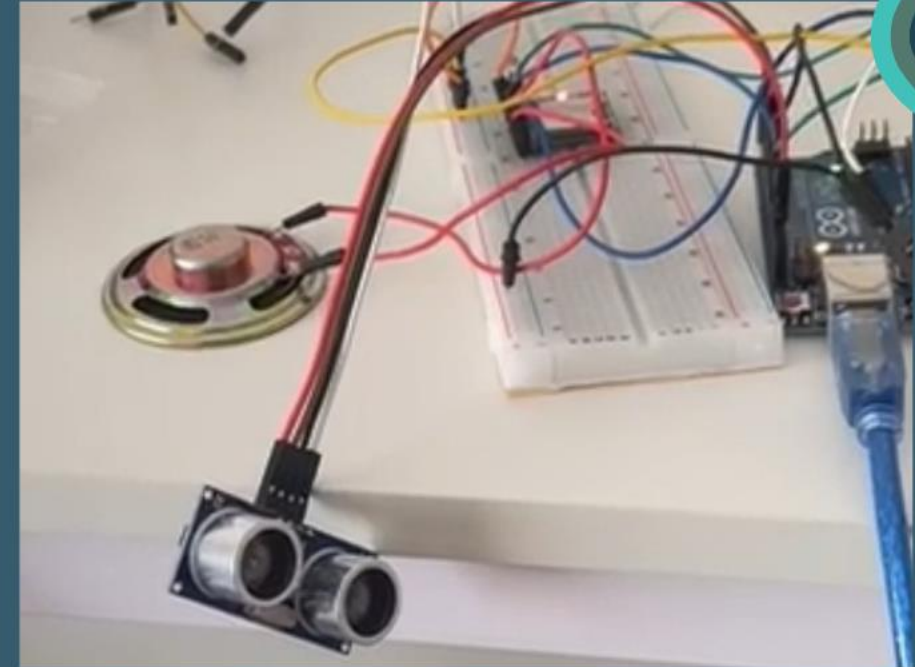
Decision:

- Ultrasonic sensor for the detection of objects

Reason:

- Ultrasonic sensor measures distance to the object so according to our goal this sensor was the perfect choice from the kit and the best choice

Step 3. Trigger buzzer and vibration motor when obstacles are detected



Decision:

- Ultrasonic df player and speaker for the sounds while detecting the objects

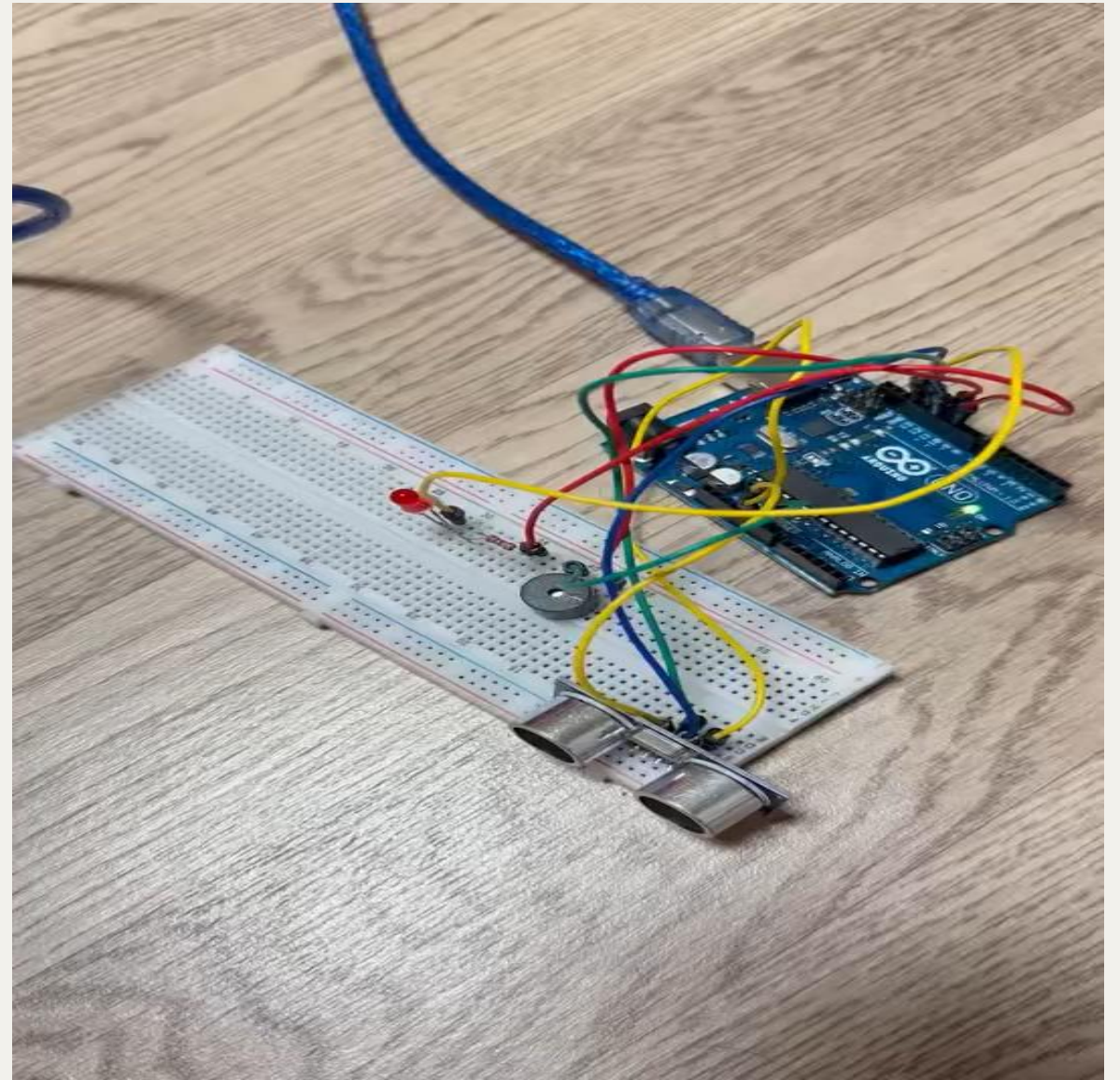
Reason:

- Voice assistance to the blind people.

01

Project Design

Step 4. Real time feedback to the user



02 Challenges Solved

1. Power Supply

- Switched to a reliable 9V battery for portability

2. Sensor Calibration

- Fine-tuned ultrasonic sensors for better accuracy
-

3. Feedback Output

- Enhanced buzzer and vibration feedback strength

4. Real-Time Monitoring

- Detecting objects and then giving direction
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How the purpose of the project is accomplished in the final design & execution?

- Fully functional prototype tested successfully
- Accurate and responsive obstacle detection
- Cost-effective assistive device with real-time alerts
- Met project goals by enhancing the mobility of visually impaired individuals
- Tested multiple times for the better performance analysis.



- **Fully functional prototype tested successfully**
- **Accurate and responsive obstacle detection**
- **Cost-effective assistive device with real-time alerts**
- **Met project goals by enhancing the mobility of visually impaired individuals**

Part 4:

Conclusion and Recommendations

- Despite challenges like environmental factors and hardware limitations, the project achieved its primary goal.
- **Future improvements could include:**
- Adding more sensors for wider obstacle detection
- Upgrading to a more advanced audio system
- Implementing Bluetooth connectivity for device tracking
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