Smart Stick for the Blind

Introduction

The Traditional stick which the blind people use does not fulfill the requirements of the modern world. The Smart stick is a device for the visually impaired to guide the user to respective destination and avoiding to collide with the obstacles which is done with the help of a microcontroller (Arduino Uno), a sensor (UltraSonic Sensor: HC-SR04) and a buzzer.

High Level Requirements

The Smart Stick must be able to perform the following operations:

- To detect the distance of any object which comes infront of the ultrasonic sensor
- To provide warning in form of sound with help of Buzzer when the distance between the stick (ultrasonic sensor) and the object is too less

Low Level Requirements

Low level requirements must have

- Interface HC-SR04 (UltraSonic sensor) with Arduino Uno
- Interface LCD With Arduino uno
- Interface Buzzer with Arduino Uno

Component Description

- **Power Supply:**
  - External source of power supply that powers all devices, switches and microcontroller
- **Microcontroller:**
  - Performs all operations required by our system. Takes input the signals which the ultrasonic sensor receives and processes them to find the distance between the object and the sensor

- **Ultra Sonic Sensor**
    - Sends and recieves ultra sonic signals which are used to determine distance between the sensor and the object

- **Buzzer**
    - Acts as a device to communicate with the user when any object is too close to it

- **SWOT**

- **Strengths**
    - Easy to understand the application and use it
    - Easy method to check whether the distace between the object is very less by turning on the buzzer
    - Ultrasonic sensors are highly accurate and can detect small variations

- **Weakness**
    - Ultrasonic sensors have difficulties in reading reflections from soft, curved and thin as well as a small object
    - Measuring the distance is limited

- **Opportunities**
    - Used by the visually impared

- **Threats**
    - Other sensors can be used which have greater efficiency than Ultrasonic Sensor
    - Many other similar applications available

- **4W's & 1H**

- **Who**

A visually impaired person.

- **What**

This is a utility application to determine distance and warn the visually impared person if the distance is very less by turning on the buzzer/Leds.

- **When**

While walking

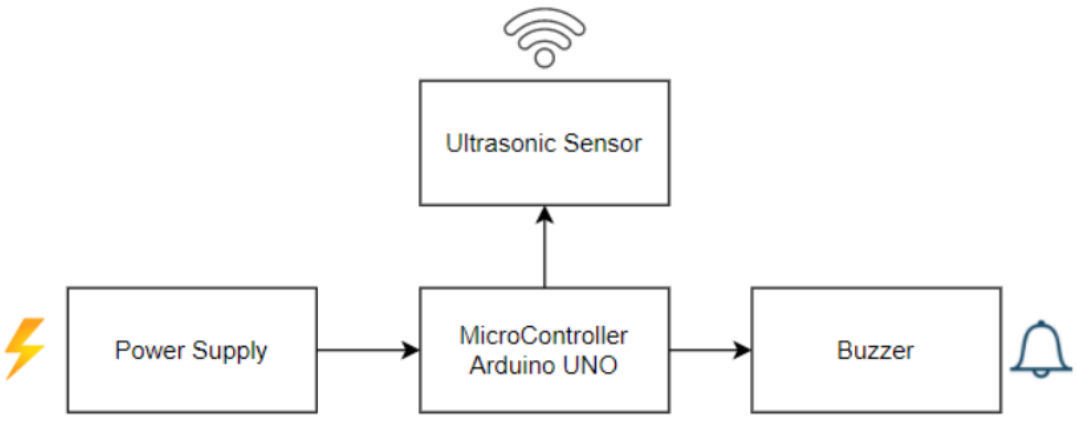
- **Where**

- The user is a visually impaired person who can use this utility to prevent any collisions by warning him

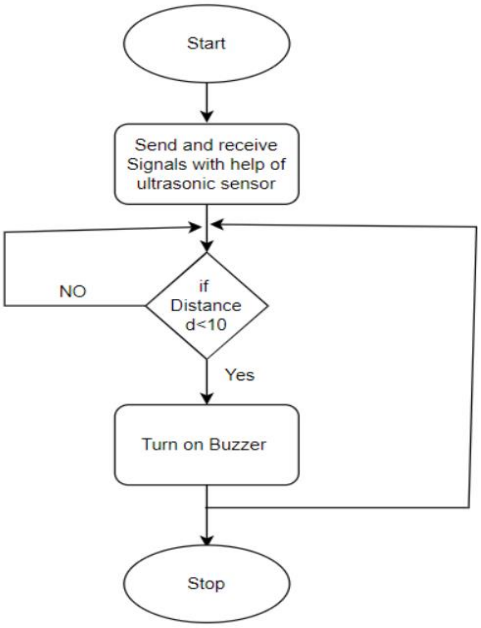
- **How**

Developed using Arduino UNO and implemented on SimulIDE.

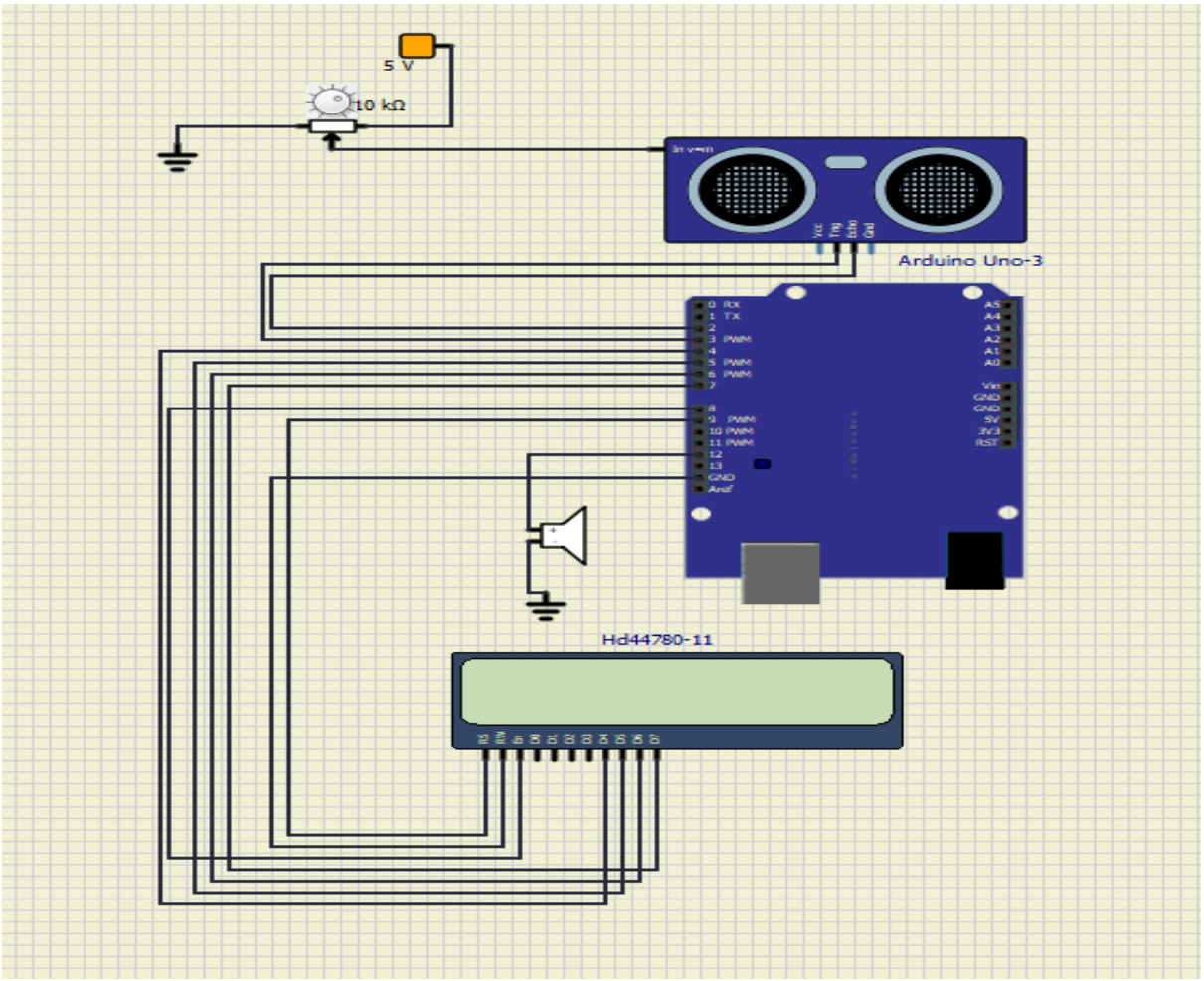
- **Block Diagram**



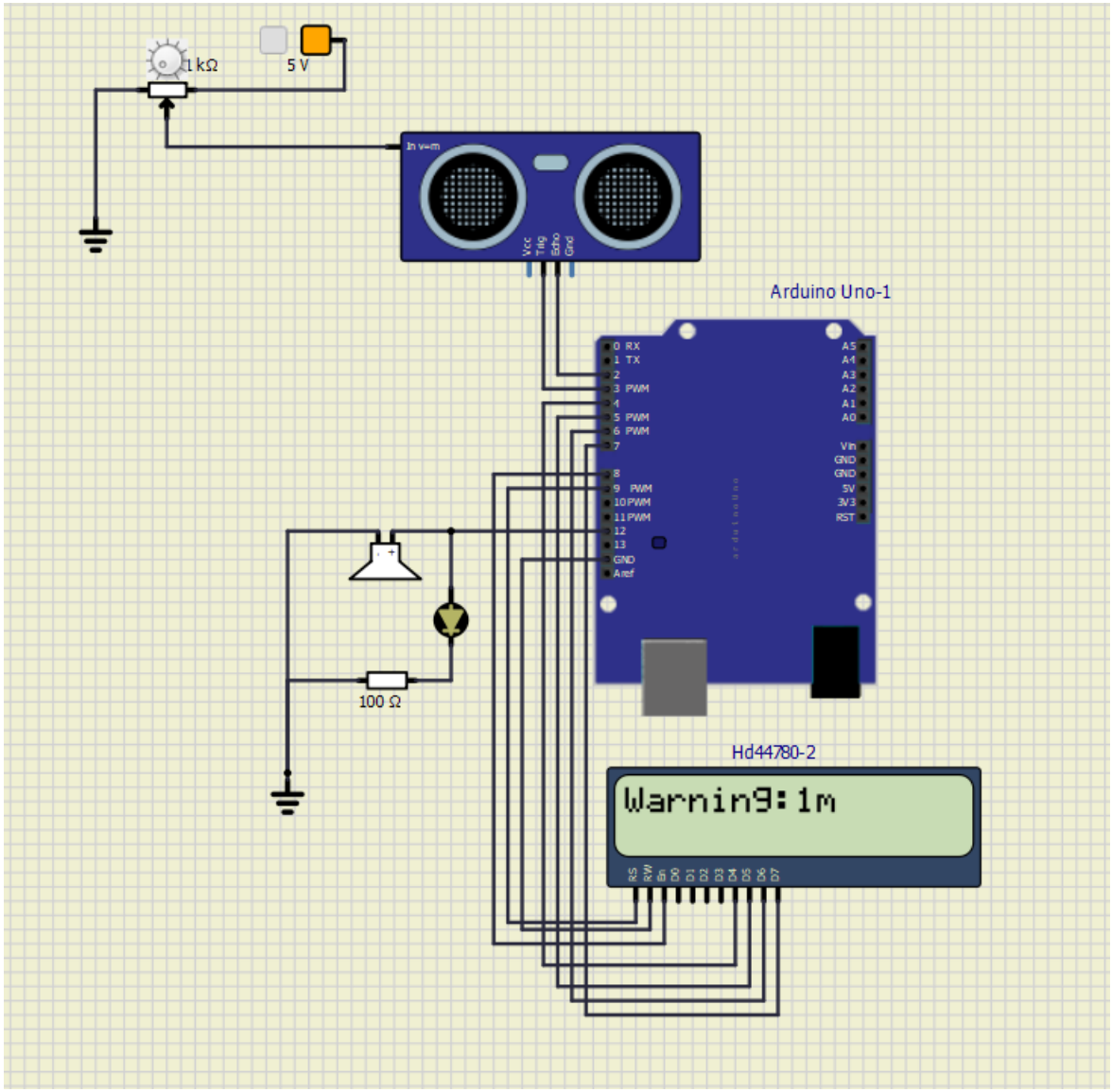
- **Flowchart**



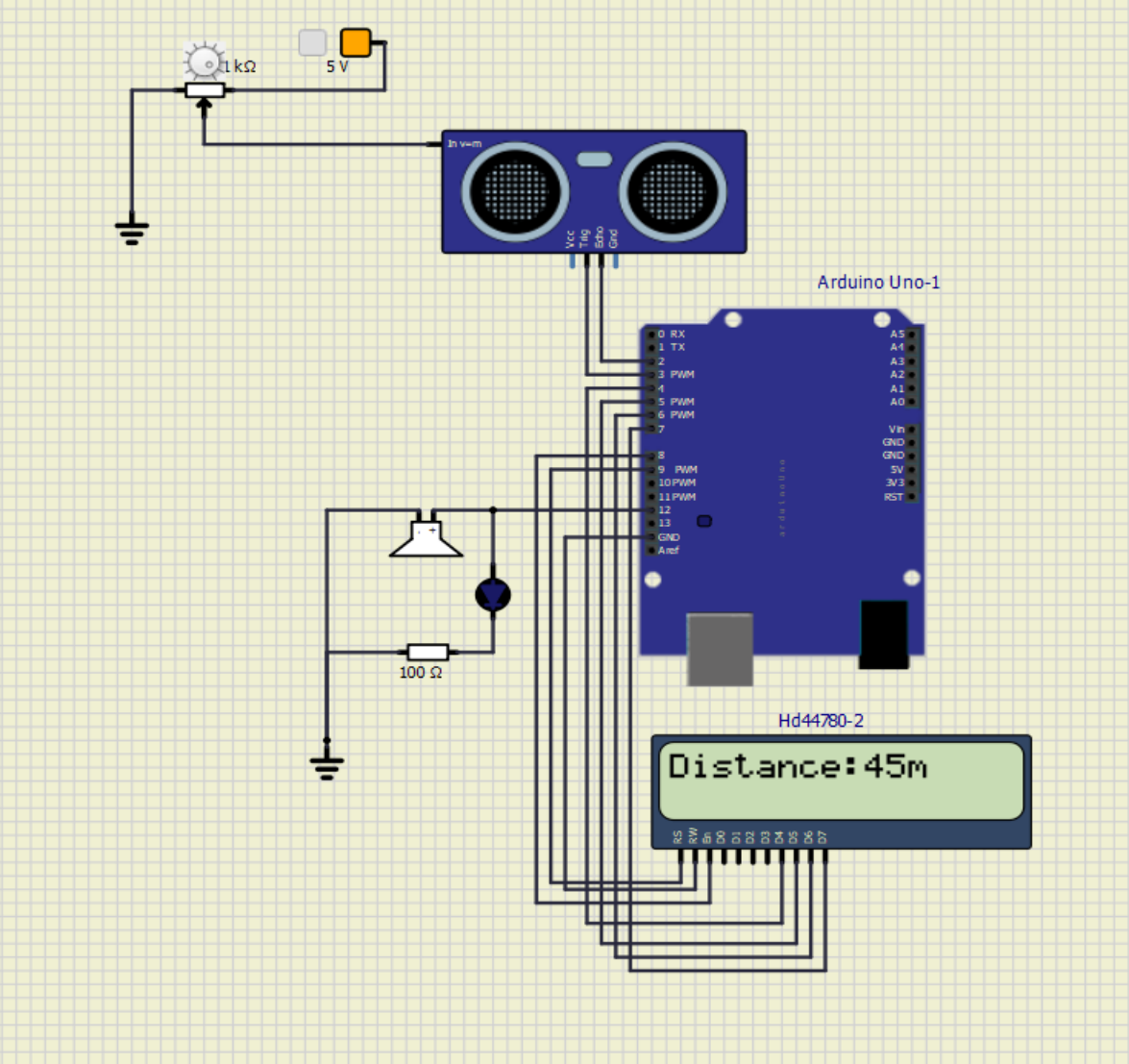
Circuit Diagram



Case 1: Warning when object is too close to the stick



Case 2: No Warning when object is not close to the stick



- **Test Plan and Output**

High level test plan

Test ID	Description	Exp I/P	Exp O/P	Actual Output	Type Of Test
H_01	Integrate Ultrasonic sensor with Microcontroller	None	Succesful Integration	Succesful Integration	Requirement based
H_02	Integrate Buzzer with Microcontroller	None	Succesful Integration	Succesful Integration	Requirement based

Low level test plan

Test ID	Description	Exp I/P	Exp O/P	Actual Output	Type Of Test
L_01	Use Potentiometer to give input to the ultrasonic sensor	-	-	-	Requirement based
L_02	Detect Distance of any object placed infront of ultrasonic sensor	For simulation : Expected input for ultrasonic sensor is given with help of potentiometer	Distance of object from ultrasonic sensor in "cm"	Distance of object from ultrasonic sensor in "cm"	Requirement based
L_03	To power the buzzer if any object is too close to the ultrasonic sensor	Object too close to the ultrasonic sensor	Buzzer sound	Buzzer Sound	Requirement based