Course Title: Peripherals & Interfacing Laboratory

Course No: CSE 3104

Project Title: Smart Blind Stick

Submitted To,

- Md. Repon Islam
  Lecturer, Department of CSE, KUET.
- Md. Badiuzzaman Shuvo
  Lecturer, Department of CSE, KUET.

Submitted By,

- Tasfia Tasnim
  Roll: 1907102
- MST. Rubaiya Raktin Raha
  Roll: 1907111

3rd Year 1st Semester

Objectives:

- To develop a smart blind stick.
- To learn about Arduino Uno and how to use it.
- To incorporate various peripheral features to the project.
- To enhance the safety and independence of visually impaired individuals.

Introduction:

Visually impaired individuals face significant challenges while navigating through their surroundings. The conventional blind stick only assists with basic obstacle detection. But the smart blind stick incorporates advanced technologies and peripheral features, including distance measurement, water detection, and a night indicator. By leveraging components such as Arduino Uno, Ultrasonic sensors, LDR modules, LEDs and rain detector modules. This innovation device aims to provide valuable assistance to visually impaired individuals in their daily activities.

The report will dive into the details of components, working principle, applications, limitations, future plans of the smart blind stick with peripheral devices.

Apparatus Required:

- Arduino Uno
- Ultrasonic Sensor
- Light Dependent Resistor (LDR) module
- LED (Light Emitting diode)
- Rain Detector Module (fc-37)
- Buzzer
- Power Source (9V Battery)
- Switch
- Vibrator
- Casing and Stick handle
- Connecting wires

Component Details:

1. Arduino Uno:

The Arduino Uno is a popular microcontroller board that acts as the brain of the robotic arm system. It provides the necessary computational power and I/O capabilities to control and coordinate the movement of the arm. The Arduino Uno is user-friendly, flexible, and supports a wide range of programming languages, making it an ideal choice for peripheral applications.

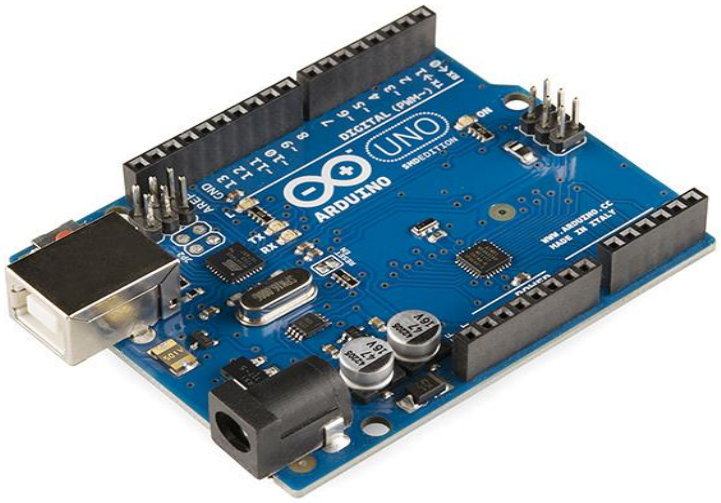


Fig: Arduino Uno

2. Ultrasonic Sensor:

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity.

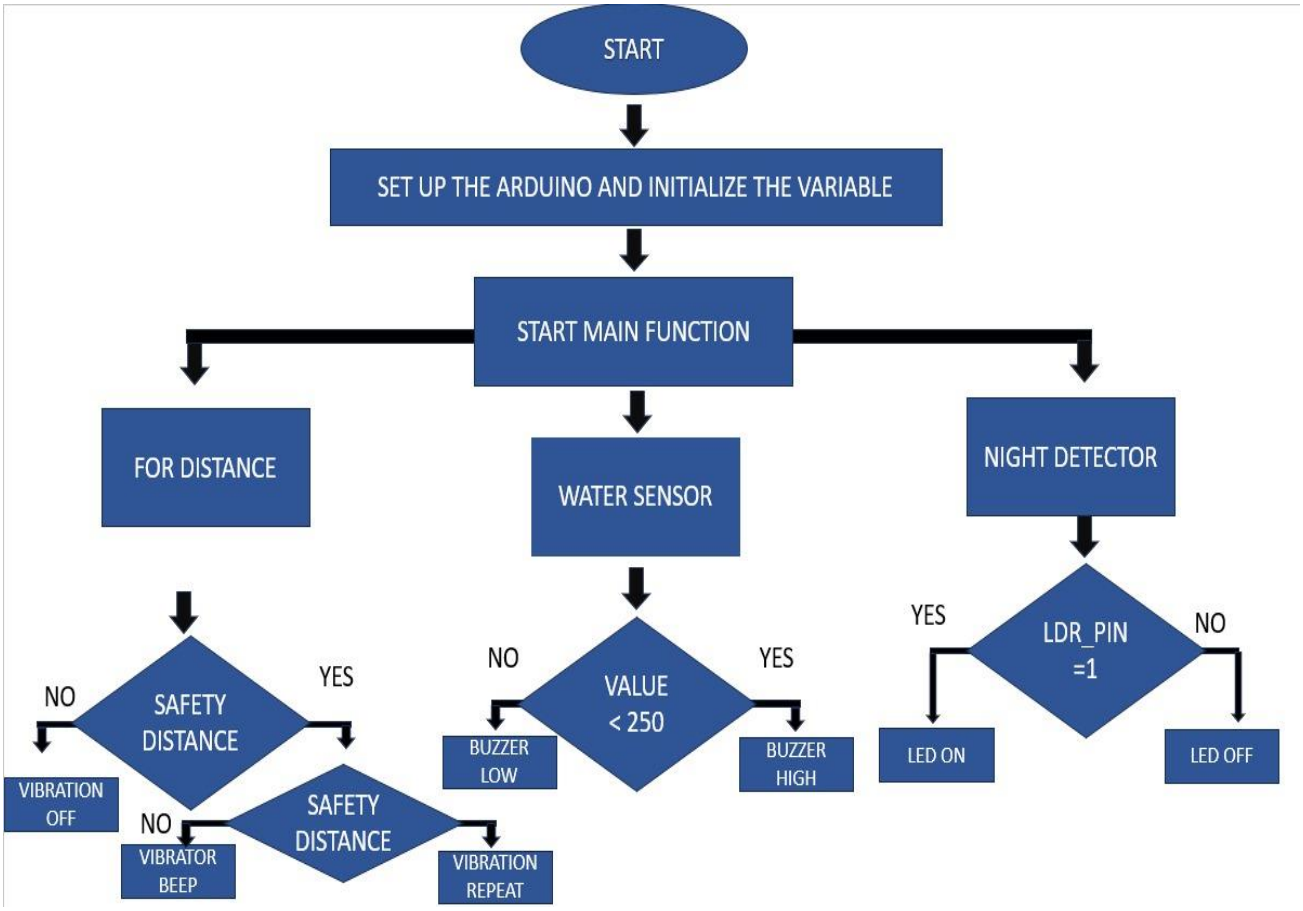
3. Rain Detector Module:

A rain sensor module is a simple tool for detecting rain. It can be used as a switch when a raindrop falls through the rain board, as well as to measure the intensity of the rain.

4. LDR module:

The LDR Sensor Module is used to detect the presence of light or measuring the intensity of light. The output of the module goes high in the presence of light and it becomes low in the absence of light. The sensitivity of the signal detection can be adjusted using a potentiometer.

Flow Chart:



Psedu Code:

Declare variables: distance,duration,safety_distance

Setup():

Initialize serial communication

Attach buzzer to pin 4

Attach ldr_pin to pin 7

Attach led_pin to pin 13

Attach trig to pin 9

Attach echo to pin 10

void loop() {

// Measure the distance using the ultrasonic sensor

call measureDistance();

// Check the safety distance and trigger the buzzer accordingly

call checkSafetyDistance();

// Read the LDR value and control the LED accordingly

call controlLED();

// Delay for a certain period

delay(50);

}

void measureDistance() {

```
    // Trigger the ultrasonic sensor to measure distance
    SET trigpin LOW
    delay 2 Microsecond
    SET trigpin HIGH
    delay 10 Microsecond
    SET trigpin LOW
    Measure the duration for the time echo pin was HIGH
    Calculating Distance
    safety_distance = distance
}
void checkSafetyDistance() {
    IF safety_distance < 60 {
        IF safety_distance < 30 {
            // Activate the buzzer continuously
            SET buzz HIGH
        } ELSE {
            // Activate the buzzer with intervals
            SET buzz HIGH
            delay 1000 Microsecond
            SET buzz LOW
           delay 1000 Microsecond
        }
    } ELSE {
```

```
        // Deactivate the buzzer
          SET buzz LOW
    }
}
void controlLED() {

    // Check the LDR value and control the LED accordingly
    IF value < 250 {
        SET buz HIGH
       delay 1000 Microsecond
    } ELSE {
       SET buz LOW
    }
    // Check the LDR pin status and control the LED accordingly
    IF digitalRead(ldr_pin) == 1 {
      SET led_pin HIGH
    } ELSE {
        SET led_pin HIGH
    }
}
```

Project Pictures:

Fig 1.1: The stick

Components:

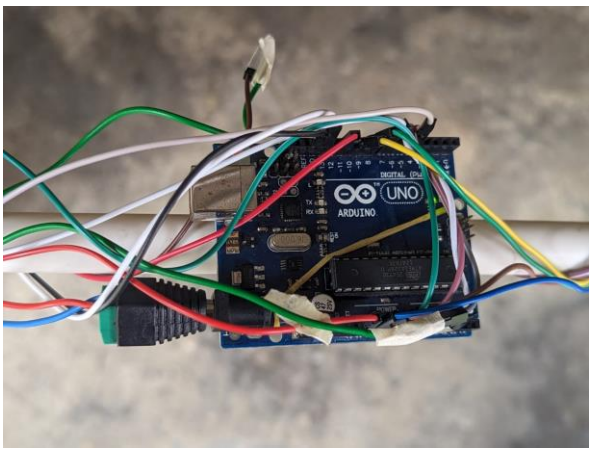


Fig 1.2: Arduino Uno

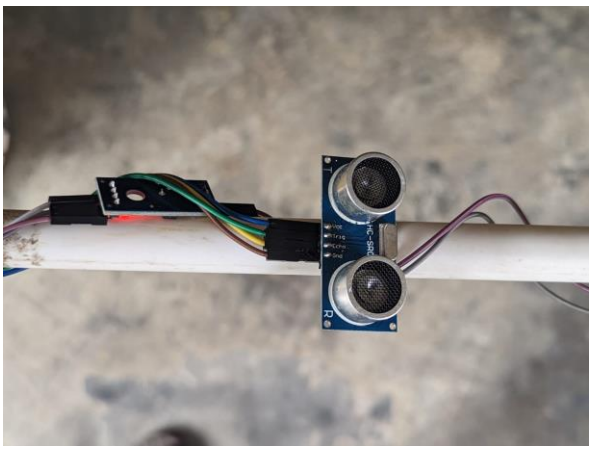


Fig 1.3: Ultrasonic sensor

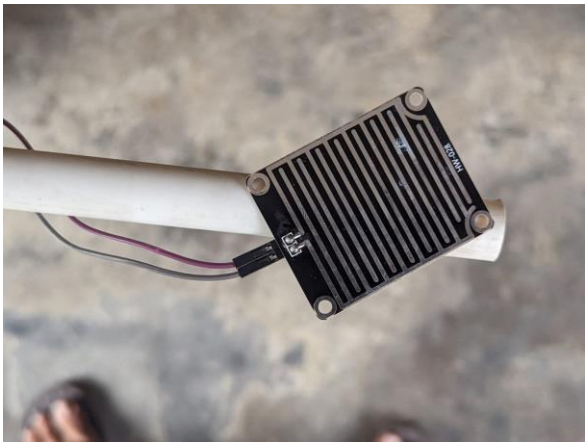


Fig 1.4: Rain sensor module

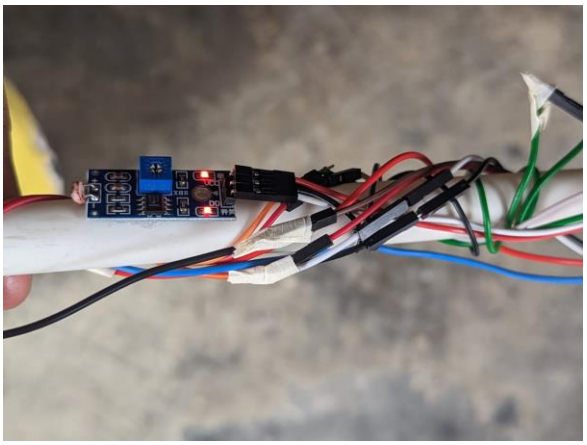


Fig 1.5: LDR sensor

Application:

1. Independent navigation for visually impaired individuals.
2. Increased safety during mobility in various environments.
3. Improved adaptability to changing light conditions.
4. Enhanced detection and avoidance of wet surfaces.

Limitation:

1. The smart blind stick relies on the accuracy of the sensors, which may be affected by external factors.
2. The stick may not detect obstacles that are too small or transparent, posing potential risks.
3. The device is not capable of identifying complex objects or differentiating between different types of obstacles.

Future Plans:

1. Incorporation of GPS capabilities to provide a real time navigation assistance.
2. Develop a companion mobile application to offer addition functionalities and customized options.

Conclusion:

In conclusion, the development of the smart blind stick with peripheral features brings significant improvements to the lives of visually impaired individuals. By integrating technologies such as distance measurement, water detection and a night detector, this device enhances safety and independence during mobility.

The project successfully utilizes components like Arduino Uno, Ultrasonic Sensor, LDR modules, LEDs and rain detector modules to create a reliable and efficient smart blind stick. It provides valuable assistance by detecting obstacles, alerting users to the presence of water, and alerting the passerby or drivers of the presence of blind person at night at the road.