A Report on Project Titled

Park Assist

Description:

Unsuccessful parking attempts are frustrating. The Park assist gets drivers into any suitable parking space. The two ultra-sonic sensors placed at the rear side of the car scan the sides of the road and warns the driver if any object is too close.

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 presence of object.

- Ultra Sonic Sensor:

    Ultrasonic sensor HC-SR04 is used here to detect the presence of an object while parking. The sensor module consists of ultrasonic transmitter, receiver and the control circuit. Ultrasonic Sensor consists of two circular eyes out of which one is used to transmit the ultrasonic wave and the other to receive it.

- LCD:

    Alerts when the sensor detects presence of any object while parking the car.

High Level Requirements

- To detect the presence of object while parking the car.
- To alert the driver using LCD when any obstacle is within the range of senor.

Low Level Requirements

- Interface HC-SR04(Ultrasonic Sensor) with Arduino UNO.
- Interface LCD with Arduino UNO.
- To give an alert after the task is completed.

SWOT Analysis:

Strengths:

- Easy to understand and use.
- Range for the ultra-sonic sensors can be adjusted according to user.
- Can be used in dark environment.
- Least affected by dust, dirt and moisture environment.

Weakness:

- Sensing accuracy affected by changes in temperature of 5-10 degrees or more.
- Objects covered in a very soft fabric absorb more sound waves making it hard for the sensor to see the target.

Opportunities:

- Easy setup that can be used in any vehicle.

Threats:

- Other Sensors with greater efficiency can replace this.
- Many other similar application are available.

4W's & 1H

Who

- Any user using four wheeler vehicle where visibility of the rear side is less.

What

- This is a Utility application to sense the obstacles in the rear side while parking the vehicle and alert the driver.

When

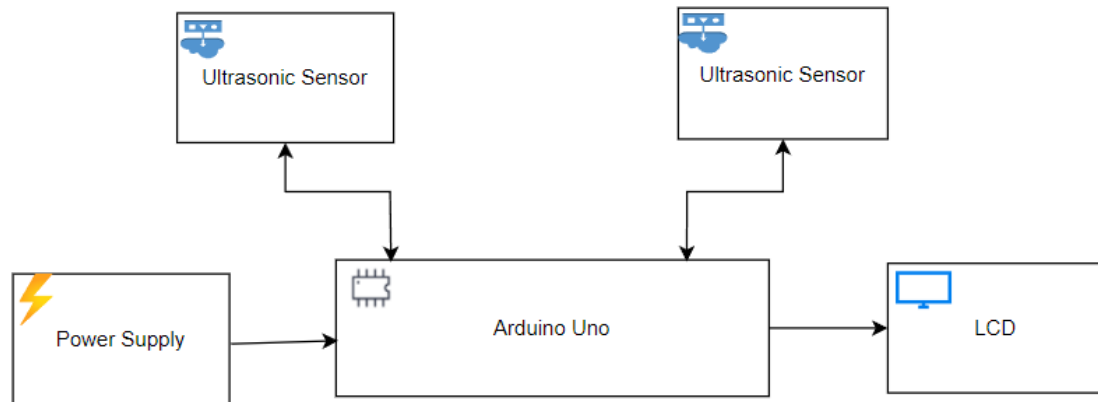- Can be used while parking.

Where

- User can belong to any background who can use this utility to ensure safety while parking the vehicle to avoid collision.
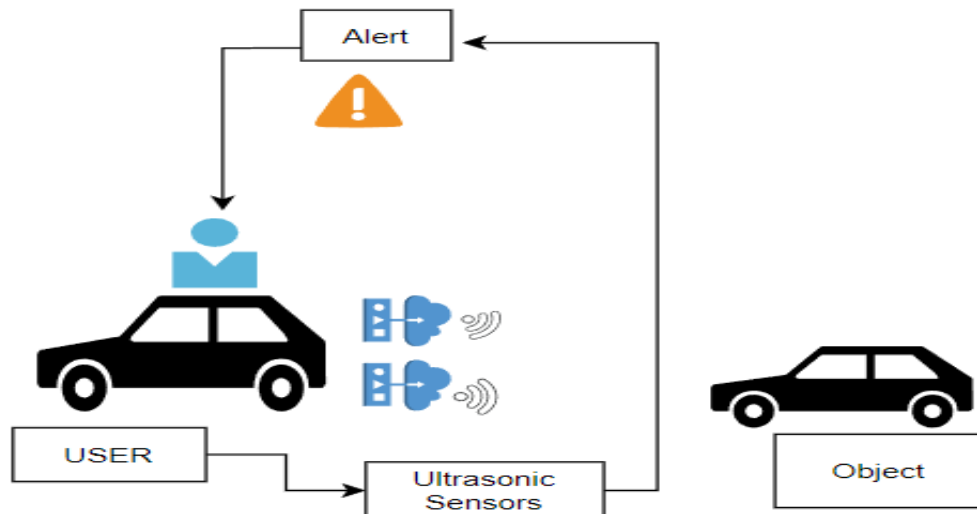
How

- Developed using Arduino UNO and implemented on SimulIDE.
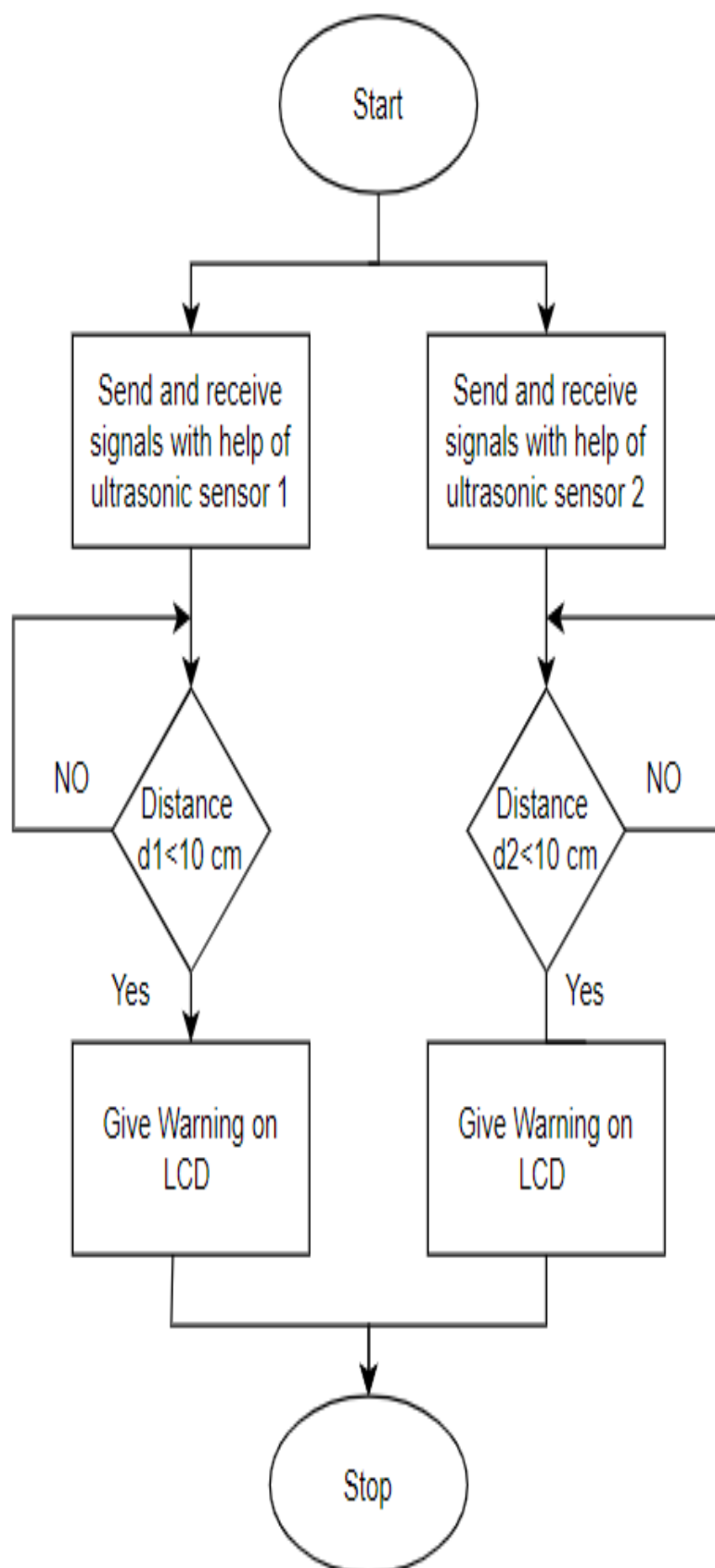
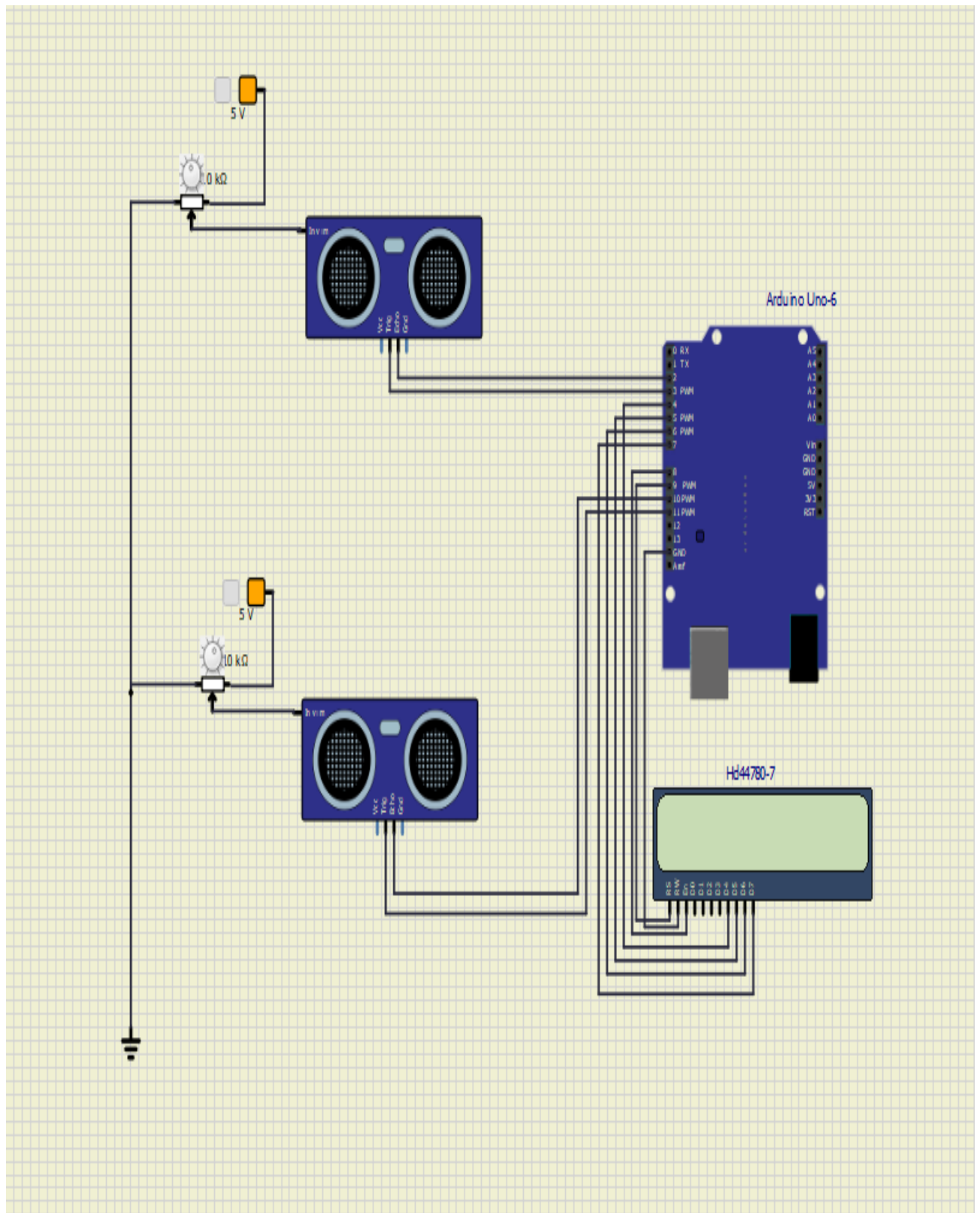## Architecture:

- **Block Diagram:**

- **Structural Diagram:**

- **Flowchart**

```
                          ┌─────────┐
                          │  Start  │
                          └────┬────┘
                               │
                ┌──────────────┴──────────────┐
                ▼                              ▼
     ┌─────────────────────┐       ┌─────────────────────┐
     │ Send and receive    │       │ Send and receive    │
     │ signals with help of│       │ signals with help of│
     │ ultrasonic sensor 1 │       │ ultrasonic sensor 2 │
     └──────────┬──────────┘       └──────────┬──────────┘
                ▼                              ▼
              ◇ Distance                     ◇ Distance
         NO   d1<10 cm   ◇              ◇    d2<10 cm   NO
                ▼ Yes                          ▼ Yes
     ┌─────────────────────┐       ┌─────────────────────┐
     │ Give Warning on     │       │ Give Warning on     │
     │ LCD                 │       │ LCD                 │
     └──────────┬──────────┘       └──────────┬──────────┘
                └──────────────┬──────────────┘
                               ▼
                          ┌─────────┐
                          │  Stop   │
                          └─────────┘
```

- **Circuit Diagram**

- **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 two Ultrasonic sensors with Microcontroller	None	Successful Integration	Successful Integration	Requirement based
H_02	Integrate LCD with Microcontroller	None	Successful Integration	Successful Integration	Requirement based

- **Low level test plan**

| Test ID	Description	Exp I/P	Exp O/P	Actual Output	Type Of Test
L_01	Use two Potentiometers to give input to the ultrasonic sensors	-	-	-	Requirement based
L_02	Detect Distance of any object placed infront of right ultrasonic sensor	For simulation : Expected input for ultrasonic sensor is given with help of potentiometer	Right Warning : "cm"	Right Warning : "cm"	Requirement based
L_03	Detect Distance of any object placed infront of left ultrasonic sensor	For simulation : Expected input for ultrasonic sensor is given with help of potentiometer	Left Warning : "cm"	Left Warning : "cm"	Requirement based
L_04	Detect No object as an obstacle for the car	For simulation : Expected input for ultrasonic sensor is given with help of potentiometer	Safe	Safe	Requirement based
L_03	To power the LCD if any object is too close to the ultrasonic sensor	Object too close to the ultrasonic sensor	Display Right Warning or left warning or safe	Display Right Warning or left warning or safe	Requirement based

- **Results**

Warning if the object is close to right sensor
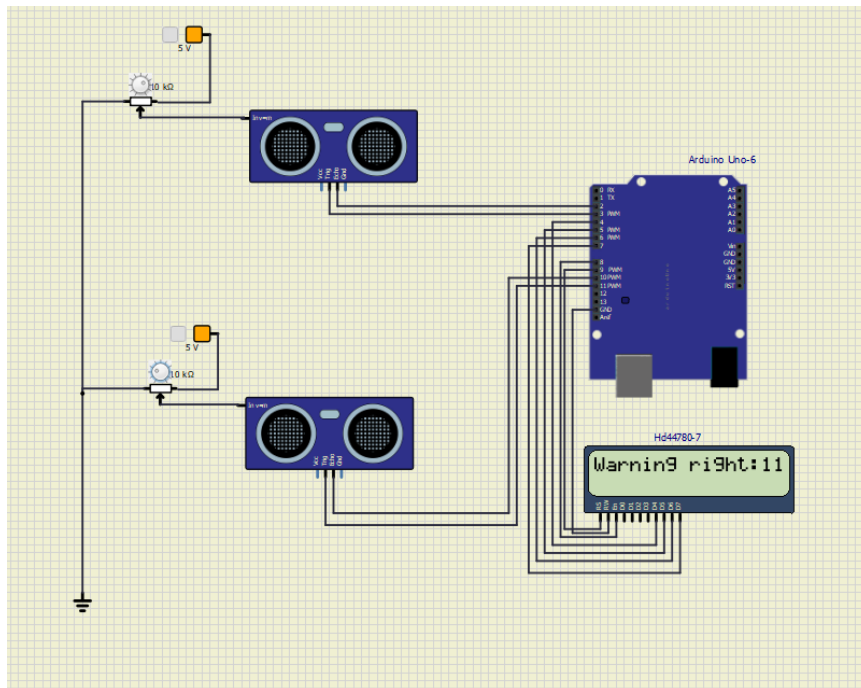
Warning if the object is close to right sensor
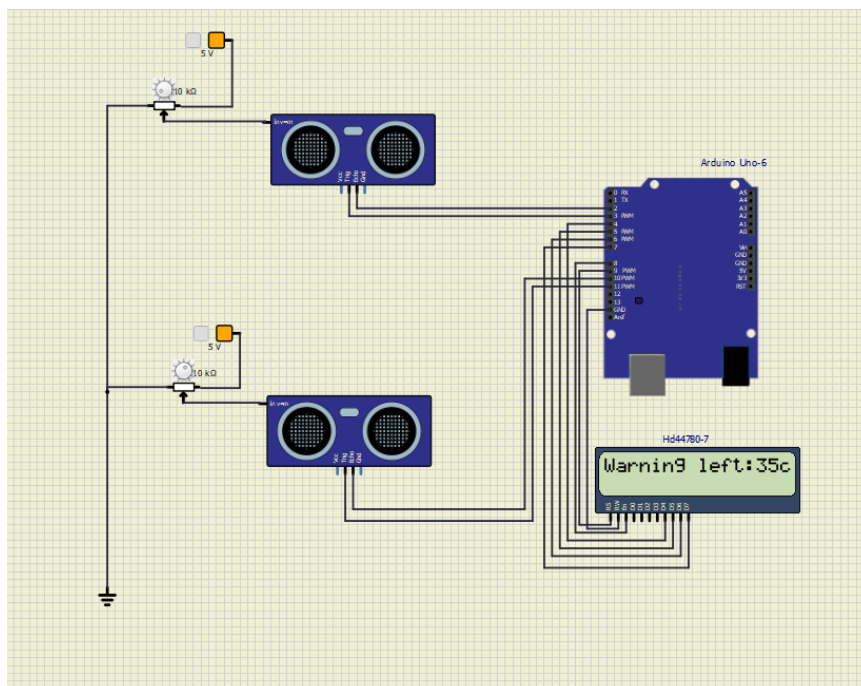
Displaying " Safe" when the car is at safer distance from the object.
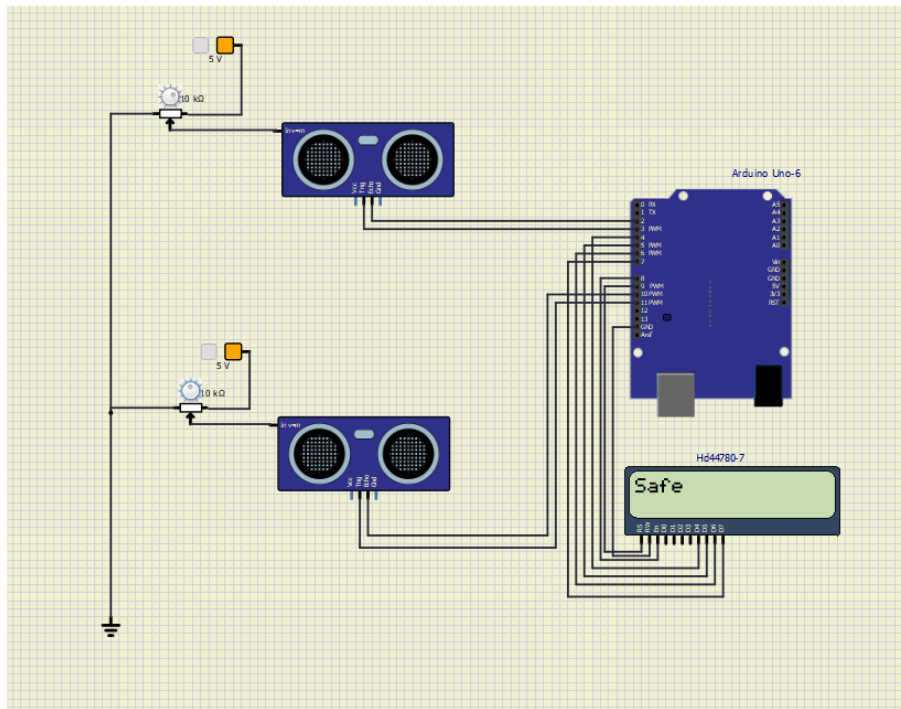
- **Conclusion:**

The Park Assist assists the driver to park his vehicle without stressing from the objects that are not clearly visible from the rear side. The ultra sonic senors have worked properly in order to detect the object and alert the driver to ensure safety of the car as well as people.