Project Report

on

Object Avoiding Robot

in partial fulfilment for the award of the degree of

BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE AND ENGINEERING WITH SPECIALIZATION IN AI AND ML

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1. Project Overview

- **About:** Our project focuses on developing an Object Avoiding Robot, which autonomously detects and avoids obstacles in its path using sensors and programmed logic.

- **Importance:** Object avoidance is a critical capability for autonomous robots used in various industries, from warehouse automation to self-driving vehicles. This project enhances robotic mobility and intelligent navigation.

- **Brief background**: Obstacle avoidance is widely applied in modern robotics, utilizing sensor-based detection systems. Using ultrasonic and IR sensors, the robot analyzes its surroundings and makes real-time adjustments to avoid collisions.

2. Objective and Problem Statement

- **Problem Statement:** Traditional wheeled robots lack autonomous navigation and obstacle detection, limiting their functionality. The goal is to build a self-navigating robot that avoids obstacles without human intervention. Implement sensor-based detection to make real-time movement decisions.

- **Objectives:** Design and program an autonomous robot for obstacle avoidance. Ensure seamless navigation using real-time adjustments to its path.

3. Proposed Solution & Methodology

- **Solution Overview:** We propose using an Arduino-based platform with ultrasonic sensors, IR sensors, and DC motors to design an autonomous object-avoiding robot.

- **Tools/Software/Materials Used:**

Hardware: Arduino Uno, HC-SR04 ultrasonic sensors, motor driver (L293D), DC motors, wheels, and power supply.

Software: Arduino IDE for coding, C++ for control logic implementation.

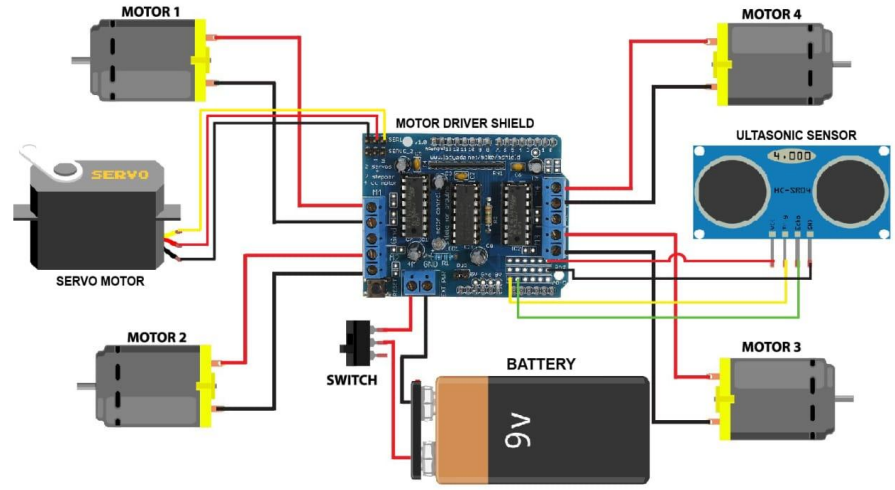
4. Key Findings / Results

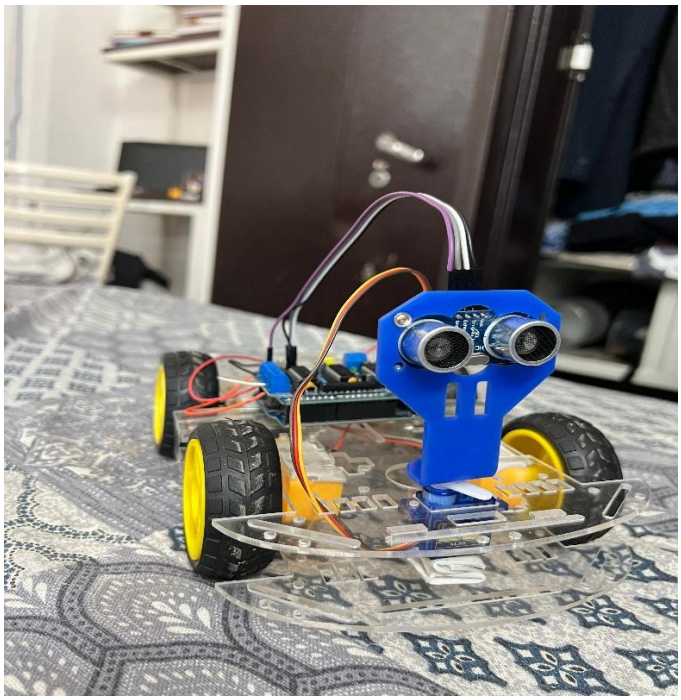
- Observations: The ultrasonic sensor can accurately sense objects in a range of 2-300 cm.

The robot successfully alters its path upon encountering obstacles.

Real-time decision-making is achieved using programmed logic.

- Circuit Diagram:





5. Conclusion & Learnings

- What did we learn?

Sensor Integration plays an important role in real-time autonomous movement.

Code Optimization enhances response time and efficiency.

Power Management affects robot stability and operations.

- Improvements And Next Steps:

Implement **machine learning algorithms** for smarter obstacle detection.

Enhance mobility by using **servo motors** for improved rotation.

Develop **wireless control** for remote operations.

6. References

1. **DIY Builder** YouTube channel.

2. Arduino Programming Guide **- Tech Robotics Publication.**

7. Appendix

- **Code Snippet:**

```
#include <AFMotor.h>
#include <NewPing.h>
#include <Servo.h>

#define TRIG_PIN A0
#define ECHO_PIN A1
#define MAX_DISTANCE 200
#define MAX_SPEED 190 // sets speed of DC  motors
#define MAX_SPEED_OFFSET 20
NewPing sonar(TRIG_PIN, ECHO_PIN, MAX_DISTANCE);
AF_DCMotor motor1(1, MOTOR12_1KHZ);
AF_DCMotor motor2(2, MOTOR12_1KHZ);
AF_DCMotor motor3(3, MOTOR34_1KHZ);
AF_DCMotor motor4(4, MOTOR34_1KHZ);
Servo myservo;
boolean goesForward=false;
int distance = 100;
int speedSet = 0;
```

```
void setup() {
  myservo.attach(10);
  myservo.write(115);
  delay(2000);
  distance = readPing();
  delay(100);
  distance = readPing();
  delay(100);
  distance = readPing();
  delay(100);
  distance = readPing();
  delay(100);
}
```