DAYANANDA SAGAR UNIVERSITY

Devarakaggalahalli, Harohalli Kanakapura Road, Dt, Ramanagara, Karnataka 562112

SCHOOL OF ENGINEERING

Bachelor of Technology
in
COMPUTER SCIENCE AND ENGINEERING
(Artificial Intelligence and Machine Learning)

COURSE TITLE: EMBEDDED SYSTEM DESIGN

Mini Project

"Obstacle avoiding bot"

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
(Artificial Intelligence and Machine Learning)
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CERTIFICATE

This is to certify that the Mini-Project titled **"Obsatcle avoiding bot"** is carried out by **C Vishnu Vardhan (ENG22AM0007), Hemanth S R(ENG22AM0024), Nitya Shetty (ENG22AM0037) and Ullas chander R (ENG22AM0066)** bonafide students of Bachelor of Technology in Computer Science and Engineering (Artificial Intelligence and Machine Learning) at the School of Engineering, Dayananda Sagar University,

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DECLARATION

We,**C Vishnu Vardhan (ENG22AM0007), Hemanth S R (ENG22AM0024), Nitya Shetty (ENG22AM0037) and Ullas chander R (ENG22AM0066)** are students of the fourth semester B.Tech in Computer Science and Engineering(AI&ML), at School of Engineering, Dayananda Sagar University, hereby declare that the Embedded System project titled "Obstacle Avoiding Bot" has been carried out by us and submitted in partial fulfillment for the award of degree in Bachelor of Technology in Computer Science and Engineering(AI&ML) during the academic year 2023 2024.

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INTRODUCTION:

In the real world, navigating through obstacles can often be a challenging task, requiring careful planning and quick reflexes to avoid collisions. Whether it's maneuvering through a crowded street or traversing a cluttered workspace, the ability to detect and avoid obstacles is crucial for efficient and safe movement. This necessity has inspired the development of obstacle-avoiding robots, which mimic the problem-solving abilities of living organisms to navigate complex environments autonomously.

obstacle-avoiding bot represents a fusion of advanced technology and practical problem-solving, designed to tackle real-world challenges with ease and efficiency. With its array of sensors and intelligent algorithms, the bot can perceive its surroundings and make split-second decisions to avoid obstacles in its path.

The addition of a high-resolution LCD display enhances its functionality, providing real-time feedback and status updates to users. This feature not only enhances the user experience but also allows for seamless interaction and control, making it ideal for various applications ranging from educational robotics projects to industrial automation tasks.

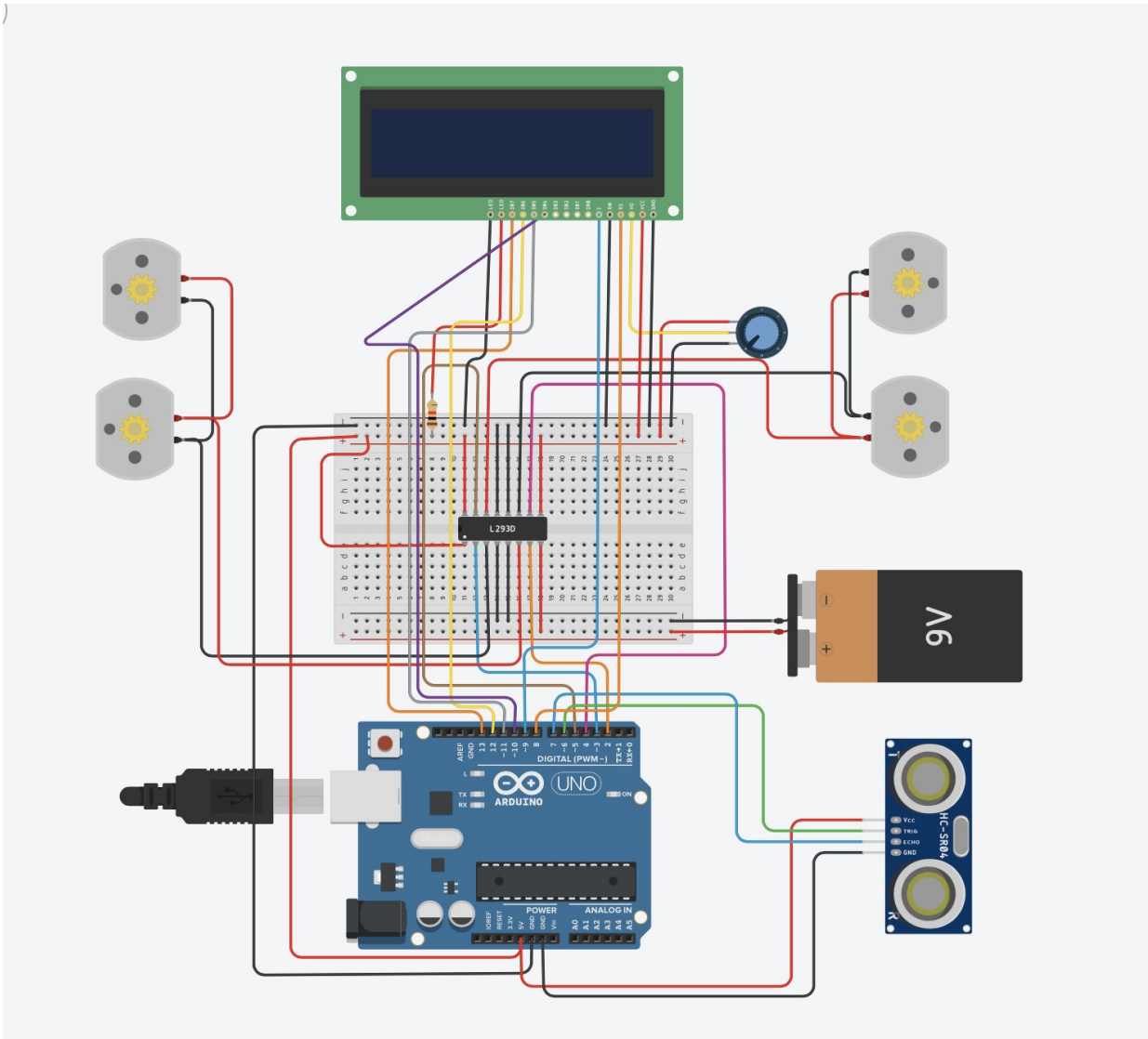
PROBLEM STATEMENT:

Developing an efficient obstacle-avoiding bot with an integrated LCD display to navigate through dynamic environments.

OBJECTIVES:

- **Enhanced Workplace Safety**: The bot proactively navigates through industrial environments, mitigating collision risks and ensuring a safer workplace.
- **Real-Time Hazard Detection**: Through its sensors and LCD display, the bot instantly alerts workers to potential hazards, enabling swift preventive actions.
- **Productivity Optimization:** By providing real-time status updates, the bot facilitates streamlined workflows and minimizes disruptions, thereby enhancing productivity.
- **Performance Analysis:** Continuous monitoring and evaluation of the bot's navigation capabilities, allowing for ongoing refinement and optimization to maintain peak performance levels.

SIMULATION:



SOURCE CODE:

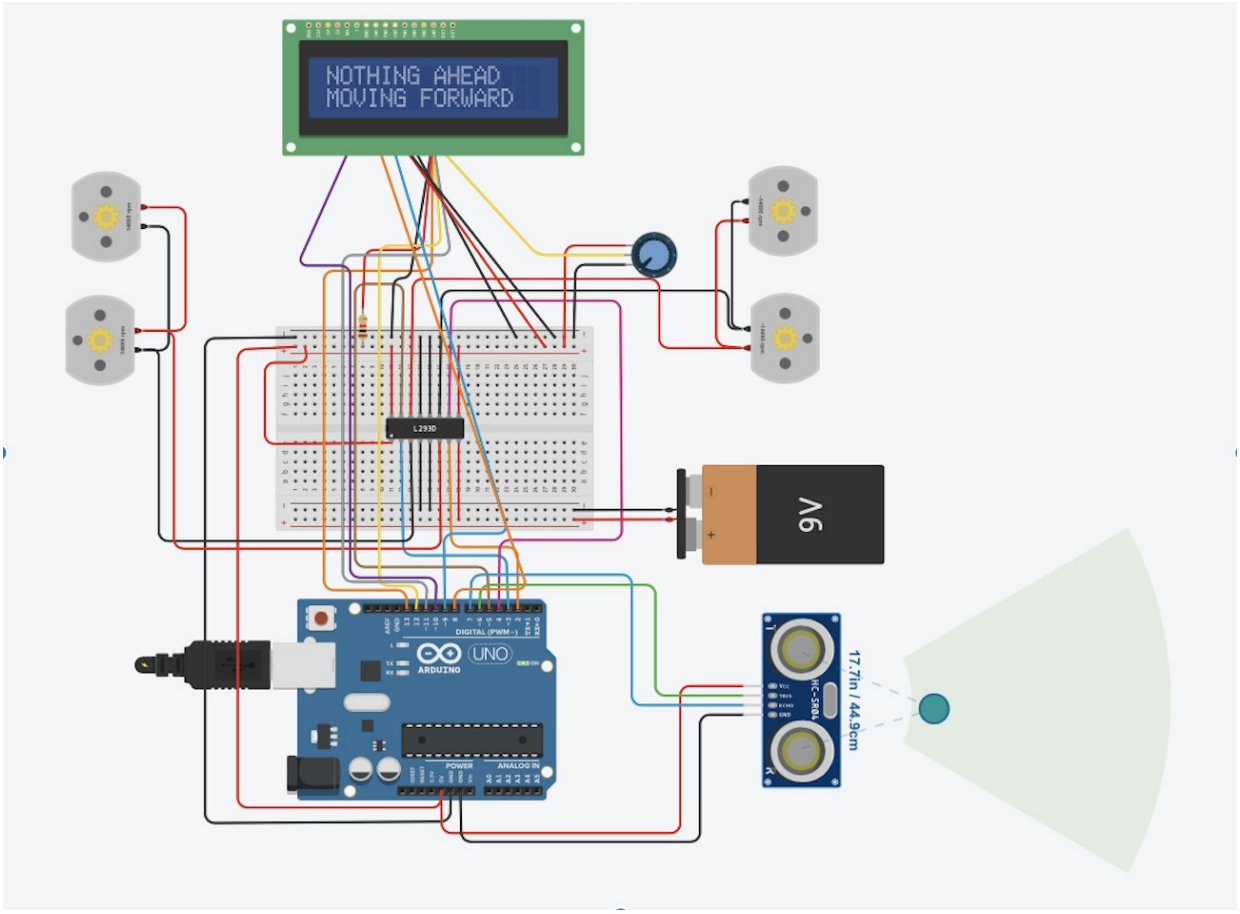
```
#include <LiquidCrystal.h>
LiquidCrystal lcd(8, 9, 10, 11, 12, 13);

long cm, duration;
const int echoPin = 7;
const int trigPin = 6;

const int lm1 = 2;
const int lm2 = 3;
const int rm1 = 4;
const int rm2 = 5;

void setup() {
  pinMode(lm1, OUTPUT);
  pinMode(lm2, OUTPUT);
  pinMode(rm1, OUTPUT);
  pinMode(rm2, OUTPUT);

  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);

  Serial.begin(9600);
  lcd.begin(16, 2);
}

void loop() {

  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);
```

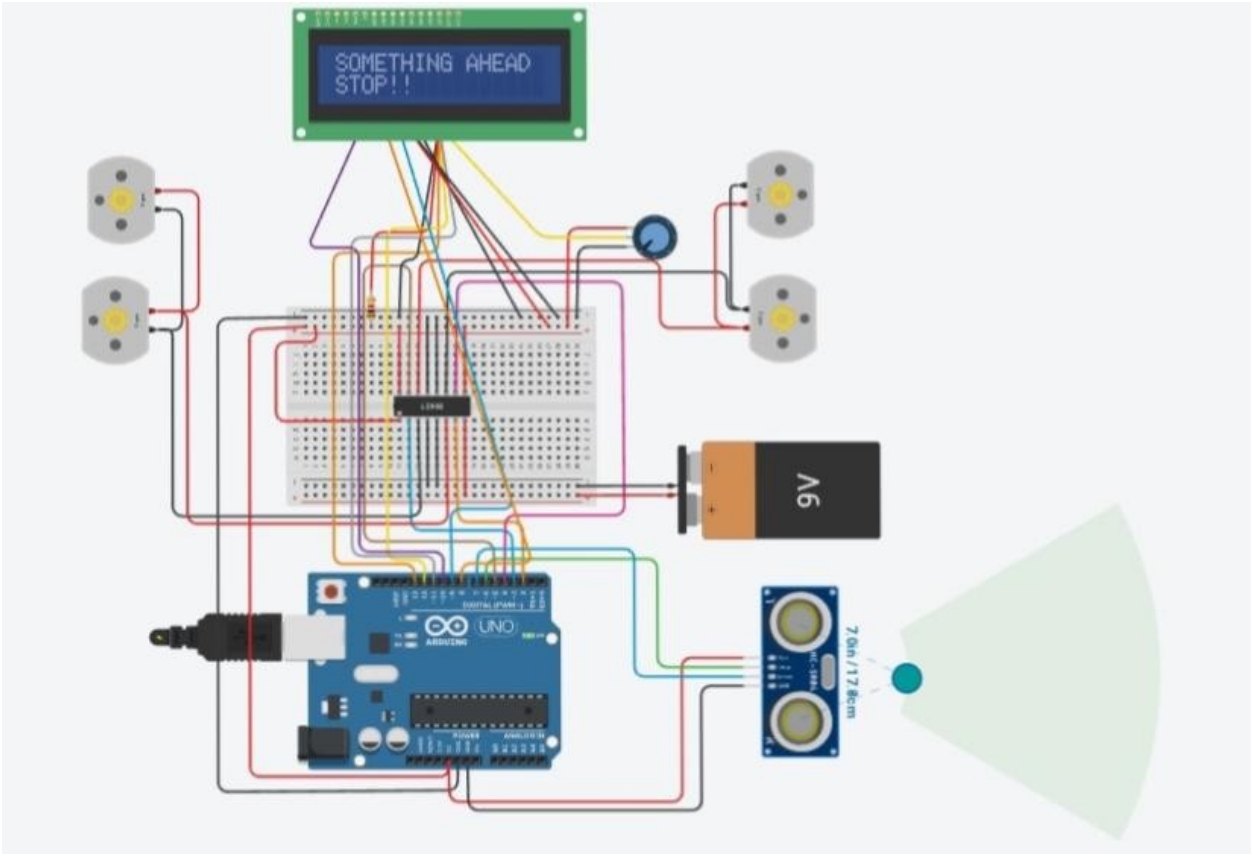
```
  duration = pulseIn(echoPin, HIGH);

  cm = duration * 0.034 / 2;

  if (cm/1.11 < 20) {
    stop_bot();
    delay(1000);

    go_back();
    delay(1000);

    stop_again();
    delay(1000);

    go_left();
    delay(1000);
  } else {
    go_straight();
    delay(1000);
  }

  Serial.print("Distance: ");
  Serial.print(cm);
  Serial.println(" cm");
}

void go_straight() {
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("NOTHING AHEAD");
  lcd.setCursor(0, 1);
  lcd.print("MOVING FORWARD");


 digitalWrite(lm1, HIGH);
  digitalWrite(lm2, LOW);
```

```
 digitalWrite(rm1, HIGH);
  digitalWrite(rm2, LOW);
}
void go_back() {
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("TAKING REVERSE");
  lcd.setCursor(0, 1);
  lcd.print(cm);

  digitalWrite(lm2, HIGH);
  digitalWrite(lm1, LOW);
  digitalWrite(rm2, HIGH);
  digitalWrite(rm1, LOW);
}

void stop_bot() {
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("SOMETHING AHEAD");
  lcd.setCursor(0, 1);
  lcd.print("STOP!!");

  digitalWrite(lm1, LOW);
  digitalWrite(lm2, LOW);
  digitalWrite(rm1, LOW);
  digitalWrite(rm2, LOW);
}

void stop_again() {
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("BREAK FOR TURN");



digitalWrite(lm1, LOW);
```

```
digitalWrite(lm2, LOW);
  digitalWrite(rm1, LOW);
  digitalWrite(rm2, LOW);
}

void go_left() {
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("TURNING LEFT");
  lcd.setCursor(0, 1);
  lcd.print(cm);

  digitalWrite(lm1, LOW);
  digitalWrite(lm2, LOW);
  digitalWrite(rm1, HIGH);
  digitalWrite(rm2, LOW);
}

void go_right() {
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("TURNING RIGHT");
  lcd.setCursor(0, 1);
  lcd.print(cm);
   digitalWrite(lm1, HIGH);
  digitalWrite(lm2, LOW);
  digitalWrite(rm1, LOW);
  digitalWrite(rm2, LOW);
  }
```

RESULT AND ANALYSIS:





APPLICATION:

Obstacle-avoiding bots is equipped with sensors and processing power to detect and navigate around obstacles in their path.

- Domestic tasks
- Hazardous environments
- Logistics and warehousing
- Obstacle avoiding robots can be used in almost all mobile robot navigation systems.
- They can also be used in dangerous environments, where human penetration could befatal.
- Unmanned vehicle driving
- Mining Vehicle that uses Obstacle Detection

CONCLUSION:

As the technology for obstacle avoidance continues to advance, we can expect to see these versatile robots play an even greater role in our lives. Their ability to navigate complex environments safely and efficiently opens doors for applications that were once unimaginable. From revolutionizing industries to aiding in exploration and rescue, obstacle-avoiding bots hold the promise of a future where robots seamlessly integrate into our world, making it safer, more efficient, and richer in possibilities.

Obstacle-avoiding bots are rapidly evolving from intriguing concepts to transformative tools. Their ability to navigate complex environments with increasing autonomy opens doors to a future brimming with possibilities. Imagine robots seamlessly performing delicate surgeries in remote locations, assisting firefighters in battling infernos, or even providing companionship to the elderly in their homes – all while navigating obstacles with precision and safety. The potential applications extend far beyond our current understanding, with future advancements in artificial intelligence and sensor technology pushing the boundaries of what these robots can achieve.

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