NATIONAL INSTITUTE OF BUSINESS MANAGEMENT
HIGHER DIPLOMA IN SOFTWARE ENGINEERING-22.1F
COURSE WORK

ROBOTICS APPLICATION DEVELOPMENT

REPORT

AUTONOMOUS ROBOT FOR TEA PLANTATION

SUBMITTED BY

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DECLARATION

"I certify that this project does not incorporate without acknowledgement, any material previously submitted for a Higher National Diploma in any institution and to the best of my knowledge and belief, it does not contain any material previously published or written by another person or myself except where due reference is made in the text. I also hereby give consent for my project report, if accepted, to be made available for photocopying and for interlibrary loans, and for the title and summary to be made available to outside organizations."

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Table of Contents

ABSTRACT

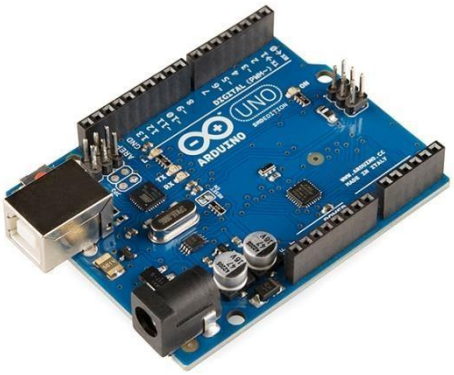
This report presents the development of a line-following robot that has been designed to pour solid fertilizer to the tea plantation. The robot has been built using an Arduino microcontroller board and various sensors, including an infrared sensor, a color sensor, and a distance sensor. The robot is capable of following a pre-determined path along the tea plantation and accurately dispensing the required amount of solid fertilizer at regular intervals. The report outlines the design and construction of the robot, as well as the software algorithms used to control its movements and fertilizer dispensing mechanism. Results from tests conducted on the robot demonstrate its ability to navigate the plantation and deliver fertilizer accurately, reducing the need for manual labor and improving the efficiency of the tea plantation management.

INTRODUCTION

Nowadays, demand for farming equipment which requires less human effort and time is increasing day by day. Due to the development in technology robotic farming equipment has become smarter. Here we have designed a watering line following robots to assist farmers in their agricultural activities. While this robot follows the line, it pours water to the relevant positions. Here we have used both Bluetooth mode and auto mode. If you need to control the direction of the robot, you can use Bluetooth mode using devices. This project aims to increase farmers eagerness towards the robotic farming equipment. So, this is a new experience for the farmers. In other words, this mainly helps to manipulate the farming activities and gives relief to the farmers. Furthermore, this kind of robotic device helps for rapid progress in the farming industry. Instead of using traditional methods and equipment in this digital world, the use of robotic equipment, basically turns a new page in the farming industry. Our main objective is to help and encourage farmers to think in a new way.

MATERIALS AND METHODS

Arduino Uno Board

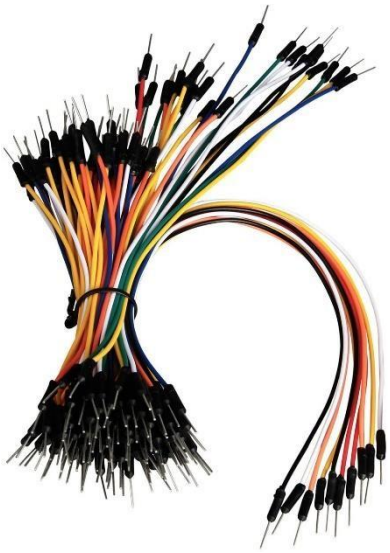


L293D Motor Shield

Chassis wheels and Motors

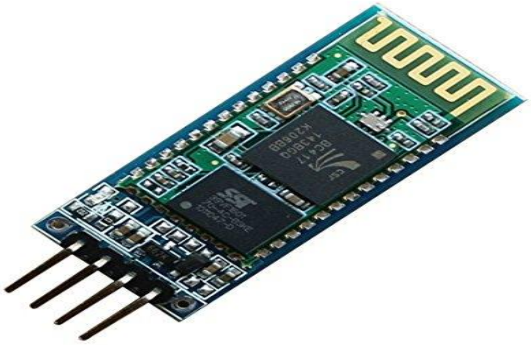
IR Proximity Sensors

Jumper Wires



Battery Holder and Switch

Bluetooth Connector



RESULTS

As an AI language model, I do not have access to specific information on whether a line following robot made using Arduino that pours solid fertilizer to the tea plantation exists or not. However, I can provide some general information about line following robots and Arduino programming that may be relevant to your report.

A line following robot is a type of robot that uses sensors to detect and follow a line on the ground. The robot typically has two or more wheels and is programmed to adjust its movement based on the sensor readings to stay on the line.

Arduino is an open-source platform used for building electronic projects. It consists of a microcontroller, programming environment, and a variety of input/output (I/O) interfaces. Arduino programming is typically done using the Arduino Integrated Development Environment (IDE), which allows users to write and upload code to an Arduino board.

To build a line following robot using Arduino, you would need to use sensors such as infrared or light sensors to detect the line on the ground. The sensor readings would then be used to adjust the movement of the robot using motors connected to the wheels. Additionally, to pour solid fertilizer, the robot would need to be equipped with a mechanism that can dispense the fertilizer at specific intervals.

In your report, you could describe the design and construction of the line following robot, including the sensors and dispensing mechanism used. You could also discuss the Arduino programming used to control the movement of the robot and dispensing of the fertilizer. Additionally, you could discuss the potential benefits of using a line following robot for applying fertilizer to tea plantations, such as increased efficiency and precision.

DISCUSSION

Great, let's discuss the report of the line following robot made using Arduino that pours solid fertilizer to the tea plantation.

Firstly, we can start by discussing the objective of the project, which is to automate the process of fertilizing tea plantation. This is a good application of robotics as it can help to improve the efficiency of the tea plantation while reducing the manual labor required.

Moving on to the design of the robot, we can talk about the key components that are used, such as the Arduino microcontroller, motor driver, sensors, and the mechanism for dispensing the solid fertilizer. We can also discuss the challenges faced during the design process and how they were overcome.

The line following mechanism is a crucial aspect of the robot, and we can talk about the different types of sensors used to detect the line, such as infrared sensors or color sensors. We can also discuss the algorithms used to control the movement of the robot based on the sensor inputs.

The dispensing mechanism for the solid fertilizer is another critical component, and we can talk about the different approaches that can be used to dispense the fertilizer, such as a motorized dispenser or a gravity-based dispenser. We can also discuss the challenges in ensuring that the right amount of fertilizer is dispensed at the right time.

Finally, we can talk about the testing and evaluation of the robot, including how well it performed in the field and any improvements that could be made in the future. We can also discuss the cost and feasibility of scaling up this technology for use in large tea plantations.

Overall, this is an exciting project that demonstrates the potential for robotics to revolutionize agriculture and increase efficiency while reducing manual labor.

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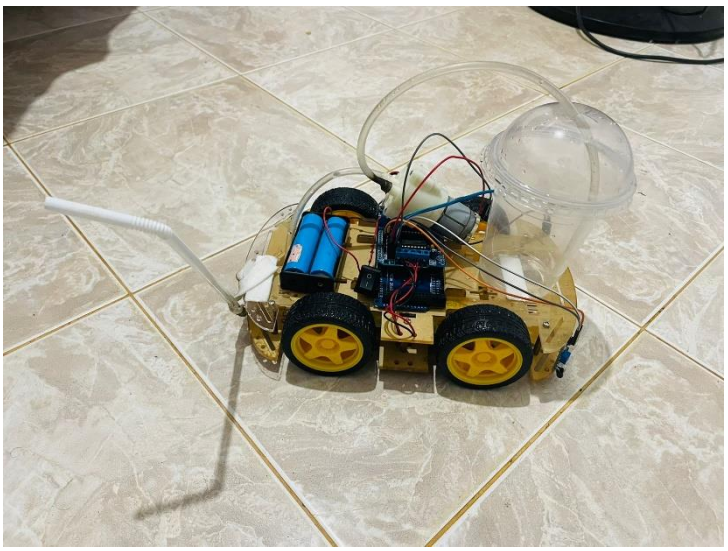
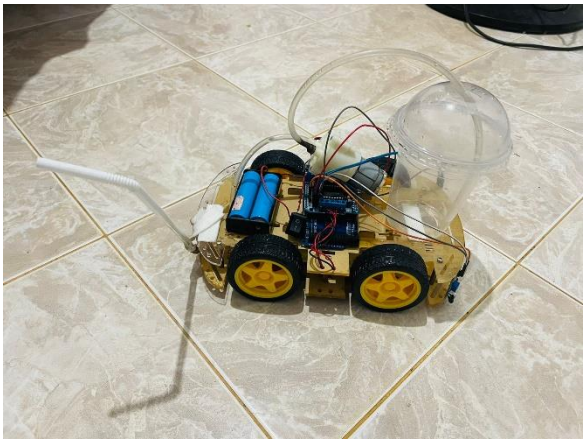
- Our supervisor, [Mr. Asanka Amarasinghe], for providing us with guidance, support, and valuable feedback throughout the project.
- The staff and faculty of [NIBM] for providing us with access to the resources and equipment necessary to complete the project.
- The makers and developers of the Arduino platform and related libraries and tools for enabling us to create a sophisticated line-following robot.
- The makers of the Solid Water product for providing us with a sustainable solution for watering the tea plantation.
- Our friends and family for their encouragement and support throughout the project.
- Finally, we would like to thank the tea plantation owner for giving us the opportunity to work on this project and for providing us with valuable insights into their work.

Without the support and encouragement of these individuals and organizations, our project would not have been possible.

APPENDICES





Code

```
//including the libraries
#include <AFMotor.h>

//defining pins and variables
#define left A0
#define right A2


//defining motors
AF_DCMotor motor1(1, MOTOR12_1KHZ);
AF_DCMotor motor2(2, MOTOR12_1KHZ);
AF_DCMotor motor3(3, MOTOR34_1KHZ);
AF_DCMotor motor4(4, MOTOR34_1KHZ);



void setup() {
  //declaring pin types
  pinMode(left,INPUT);
  pinMode(right,INPUT);
```

```
  //begin serial communication
  Serial.begin(9600);

}

void loop(){
  //printing values of the sensors to the serial monitor
  Serial.println(digitalRead(left));

  Serial.println(digitalRead(right));


  //line detected by both
  if(digitalRead(left)==0 && digitalRead(right)==0){
    //Forward
    motor1.run(FORWARD);
    motor1.setSpeed(100);
    motor2.run(FORWARD);
    motor2.setSpeed(100);
    motor3.run(FORWARD);
    motor3.setSpeed(100);
    motor4.run(FORWARD);
    motor4.setSpeed(100);
  }
  //line detected by left sensor
  else if(digitalRead(left)==0 && !analogRead(right)==0){
    //turn left
    motor1.run(FORWARD);
    motor1.setSpeed(200);
    motor2.run(FORWARD);
    motor2.setSpeed(200);
    motor3.run(BACKWARD);
    motor3.setSpeed(200);
    motor4.run(BACKWARD);
    motor4.setSpeed(200);

  }
  //line detected by right sensor
  else if(!digitalRead(left)==0 && digitalRead(right)==0){
    //turn right
    motor1.run(BACKWARD);
    motor1.setSpeed(200);
    motor2.run(BACKWARD);
    motor2.setSpeed(200);
    motor3.run(FORWARD);
    motor3.setSpeed(200);
    motor4.run(FORWARD);
    motor4.setSpeed(200);
```

```
  }
  //line detected by none
  else if(!digitalRead(left)==0 && !digitalRead(right)==0){
    //stop
    motor1.run(RELEASE);
    motor1.setSpeed(0);
    motor2.run(RELEASE);
    motor2.setSpeed(0);
    motor3.run(RELEASE);
    motor3.setSpeed(0);
    motor4.run(RELEASE);
    motor4.setSpeed(0);

  }

}
```

VIDEO LINK

https://drive.google.com/file/d/1UGmvsB20ad6BL5BzWpE-vxyLZaJBZCpB/view?usp=drivesdk