REPORT

ON

FOUR WEEKS OF INTERNSHIP-II

Agriculture Crop Monitoring Robot

Submitted to

NMAM INSTITUTE OF TECHNOLOGY, NITTE
(An Autonomous Institution under VTU, Belagavi)

In partial fulfillment of the requirements for the award of the

Degree of Bachelor of Engineering
in
Computer Science and Engineering

by

visha V Shetty **Avisha V Shetty**
USN **4NM21CS0411**

Under the guidance of

Dr. D.K.Sreekantha

Department of Computer Science and Engineering

NITTE EDUCATION TRUST | N.M.A.M. INSTITUTE OF TECHNOLOGY
(An Autonomous Institution affiliated to Visvesvaraya Technological University, Belagavi)
Nitte – 574 110, Karnataka, India

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Nitte – 574 110, Karnataka, India

CERTIFICATE

This is to certify that the "Internship-II report" submitted by Ms.Avisha V Shetty bearing USN *4NM21CS041 Of* Third *semester B.E., a bonafide student of NMAM Institute of Technology, Nitte, has undergone at least four weeks of internship at* DLithe Consultancy Services Pvt Ltd *during 2022-2023 fulfilling the partial requirements for the award of degree of Bachelor of Engineering in* ***Computer Science & Engineering*** *at NMAM Institute of Technology, Nitte.*

Dr. Deekshitha S

Name and Signature of Mentor

31/7/23

Signature of HOD

DLithe™
Be Agile..Be in Demand

Dlithe Consultancy Services Pvt. Ltd.
CIN: U72900KA2019PTC121035

06 March 2023

TO WHOMSOEVER IT MAY CONCERN

This is to certify **Avisha Shetty**, bearing USN No: **4NM21CS041** from **NMAM Institute of Technology, Nitte** has successfully completed one-month internship starting from **06 February 2023** to **06 March 2023**, under the mentorship of DLithe's development team. **Avisha Shetty** has worked on various microcontrollers, SoC, sensors, actuators with real time web server development activities using C, C++ programming. Exposure on various communication protocols TWI, SPI and UART was also provided.

The domain & agile development process exposure was given along with usage of GitHub tool.

During the internship, **Avisha Shetty** demonstrated good coding skills with good design thoughts.

We wish all the best for future endeavours!

DLITHE CONSULTANCY SERVICES PVT. LTD. Bengaluru

For Dlithe Consultancy Services Pvt Ltd
Director

Certificate ID: DLIOT4NM21CS041MAR23

Acknowledgement

I would like to express my sincere appreciation and gratitude for the invaluable assistance, support, and guidance that I received throughout the preparation of this report.

I am deeply grateful to Dr. NIRANJAN N. CHIPLUNKAR, Principal of NMAM Institute of Technology, and all the authorities of NMAMIT, Karkala, for entrusting us with this opportunity. It is with great pleasure that I present this comprehensive report on our internship experience.

I would like to extend special recognition to our mentor, Dr. D.K.SREEKANTHA, Professor in the Department of Computer Science and Engineering whose indispensable guidance and support were instrumental to the success of our project. His unwavering enthusiasm, patience, insightful comments, helpful information, practical advice, and continuous flow of ideas have consistently propelled us forward.

I am also indebted to DLithe Consultancy Services Pvt Ltd for providing us with this valuable opportunity. I would like to extend my deepest appreciation to our trainer, Mr. Vijay, for his remarkable assistance and invaluable mentorship throughout the duration of the internship. The completion of our internship project would have been extremely challenging without her presence and extensive knowledge. Furthermore, I am grateful to Ms. Dhanya Bangera, HR Manager at DLithe, for her steadfast support and invaluable aid, which served as a cornerstone of support throughout the entirety of the internship period

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Abstract

DLithe Consultancy Services Pvt Ltd is a renowned industry leader in the field of Internet of things (IoT), offering groundbreaking solutions to diverse industries. The company stands out with its state-of-the-art technologies and a team of exceptionally talented professionals. The primary objective of the industrial training program was to acquire hands-on experience and proficiency in the field of IoT. The program encompassed a comprehensive 15-day online training session, encompassing a wide array of topics ranging from Arduino IDE setup, sensors and their applications. Furthermore, participants were assigned real-world projects. DLithe adheres to industry best practices, including fostering a culture of continuous learning and upskilling for interns, all while upholding high ethical standards. The industrial training program offered exceptional opportunities for professional growth and development.

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Introduction of the Company

DLithe is an EdTech company serving IT Companies and Academic Institutions, since the year 2018. With experiences drawn from corporate time, the foundation of DLithe is built to innovate products that transform the upcoming generation. Our expertise in Embedded Systems, Robotics, Internet of Things, Cyber Security, and Artificial Intelligence is helping academic institutions to align with industry needs. Since inception, we have established 8 development centers enabling the student community to work on research and development. Our services to IT companies have reduced the hiring cycle time and led to cost effective measures to source the best talent from on and off campus. We have transformed many lives by imparting 360 degree learning – Domain, Process & Technology, keeping focus on Customer Experience and Operational Excellence objectives. We are proud to say, DLithe is a bootstrap company with a strong foundation, experience, trust and commitment to build an agile workforce towards industry needs.

Details of the training undergone

Introduction to IoT

The Internet of Things (IoT) has revolutionized the way we interact with the world around us. It is a network of interconnected physical devices, sensors, and software applications that seamlessly communicate and exchange data over the internet. IoT enables the integration of the digital and physical worlds, creating a vast ecosystem where objects, machines, and people can interact and collaborate. With the advent of IoT, everyday objects are becoming "smart," capable of collecting and transmitting data, and enabling advanced automation and decision-making.

In the context of agriculture, IoT offers immense potential for improving crop monitoring, resource management, and decision-making processes. By deploying smart sensors and devices, farmers can gather real-time data on various parameters such as temperature, humidity, soil moisture, and crop health. This data can then be analyzed and visualized to gain valuable insights, enabling farmers to make informed decisions and take timely actions to optimize crop yield, conserve resources, and enhance sustainability.

In this project, we explore the application of IoT in agriculture by developing an agriculture crop monitoring system. By integrating IoT technologies like Blynk and ThingSpeak, we aim to create a comprehensive solution that enables remote monitoring, control, and analysis of crop conditions. Through the implementation of IoT principles, we strive to empower farmers with the tools and information they need to achieve efficient and sustainable agricultural practices.

Problem Statement

Our project aims to develop an agriculture crop monitoring robot incorporating the functionalities of Blynk and ThingSpeak. This will enable real-time data collection, remote control, and cloud-based analysis, empowering farmers with a comprehensive and user-friendly solution for effective crop management.

➢ Objective:

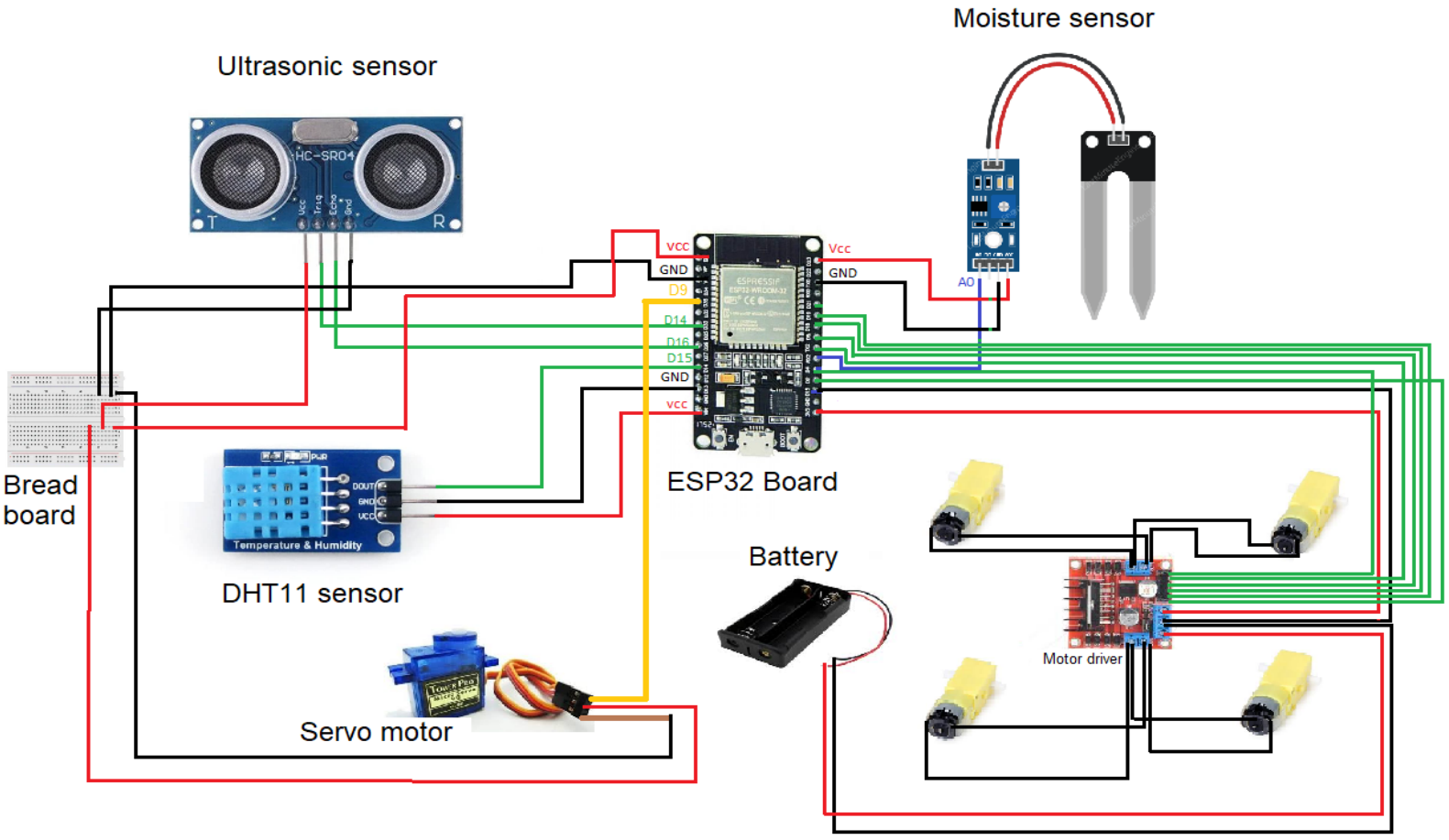
The objective of this project is to develop a user-friendly 4-wheel robot for agricultural applications. The robot will be controlled via Blynk, offering intuitive and remote control capabilities.The integration of sensors, including DHT11 for temperature and humidity measurement, moisture sensor for soil moisture detection, and ultrasonic sensor for obstacle detection, will provide valuable real-time data for crop monitoring.

By leveraging ThingSpeak, the objective is to enable farmers to access and analyze the collected data effortlessly,facilitating informed decision-making regarding irrigation, fertilization, and overall crop health.

The project aims to enhance the efficiency, productivity, and sustainability of agricultural practices by empowering farmers with an advanced IoT-based crop monitoring solution.

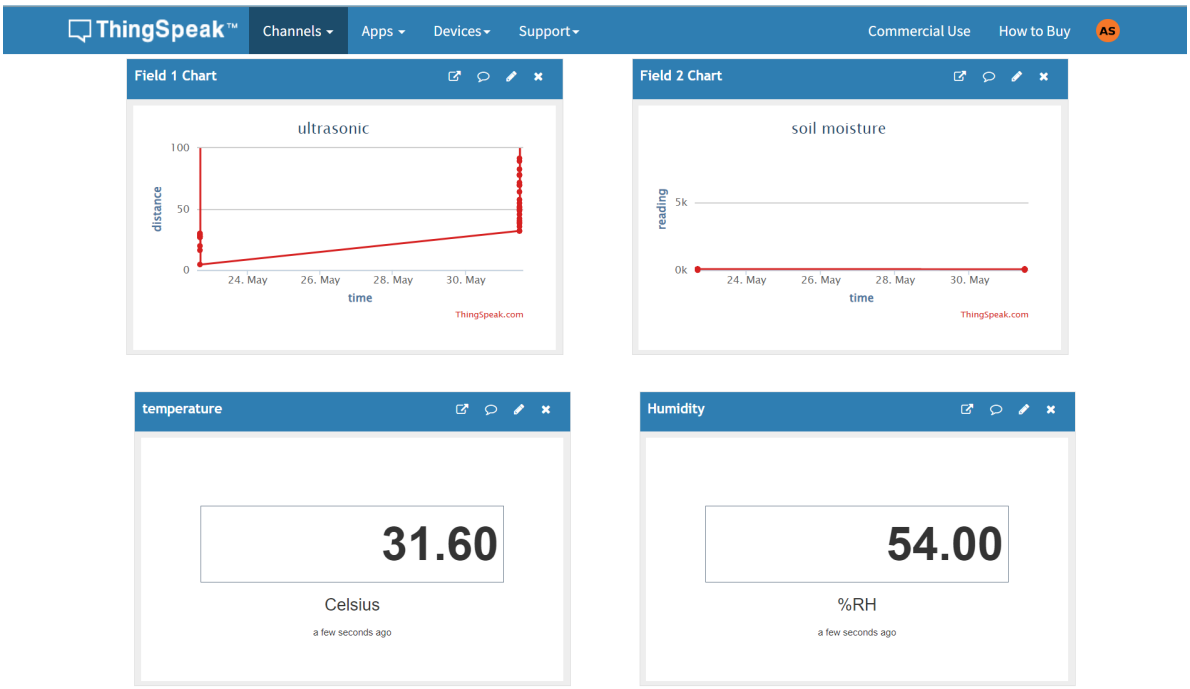
Methodology

- **Circuit Diagram**



- **ThingSpeak**

ThingSpeak is an open-source IoT platform specifically designed for the development of IoT applications. It offers a range of services for real-time data collection, analysis, and visualization. Users can collect real-time data from various devices and equipment by connecting them to ThingSpeak using internet-connected devices or Simulink blocks. The platform provides tools for analyzing and visualizing the collected data, allowing users to remotely monitor devices and equipment from anywhere using web browsers or mobile devices.

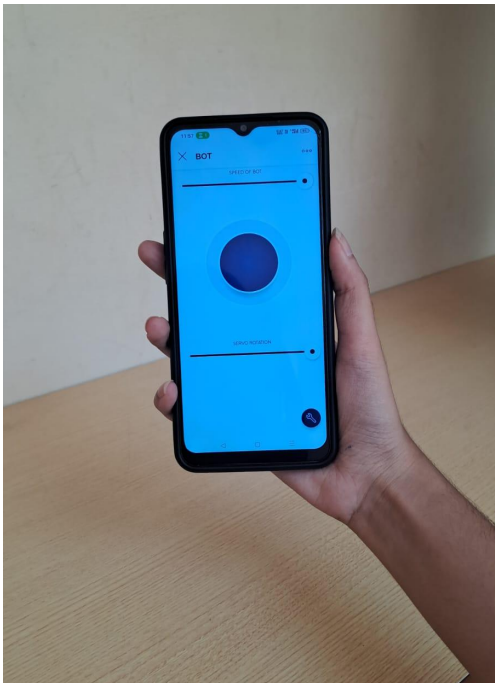


ThingSpeak provides centralized data storage in the cloud, ensuring easy accessibility for online and offline analysis. Users can securely store their data, protected by an API key that they control. When logged into their ThingSpeak account, they can securely download the data stored in the cloud.

In our project, we utilized ThingSpeak as an open-source IoT platform for real-time data collection, analysis, and visualization. The project involved reading data from various sensors, including a soil moisture sensor, DHT11 temperature and humidity sensor, and an ultrasonic sensor. The Arduino code snippet demonstrates how we obtained the sensor readings and sent them to ThingSpeak using Wi-Fi connectivity. The code reads

the sensor data, establishes a connection with ThingSpeak, and sends the data to specific fields using HTTP POST requests. The collected data, such as soil moisture, distance, temperature, and humidity, were sent to ThingSpeak for further analysis and visualization. By leveraging ThingSpeak's capabilities, we were able to monitor and analyze the sensor data in real-time, enabling effective decision-making and control in our IoT project.

- **Blynk**

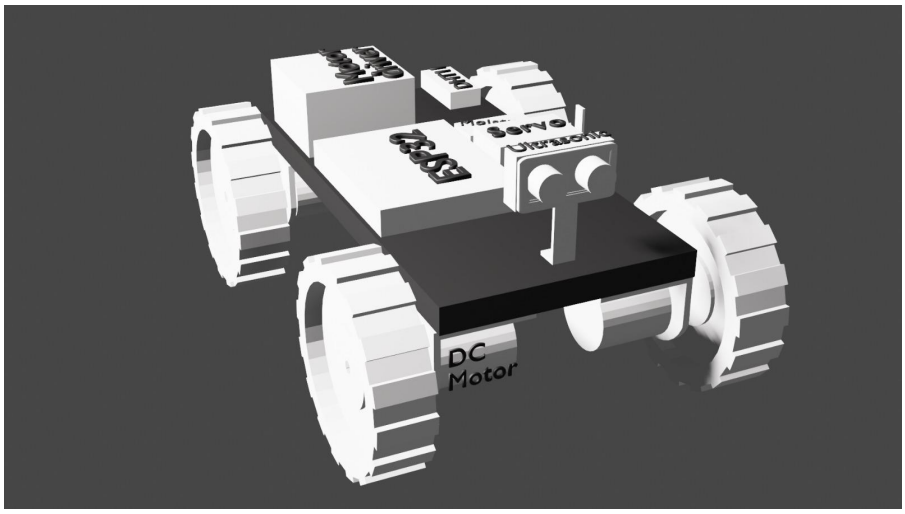


Blynk is an IoT platform that enables users to easily develop and control IoT applications. With Blynk, users can connect various hardware devices, such as Arduino, Raspberry Pi, and ESP8266, to the cloud, allowing remote monitoring and control of their projects. The platform provides a user-friendly mobile app interface, allowing users to create custom dashboards with intuitive widgets to visualize sensor data, control actuators, and set up notifications and alerts. Blynk also supports integration with popular IoT services and platforms, making it versatile and adaptable for a wide range of IoT applications..

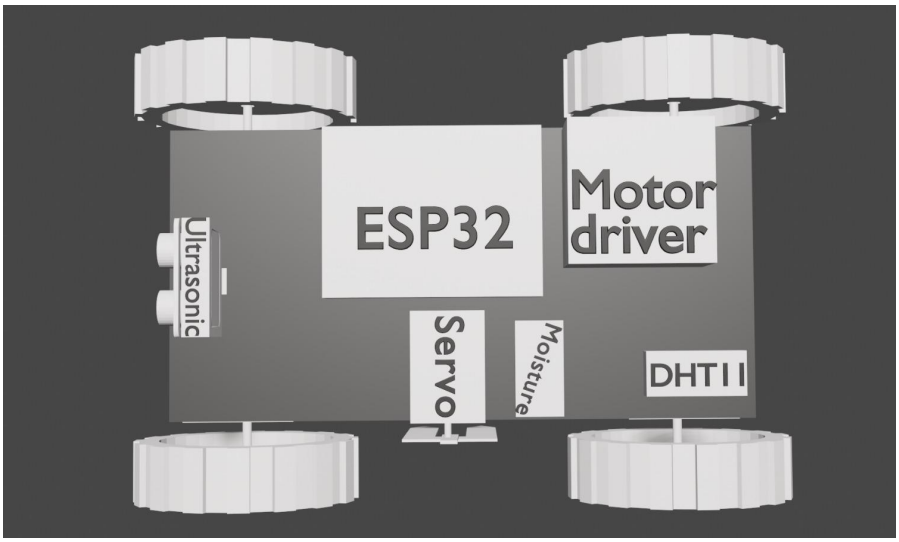
In our project, we used Blynk to create a smart car control system. Using Blynk's mobile app interface, we designed a custom dashboard with joystick and slider widgets. The provided Arduino code allowed us to retrieve the joystick and slider values from the app and use them to control the movements of the smart car. One of the sliders is to control the speed of the robot and the second slider is to control the movement of the servo motor which is attached to the moisture sensor. Based on the values received, we used the ‘if’ condition to determine the desired action for the car, whether it's moving forward, backward, left, right, or stopped. This integration of Blynk with the hardware and code enabled us to control the smart car remotely and intuitively, enhancing its functionality and providing a seamless user experience.

- **Overall Design**

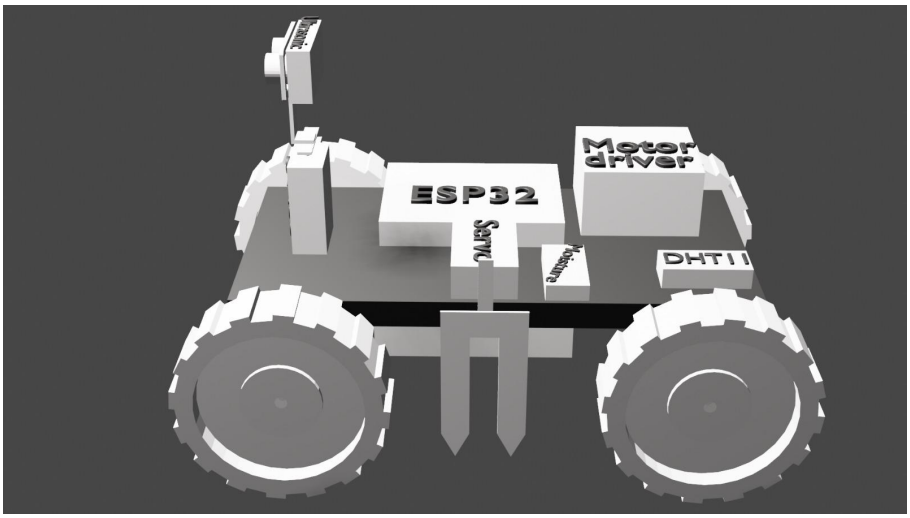
Front View:



Top View:



Side View:



- **Code**

```
// Include the library files
 #define BLYNK_PRINT Serial
 #include <WiFi.h>
 #include <BlynkSimpleEsp32.h>
 #include <DHT.h>
 #include <ESP32Servo.h>
 const int thresholdDistance = 50;// threshold distance for ultrasonic sensor
 const char* server = "api.thingspeak.com";//thingspeak server
 const String apiKey = "BLTD065NSX2D2EG9";//thingspeak api key
 const int analogInPin = A0;  // Analog input pin of soil moisture sensor
// Define the motor pins
 #define ENA 11
 #define IN1 7
 #define IN2 6
 #define IN3 5
 #define IN4 8
 #define ENB 12
 #define TRIGGER_PIN 14 // trigger pin of ultrasonic sensor
 #define ECHO_PIN 16 //echo pin of ultrasonic sensor
 #define DHTPIN 15//data pin of dht11
 #define DHTTYPE DHT11
 DHT dht(DHTPIN, DHTTYPE);// Initialize DHT sensor
// Variables for the Blynk widget values
 int x = 50;
 int y = 50;
 int speed;
 Servo servo;//initialize servo
 char auth[] = "GdhSbGKHhjud4lBKaxmRRGYAx3Pg__5q";//Enter your Blynk authtoken
 char ssid[] = "oppo"; //Enter your WIFI name
 char pass[] = "sharepass"; //Enter your WIFI password
```

```
void setup() {
  Serial.begin(9600);
//Set the motor pins as output pins
  pinMode(ENA, OUTPUT);
  pinMode(IN1, OUTPUT);
  pinMode(IN2, OUTPUT);
  pinMode(IN3, OUTPUT);
  pinMode(IN4, OUTPUT);
  pinMode(ENB, OUTPUT);
// Connect to Wi-Fi network
  Serial.println();
  Serial.println();
  Serial.print("Connecting to ");
  Serial.println(ssid);
  WiFi.begin(ssid, pass);
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  Serial.println("");
  Serial.println("WiFi connected");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
  pinMode(TRIGGER_PIN, OUTPUT);// Set trigger pin as output
  digitalWrite(TRIGGER_PIN, LOW);
  pinMode(ECHO_PIN, INPUT);// Set echo pin as input
  dht.begin();
  servo.attach(9);
  Blynk.begin(auth, ssid, pass, "blynk.cloud", 80);//Initialize Blynk library
}
// Get the joystick values
BLYNK_WRITE(V0) {
```

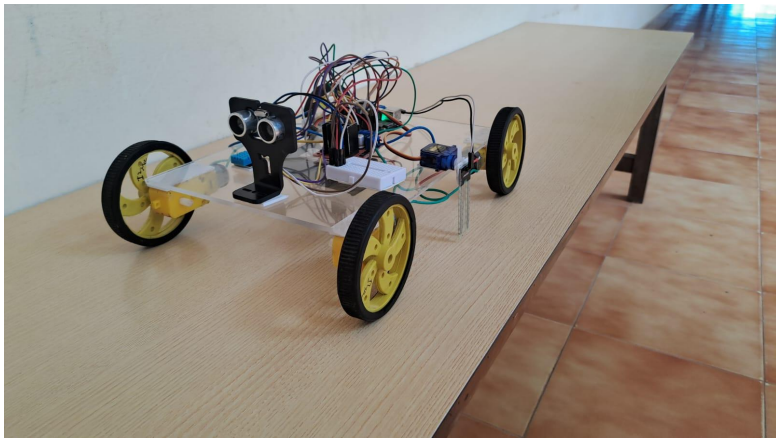
```
  x = param[0].asInt();
}
// Get the joystick values
BLYNK_WRITE(V1) {
  y = param[0].asInt();
}
//Get the slider values
BLYNK_WRITE(V2) {
  speed = param.asInt();
}
//Get the slider values
BLYNK_WRITE(V3){
  servo.write(param.asInt());
}
// Check these values using the IF condition
void smart car() {
   if (y > 70) {
    carForward();
    Serial.println("carForward");
   } else if (y < 30) {
    carBackward();
    Serial.println("carBackward");
   } else if (x < 30) {
    carLeft();
    Serial.println("carLeft");
   } else if (x > 70) {
    carRight();
    Serial.println("carRight");
   } else if (x < 70 && x > 30 && y < 70 && y > 30) {
    carStop();
    Serial.println("carstop");
  }
```

```
}
 void loop() {
  Blynk.run();// Run the blynk function
  smartcar();// Call the main function
// Read soil moisture sensor data
  int sensorValue = analogRead(analogInPin);
  Serial.print("sensorValue");
  Serial.println(sensorValue);
//Read dht11 data
  float temperature = dht.readTemperature();
  float humidity = dht.readHumidity();
  Serial.print("humidity");
  Serial.println(humidity);
  Serial.print("temperature");
  Serial.println(temperature);
//Read ultrasonic sensor data
  float duration, distance;
  digitalWrite(TRIGGER_PIN, HIGH);
  delayMicroseconds(10);
  digitalWrite(TRIGGER_PIN, LOW);
  duration = pulseIn(ECHO_PIN, HIGH);
  distance = duration * 0.034 / 2;
  Serial.print("distance");
  Serial.println(distance);
// Send data to ThingSpeak
  WiFiClient client;
  const int httpPort = 80;
  if (!client.connect(server, httpPort)) {
    Serial.println("Connection failed");
    return;
  }
  String postStr = apiKey;
```

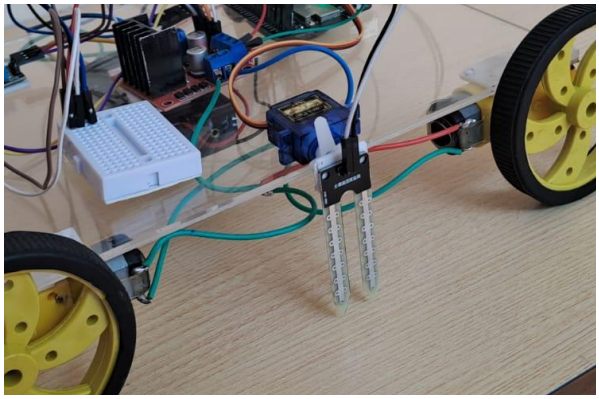
```
    postStr += "&field1=";
    postStr += String(distance);
    postStr += "\r\n\r\n";
    postStr += "&field2=";
    postStr += String(sensorValue);
    postStr += "\r\n\r\n";
    postStr += "&field3=";
    postStr += String(temperature);
    postStr += "\r\n\r\n";
    postStr += "&field4=";
    postStr += String(humidity);
    postStr += "\r\n\r\n";
  client.print("POST /update HTTP/1.1\n");
  client.print("Host: api.thingspeak.com\n");
  client.print("Connection: close\n");
  client.print("X-THINGSPEAKAPIKEY: " + apiKey + "\n");
  client.print("Content-Type: application/x-www-form-urlencoded\n");
  client.print("Content-Length: ");
  client.print(postStr.length());
  client.print("\n\n");
  client.print(postStr);
  Serial.println("Data sent to ThingSpeak");
  delay(3000);
}
/************Motor movement functions***************/
void carBackward() {
  analogWrite(ENA, speed);
  analogWrite(ENB, speed);
  digitalWrite(IN1, LOW);
  digitalWrite(IN2, HIGH);
  digitalWrite(IN3, HIGH);
  digitalWrite(IN4, LOW);
```

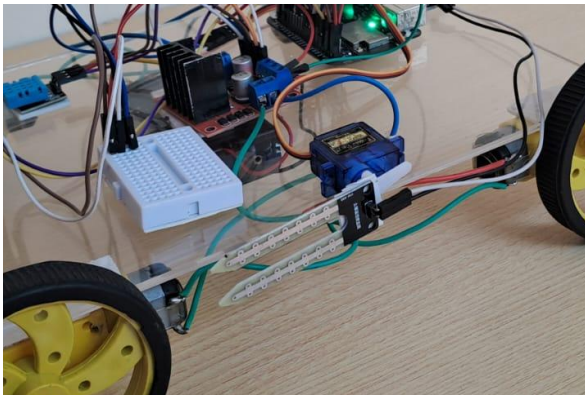
```
}
void carForward() {
  analogWrite(ENA, speed);
  analogWrite(ENB, speed);
  digitalWrite(IN1, HIGH);
  digitalWrite(IN2, LOW);
  digitalWrite(IN3, LOW);
  digitalWrite(IN4, HIGH);
}
void carRight() {
  analogWrite(ENA, speed);
  analogWrite(ENB, speed);
  digitalWrite(IN1, HIGH);
  digitalWrite(IN2, LOW);
  digitalWrite(IN3, HIGH);
  digitalWrite(IN4, LOW);
}
void carLeft() {
  analogWrite(ENA, speed);
  analogWrite(ENB, speed);
  digitalWrite(IN1, LOW);
  digitalWrite(IN2, HIGH);
  digitalWrite(IN3, LOW);
  digitalWrite(IN4, HIGH);
}
void carStop() {
  digitalWrite(IN1, LOW);
  digitalWrite(IN2, LOW);
  digitalWrite(IN3, LOW);
  digitalWrite(IN4, LOW);
}
```

- **Result**

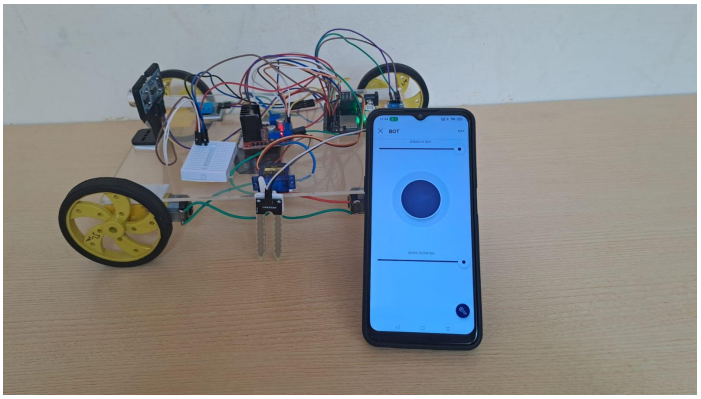


i)Overview of the bot

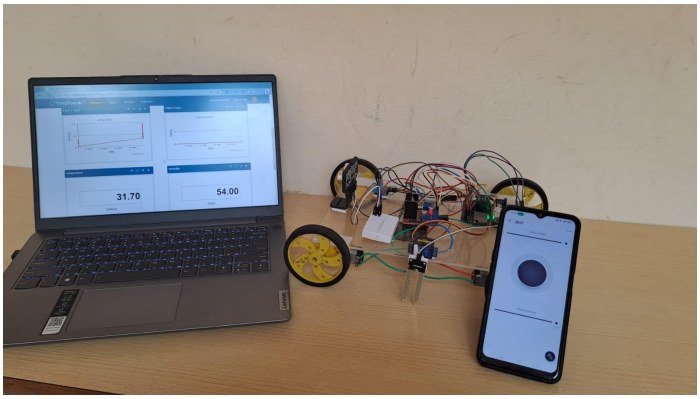




ii)Working of soil moisture sensor



iii)Robot controlled via blynk



iv)Readings observed through thingspeak

Conclusion

In conclusion, my internship experience in developing an IoT agricultural robot has been a valuable learning opportunity. I have gained hands-on experience in various aspects of IoT development, including design, assembling of the components, coding, testing, and deployment. Overall, this experience has enhanced my skills and knowledge in IoT and has prepared me for future career opportunities in this field. In the future we also plan to use obstacle avoidance using sensors and replace the servo motor with rack and pinion mechanism for soil moisture sensor. Overall, we believe that our internship at DLithe Consultancy Services Pvt Ltd . was a great learning experience that has prepared us for our future careers in the technology industry. We are grateful to our supervisor Dr. Sree Kantha for providing us with this opportunity and for guiding us throughout the project. We also thank our respective departments and college for including this internship as a part of our curriculum, which has helped us gain valuable industry experience.

References

- https://youtu.be/6mBO2vqLv38
- https://youtu.be/6WPsRJDA6tc
- https://youtu.be/0zyFFlo_s1M
- https://www.geeksforgeeks.org/sensors-in-internet-of-thingsiot/
- https://blynk.io/blog/esp32-blynk-iot-platform-for-your-connected-product#:~:text=Activating%20your%20device,and%20assigned%20to%20the%20user

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Department of Computer Science and Engineering

III/IV semester BE-Computer Science and Engineering

Summer Internship-II (21INT102)

Progress report

Internship Title: Agriculture Crop Monitoring Robot

Internship Category(Innovation/ Societal /Entrepreneurship): Innovation

Team Number: 2

Team members with USN:

Name	USN
Ms. Avisha V Shetty	4NM21CS041
Ms. Carol Jeswin Dcunha	4NM21CS045
Ms. Deepthi	4NM21CS053
Ms. Devishree Bangera	4NM21CS054
Mr. Amit Hansie Sarto	4NM21IS012

Weekly progress:

Date	Tasks Achieved	Guide signature with date
06-02-2023	Survey of literature As the first step our mentor suggested us to watch many YouTube videos on IoT-based projects, specifically in the agricultural sector. Our objective was to gain insights and inspiration for our own project in this domain.	 6/2/23

	Through these videos we explored various innovative solutions implemented in agriculture. We observed the projects on smart irrigation systems, Smart crop protection from wild animals, Soil nutrient monitoring and analysis systems, livestock tracking systems and so on. By analyzing these projects, we gained a better understanding of challenges faced in the agricultural sector and the solutions offered by IoT. The videos gave us some creative ideas and allowed us to identify some key areas where we can apply IoT technology to enhance productivity.	
13/02/2023	Prototype This week , we made progress on our project by developing a prototype model for our agricultural robot using Blender. Main focus was on placing all the required components on the bot and to show our mentor how the final product will look like at the end of our project. We implemented various features and details, such as wheels, sensors and other key components, to provide an accurate representation of our final product.	 13/2/23
20/02/2023	Submitted report on proposal of components After completing the prototype of our robot, the next step was to order the necessary components in order to proceed with the project. Hence we made a report which was around 50 pages. The report encompassed the overall project idea and included sections on literature survey, proposed system, components study, and time plan. Additionally, it provided a	

	comprehensive list of all the components required for the project, along with their respective quantities. The idea of the project was approved and we were funded with cash price in order to buy the components. Further we proceeded to buy the components and ordered the components from amazon and robu.in. The comprehensive report played a vital role in securing the necessary funding and outlining the project's roadmap. By ordering the components from trusted sources, we can ensure their quality and adherence to the specifications outlined in the report.	 20/2/23
27/02/2023	Sensors This week's focus on studying and individually working on specific sensors. Each team member worked individually to explore the functionalities, technical specifications, and implementation details of these sensors. After completing it, we came together and shared our thoughts. Then combined our knowledge which enabled us to create a system that incorporates various sensors.	 27/2/23
06/03/2023	Thigspeak After watching informative videos in the first week, we decided to utilize Thingspeak as our chosen IoT platform. Thingspeak is an IOT platform that allows users to collect, analyze, and visualize sensor's data in real-time. Our plan was to display the readings obtained from various sensors in the form of graphs on Thingspeak, which would provide a clear representation of the data. To begin the implementation, we first created an account on	 6/3/23

	Thingspeak and proceeded to create a new channel. This channel would serve as the destination for our sensor data. Further, we connected the sensors to the Thingspeak platform and successfully uploaded the collected data into the designated channel.	
13/03/2023	Blynk/assembling This week, our team included the Blynk application into our project, using which we can control the movement of our bot and soil moisture sensor into the soil. We began by familiarizing ourselves with the blynk platform and explored its features. We then wrote the necessary code and achieved the communication between the bot and Blynk app. This allowed us to remotely control the robot's movement through the app.	 13/3/23
20/03/2023	Testing After ordering the components we began to work with it without any delay.Firstly, we worked on the robot and controlled it via the Blynk app.After a lot of failures, we eventually achieved the desired outcome of getting the robot to move successfully. Further we mounted all the sensors on the robot and tested it.This stage allowed us to ensure that the sensors were functioning as intended and properly integrated with the robot's overall system. Upon completing the assembly and testing of the robot, we proceeded to evaluate its performance across various platforms.We are pleased with the progress made so far and are excited about the opportunities presented by this project	 20/3/23