A

PROJECT REPORT

ON

AUTOMATIC CROP PROTECTION FROM HEAVY RAIN USING IoT AND BLYNK APP

SUBMITTED TO SAVITRIBAI PHULE PUNE UNIVERSITY
IN FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE

BACHELOR OF ENGINEERING IN COMPUTER ENGINEERING

BY

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2023-24

CERTIFICATE

This is to certify that the project work entitled

AUTOMATIC CROP PROTECTION FROM HEAVY RAIN USING IoT AND BLYNK APP

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ACKNOWLEDGEMENT

It gives us great pleasure in presenting the preliminary project report on **“AUTOMATIC CROP PROTECTION FROM RAIN USING IOT AND BLYNK APP’ ’**

We would like to take this opportunity to thank our internal guide **Prof. Gade S. A.** and Head of Department **Prof. Daund R.P.** for giving us all the help and guidance we needed. So really grateful to him for their kind support. Their valuable suggestions were very helpful.

Beside we are thankful to management and **Dr. Yadav D.M** Principal of our college.We are thankful to our family members for supporting and to encourage us and for providing their guidance, for Our Project.

In the end our thank to all friends colleagues for providing their useful suggestions which contributed greatly in making our project successful.

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ABSTRACT

Smart farming, precision agriculture and Agriculture 4.0 all involve the integration of advanced technologies into existing farming architecture. The goal is to increase production efficiency and product quality, as well as reducing overall costs. To this end, the inclusion of Smart technologies into Irish agriculture has been inevitable with increased pressure being placed on farming practices to remain profitable, as well as adhere to environmental regulation.
The growing adoption of advanced technology in farming, from agricultural drones, precision seeding systems, auto-steering, automatic feeding systems and fruit-picking robots (amongst others), have all incentivised traditional agri-companies to invest in smart agriculture technology. The deployment of advanced agri-tech has the potential to allow for an increased focus on non-profitable tasks, such as farm maintenance and environmental practices. The reduction of heavy labour and tedious tasks can also lead to improvements in the health and work/life balance of farming staff.

Keywords: Automatic Crop Protection, IoT, Rain, Agriculture, Sensor Deployment, Automation, Environmental Monitoring, Crop Yield Enhancement, Sustainable Farming.

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Chapter 1

INTRODUCTION

With the exponential growth of world population, according to the UN Food and Agriculture Organization, the world will need to produce 70 Percentage more food in 2050, shrinking agricultural lands, and depletion of finite natural resources, the need to enhance farm yield has become critical. Limited availability of natural resources such as fresh water and arable land along with slowing yield trends in several staple crops, have further aggravated the problem. Another impeding concern over the farming industry is the shifting structure of agricultural workforce. Moreover, agricultural labor in most of the countries has declined. As a result of the declining agricultural workforce, adoption of internet connectivity solutions in farming practices has been triggered, to reduce the need for manual labor. IoT solutions are focused on helping farmers close the supply demand gap, by ensuring high yields, profitability, and protection of the environment. The approach of using IoT technology to ensure optimum application of resources to achieve high crop yields and reduce operational costs is called precision agriculture. IoT in agriculture technologies comprise specialized equipment, wireless connectivity, software and IT services. BI Intelligence survey expects that the adoption of IoT devices in the agriculture industry will reach 75 million in 2020, growing 20 Percentage annually. At the same time, the global smart agriculture market size is expected to triple by 2025, reaching $15.3billion(comparedtobeingslightlyover5$ billion back in 2016).

Smart farming based on IoT technologies enables growers and farmers to reduce waste and enhance productivity ranging from the quantity of fertilizer utilized to the number of journeys the farm vehicles have made, and enabling efficient utilization of resources such as water, electricity, etc. IoT smart farming solutions is a system that is built for monitoring the crop field with the help of sensors (light, humidity, temperature, soil moisture, crop health, etc.) and automating the irrigation system. The farmers can monitor the field conditions from anywhere. They can also select between manual and automated options for taking necessary actions based on this data. For example, if the soil moisture level decreases, the farmer can deploy sensors to start the irrigation. Smart farming is highly efficient when compared with the conventional approach. IoT have the potential to transform agriculture in many aspects and these are the main ones. Data collected by smart agriculture sensors, in this approach of farm management, a key component are sensors, control systems, robotics, autonomous vehicles, automated hardware, variable rate technology, motion detectors, button camera, and wearable devices. This data can be used to track the state of the business in general as well as staff performance, equipment efficiency. The ability to foresee the output of production allows to plan for better product distribution.

1.1 Motivation

IoT-based system is in charge of providing knowledge from an environment to an non-expert user. IoT-based system can be used in different environments, so it needs to be able to address many heterogeneous devices. Thus, a major concern within developing an IoT-based system is how to handle the interaction with the heterogeneous devices for non-expert users. This concern can be addressed by a middleware layer between devices and non-expert users. This layer is responsible to hide the diversity of devices from the user perspective, and provides access transparency to the devices for the end users. The idea of creating abstractions of devices been addressed in the literature. The middleware we found in the literature can provide satisfaction by facilitating the interaction with devices, but they do not support low-level device configuration.

1.2 Problem Definition

The problem we aim to address with our project, ”Automatic Crop Protection from Heavy Rain using IoT and Blynk App” lies at the intersection of agriculture, technology, and climate change. It revolves around the vulnerability of crops to heavy rainfall events and the limitations of traditional farming practices in mitigating the adverse effects of such weather phenomena. The problem at hand is to develop an innovative system that leverages IoT and cloud technology to address the vulnerability of crops to heavy rainfall. This system must provide timely and automated responses to protect crops

CHAPTER 2

LITERATURE SURVEY

We've examined work on similar projects in the past and know how to do research. Agriculture is the backbone of the Indian economy, according to many ways. Agriculture is the primary source of nourishment for us, making life impossible without it. However, in the current situation, finding farm employees is difficult. Modern development is prompted by the computerization of all industries. Up to a certain extent, the agricultural process is automated here.

P. Goutham Goud et al [1] Rain sensor, a sophisticated microprocessor, and a DC motor are used in a system where the deluge is recognised and a protective shield is wrapped around the rooftop. The rain sensor of such a drying shed protects the harvest from rain and wetness. To automate this task, a rainfall detects the downpour and sends the information to the microcontroller. A defensive wrapper is wrapped over the rooftop top, and the microcontroller forms the information and activates the DC motor control circuit.

Dheekshith et al [2] developed a system for identifying precipitation by using a downpour distinguishing sensor. The sensor is connected to a direct actuator motor and a spread job that protects against rain. When the sensor detects rain, it goes to work and pivots the spreading roll, which covers the gathered merchandise and protects the farmer from losses.

Naveen K B et al [3] suggested a framework that was structured using the Proteus programming language. When the rain sensor detects a deluge, the soil moisture sensor determines dampness content, which is displayed on the LCD. . The value sent to the PIC microcontroller is determined by the soil moisture sensor, temperature sensor, and rain sensor. The automatic rainwater and crop saving system protect crops from excessive rainwater by taking into consideration the attributes.

Ritik Bansode [4] To overcome the limitations of existing systems, we have proposed a framework that covers the harvested crops from heavy precipitation and navigates this water to the nearest storage chamber to avoid soil erosion and have the least impact on crop yield. The method consists of ATMEGA328P Micro-controller, NodeMCU wifi module to control the system from a nearby place, Soil Moisture Sensor, LCD which will give live readings to the farmer.The current work entails preserving the unique resources that are available to mankind. We can limit the flow of water and so eliminate waste by assessing the status of the soil productively. Water stream can be obligated by substantially sending by knowing the state of moistness, and temperature over with the use of unexpectedness and temperature sensors. There are currently no effective frameworks available in the current situation. The farmer must go to the drying region and cover the gathered fields, which is particularly difficult if the farmer's location is distant from the harvest and the entire crop would be pummeled by the downpour before the farmer arrives. Conducting a survey

[5]of farmers related to automatic crop protection from rain using IoT and the Blynk app can provide valuable insights into their perspectives, needs, and challenges. Here's a structured approach for designing such a survey Gather demographic information:
Name: Samadhan S. Gavande,
Age: 55,
Gender: Male,
Location :Laxmanpur,
Years of farming experience: 25

CHAPTER 3

SOFTWARE REQUIRMENT SPECIFICATION

3.1 Introduction

Crop protection is a critical aspect of modern agriculture, and with the advent of advanced technologies, there is a growing need for innovative solutions to enhance efficiency and sustainability. The integration of Internet of Things (IoT) in agriculture has opened up new possibilities for monitoring and managing crop protection measures in real-time. This Software Requirements Specification (SRS) document outlines the necessary details for the development of a robust software system focused on Crop Protection Using IoT.

3.2 Project Scope

The scope of our project, ”Automatic Crop Protection from Heavy Rain using IoT and BLYNK APP” encompasses the development of a robust system that integrates IoT sensors and the Blynk platform to monitor real-time environmental conditions in agricultural settings. This includes rainfall intensity, soil moisture, temperature, and humidity. The system will automatically respond to heavy rain events by initiating protective measures, optimizing resource utilization, and providing farmers with a user-friendly interface for monitoring and control. The project aims to mitigate crop damage, reduce losses, and enhance food security, contributing to more sustainable and efficient agriculture practices while leveraging the potential for scalability and future innovations in smart farming. .

3.2.1 Assumptions and Dependencies

- **IoT Device Compatibility:**

  Assumption: The IoT devices, such as sensors and actuators, used for crop monitoring and protection, will be readily available and compatible with the chosen software platform.

Rationale: Assuming the availability of compatible devices ensures that the development team can focus on the software integration aspects without delays related to hardware compatibility issues.

Stable Connectivity:
Assumption: Reliable and stable internet connectivity is available across the agricultural areas where the system is intended to be implemented.
Rationale: The assumption of stable connectivity is essential for real-time data transmission between IoT devices and the central software platform. This ensures timely monitoring and response to crop protection needs.

3.3 Dependencies

3.3.1 Hardware Dependencies

•IoT Devices: Reliable and compatible IoT devices such as sensors for monitoring environmental conditions (temperature, humidity, soil moisture), pest detection devices (cameras, traps), and actuators for controlling irrigation systems or deploying pest control measures.

•Communication Infrastructure: Stable and scalable communication channels (e.g., Wi-Fi) to facilitate data transfer between IoT devices and the central system.

3.3.2 Software Dependencies

User Interface (UI): Development of a user-friendly interface for farmers and stakeholders to interact with the system, monitor crop conditions, and control IoT devices.

3.3.3 Data Dependencies

Weather Data: Integration with reliable weather data sources to enhance the accuracy of environmental monitoring and pest prediction.
• Crop Information: Access to databases containing information about specific crops, their growth cycles, and susceptibility to pests and diseases.

3.3.4 Security Dependencies

•Security Protocols: Implementation of robust security protocols to protect data integrity, confidentiality, and prevent unauthorized access to the IoT system.
•Authentication and Authorization: Secure methods for authenticating users and authorizing access to sensitive functionalities within the system.

3.3.5 Regulatory and Compliance Dependencies

• Compliance Standards: Adherence to agricultural and environmental regulations, ensuring that the system complies with ethical, legal, and industry standards.
• Data Privacy: Implementation of measures to ensure the privacy and confidentiality of sensitive data, especially considering the collection of farm-specific information.

3.3.6 Environmental Dependencies

• Power Supply: Reliable and sustainable power sources for IoT devices, considering the often remote and off-grid locations of agricultural fields.

• Climate Considerations: Designing IoT devices that can withstand various environmental conditions prevalent in agricultural settings.

3.4 Functional Requirement

3.4.1 Classification System

1. Technology Domain Classification:
Agricultural Technology: The project primarily focuses on the agricultural sector, using advanced technologies like IoT and cloud computing to address specific challenges in farming. IoT Integration in Agriculture: The project showcases the integration of IoT technology into the agricultural sector

2. Cloud Computing Classification:
Cloud-Based Agriculture: The project is characterized by its reliance on cloud computing, specifically Cloud, for data storage and processing.
These classifications highlight the project's key features and its alignment with various domains and technologies, emphasizing its role in advancing agriculture through innovative

solutions.

3.5 External User Interface

3.5.1 User Interfaces

The user interface should provide an intuitive and informative experience, allowing users to monitor their crops, receive critical alerts, and make informed decisions to protect their agricultural investments effectively.

Frontend Interface: The project's frontend interface features a user-friendly dashboard displaying real-time environmental data. It offers interactive controls for manual adjustments, alerts for critical events, and personalized settings. The interface ensures ease of use, aiding farmers in monitoring and safeguarding their crops against heavy rainfall via an intuitive and responsive design.

Backend Interface : The backend interface manages data processing and automation. It handles data collected from IoT sensors, performs real-time analysis, and triggers automated crop protection measures based on weather conditions. It also ensures secure data storage and efficient communication with the frontend user interface through the Cloud platform.

3.5.2 Software Interfaces

The software interface of the project facilitates communication between IoT devices, the Cloud platform, and the user interface. It ensures seamless data transfer from sensors to the cloud, real-time data processing and analysis, and automated decision-making. The interface also allows user interaction and control over crop protection measures.

3.5.3 Hardware Interface

A good working security system will require to frame the user.

3.6 Non- functional Requirements

3.6.1 Performance Requirements

Response Time: Ensure that the system responds to user commands and alerts within seconds for a seamless user experience.

Data Processing Speed: Process and analyze sensor data in real-time to trigger timely automated responses

3.6.2 Security Requirements

There should be only one person in the camera frame at a time.

3.6.3 Software Quality Attributes

Software testing is a critical element of software quality assurance and represents the ul- timate review of specification, design and coding. In fact, testing is the one step in the software engineering process that could be viewed as destructive rather than constructive. A strategy for software testing integrates software test case design methods into a well-planned series of steps that result in the successful construction of software. Testing is the set of activities that can be planned in advance and conducted systematically. The underlying motivation of program testing is to affirm software quality with methods that can economically and effectively apply to both strategic to both large and small-scale systems.

Correctness: The system should classify the langauge and predict output very quickly. The low accuracy can result in low reliability.

Usability: The system is very useful for the organization of the deaf and dumb peo- ple. Very reliable for the making change in the life of the deaf and dumb people.

3.7 System Requirement

3.7.1 Software Requirements

- **Arduino IDE :** The Arduino IDE is an open-source software, which is used to write and upload code to the Arduino boards. The IDE application is suitable for different operating systems such as Windows, Mac OS X, and Linux. It supports the programming languages C and C++. Arduino Integrated Development Environment (IDE) is an open source IDE that allows users to write code and upload it to any Arduino board. Arduino IDE is written in Java and is compatible with Windows, macOS and Linux operating systems.
- **Blink App :** Use the Blink Home Monitor app to check in on what's happening at home from anywhere at any time. The app connects your home to your phone in HD

video so you can see and protect what matters most. With multi-system support, you can use Blink to watch your home, vacation home, or business all at the same time.

3.7.2 Hardware Requirements

- **1. ESP 32 :**

Figure 3.1: ESP 32

Microcontroller for data processing and IoT connectivity ESP32 is a series of low-cost, low-power system on a chip microcontrollers with integrated Wi-Fi and dual-mode Bluetooth Processors CPU : 32-bit microprocessor Operating at 240MHz

- **2. Rain Sensor :**

Figure 3.2: Rain Sensor

Detects rainfall for timely protection. Most rain-sensing wipers use a sensor that's mounted behind the windshield. It sends out a beam of infrared light that, when water droplets are on the windshield, is reflected back at different angles.

- **3. Dc geared Motor - 45 RPM :**

Figure 3.3: Dc geared Motor

Mechanism for crop protection An electric motor is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire winding to generate force in the form of torque applied on the motor's shaft

- **4. Motor driver - L293N :**

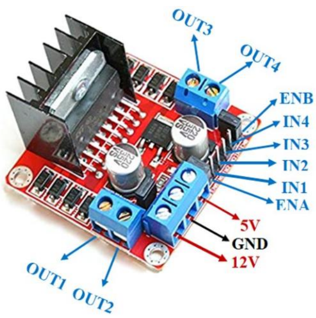


Figure 3.4: Motor driver

Controls the DC Gear Motor How the motor is activated and deactivated based on sensor inputs Motor driver is used to control motion of a motor and its direction by feeding current accordingly. Output of a motor driver is in digital form so it uses PWM (Pulse Width Modulation) to control speed of a motor. Motor Driver are basically current amplifiers followed by input signals

- **5. IR Sensor :**

Figure 3.5: IR Sensor

Monitoring Sunlight Exposure: IR sensors provide crucial data on sunlight exposure for optimizing crop growth conditions. Detects obstacles or unwanted entities Detailed explanation of how the IR Sensor works How it detects obstacles and prevents motor activation in undesirable conditions

- **6. Jumper Wire :**

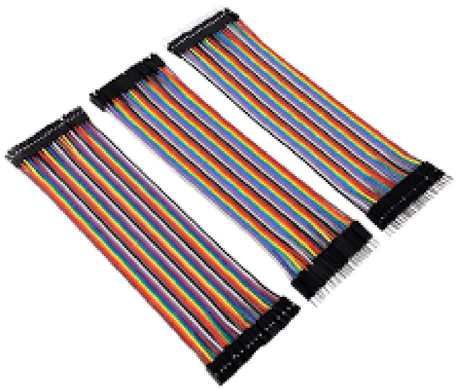


Figure 3.6: Jumper Wire

Connects components in the system Including a dedicated slide for Jumper Wires not only highlights their importance but also provides a clear understanding of their role in establishing connections within the Automatic Crop Protection System Used Male-to-Male , Male-to-Female and Female-to-Female wires

- **7. Poly-House Sheet (UV Stabilized) :**

The UV (ultraviolet) additive is what protects polyethylene plastic from sun damage.

Figure 3.7: Poly-House Sheet

Nothing destroys plastic like UV.
SolaWrap has a 10 year UV warranty! Cover you greenhouse once and be done with it for many years to come.
The other films below will stand up to the sun because of their UV protection.

3.8 Analysis Model: SDLC Model to be applied

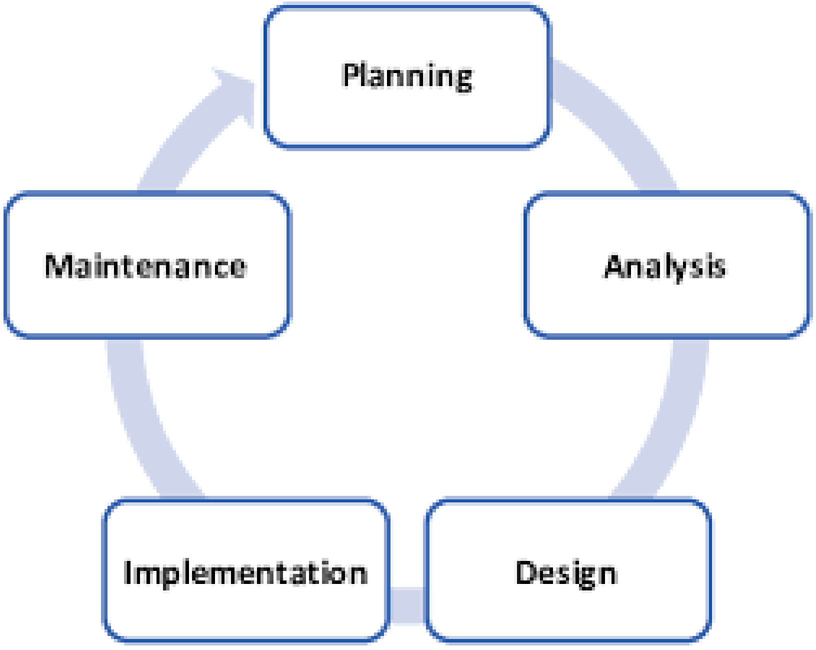


Figure 3.8: SDLC Life Cycle

1.Requirements Gathering : The first step is to gather the requirements for the Avoid Shoulder suffing attack using security qualification matrix project. Meet with stakeholders, such as authentic user of the system such authentic user or bank ATM experts, to understand their needs and expectations. Identify the key functionalities,security policies, communication protocols, visualization requirements, and any specific constraints or regulations. Length of the matrix Required to design.alphabets,which alphanumeric character should be specified within the matrix?.

1. Planning :- This is the first phase in the systems development process. It identifies whether or not there is the need for a new system to achieve a business"s strategic objectives. This is a preliminary plan (or a feasibility study) for a company"s busi- ness initiative to acquire the resources to build on an infrastructure to modify or improve a service. The company might be trying to meet or exceed expectations for their employees, customers and stakeholders too. The purpose of this step is to find out the scope of the problem and determine solutions. Resources, costs, time, benefits and other items should be considered at this stage.

2. Analysis and Requirements :- The second phase is where businesses will work on the source of their problem or the need for a change. In the event of a problem, possible solutions are submitted and analyzed to identify the best fit for the ultimate goal(s) of the project. This is where teams consider the functional requirements of the project or solution. It is also where system analysis takes place or analysing the needs of the end users to ensure the new system can meet their expectations. Systems analysis is vital in determining what a business's needs are as well as how they can be met, who will be responsible for individual pieces of the project, and what sort of time line should be expected.

textbf3. Systems Design :- The third phase describes, in detail, the necessary specifications, features and operations that will satisfy the functional requirements of the proposed system which will be in place. This is the step for end users to discuss and determine their specific business information needs for the proposed system. It"s during this phase that they will consider the essential components (hardware and/or software) structure (networking capabilities), processing and procedures for the system to accomplish its objectives.

4. Implementation :- The sixth phase is when the majority of the code for the pro- gram is written. Additionally, this phase involves the actual installation of the newly-developed system. This step puts the project into production by moving the data and components from the old system and placing them in the new system via a direct cut over. While this can be a risky (and complicated) move, the cut over typically happens during off-peak hours, thus minimizing the risk. Both sys- tem analysts and end-users should now see the realization of the project that has implemented changes

5. Maintenance :- The seventh and final phase involves maintenance and regular required updates. This step is when end users can fine-tune the system, if they wish, to boost performance, add new capabilities or meet additional user requirement

The SDLC model provides a structured and iterative approach to developing and maintaining model helps ensure that the system meets the requirements, operates reliably, and delivers value to the end-users.

Chapter 4

System Design

4.1 System Architecture

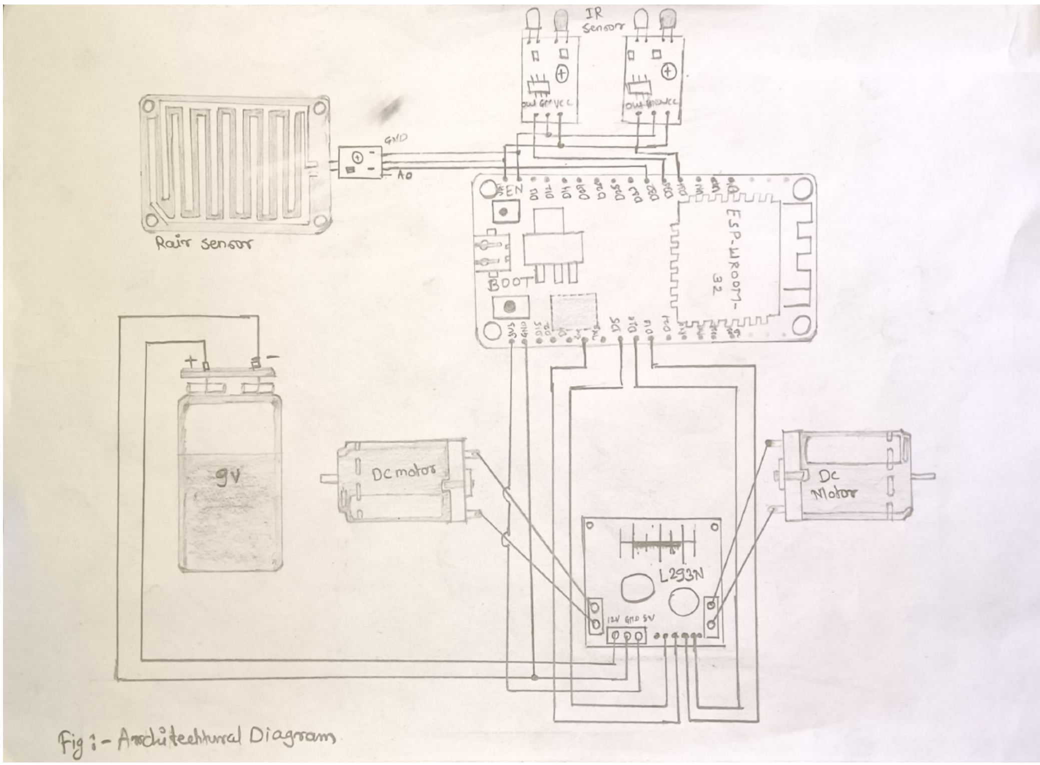


Figure 4.1: System Architecture

To develop a system for crop protection from heavy rain using IoT and the Blynk app, you'll need to integrate several components seamlessly. The core of the system lies in the conjunction of a rain sensor, a microcontroller, and Blynk's interface. The rain sensor serves as the primary input, detecting precipitation levels. A suitable microcontroller, like Arduino or ESP8266/ESP32, connects to this sensor and interfaces with the internet, either directly or through a separate WiFi module. Through the Blynk app, users can visualize the rain data in real-time and control the crop protection mechanisms remotely.

Actuators play a crucial role in executing protective measures. Depending on the specific needs of the crop and the severity of the rain, actuators such as motors for deploying covers, valves for irrigation control, or mechanisms for moving plants to sheltered areas may be required. The system's logic, programmed into the microcontroller, interprets the rain data and triggers actions based on predetermined thresholds. For instance, if the rainfall intensity surpasses a predefined level, the system activates the crop protection mechanisms automatically.

Safety features are paramount in such systems. Implementing rain delay logic can prevent premature activation after rainfall ceases, allowing time for soil absorption. Moreover, incorporating fail-safes ensures that the system doesn't inadvertently harm the crops it's designed to protect. Thorough testing under various rainfall conditions is essential to validate the system's reliability and accuracy. Calibration of the rain sensor may be necessary to refine its precision.

4.2 Data Flow Diagram

4.2.1 Data Flow Level-0

DFD Level 0 :

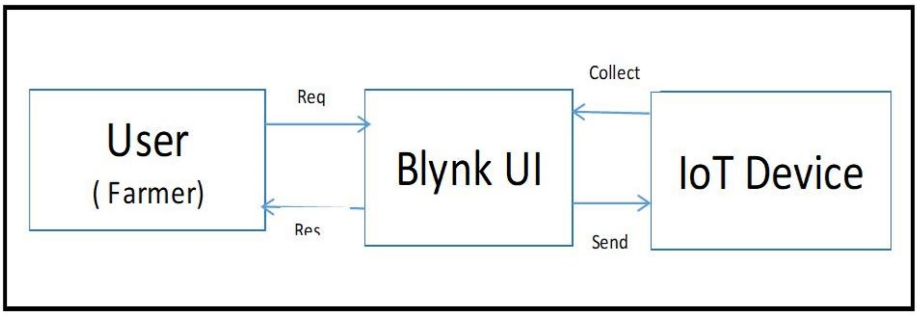


Figure 4.2: DFD-Level 0

At the core of the system lies the Crop Field, the physical area where the crops are cultivated. Interfacing with the Crop Field are IoT Devices strategically positioned to monitor environmental conditions, especially heavy rain. These IoT Devices collect data on rainfall intensity and other relevant metrics. They also have the capability to trigger protective mechanisms such as deploying covers or activating drainage systems when heavy rain is detected. Serving as the interface between users and the IoT Devices is the Blynk App. This application provides a user-friendly platform accessible via mobile devices or computers. Through the Blynk App, users can remotely monitor real-time data collected by the IoT Devices.

4.2.2 Data Flow Level-1

DFD Level 1 : The Crop Protection from Heavy Rain using IoT and Blynk app illustrates the flow of data in the system. At the core of the diagram is the process of Heavy Rain Detection, which is responsible for identifying heavy rain using sensors or weather APIs. The data collected by the sensors is then transmitted to an IoT device, which serves as the central hub for data acquisition. From there, the IoT device communicates with the Blynk app, a mobile application designed for IoT projects. The Blynk app receives the data from the IoT device and triggers alert notifications to inform farmers or relevant stakeholders about the detected heavy rain. This diagram provides a streamlined representation of how information flows within the system to protect crops from adverse weather conditions.

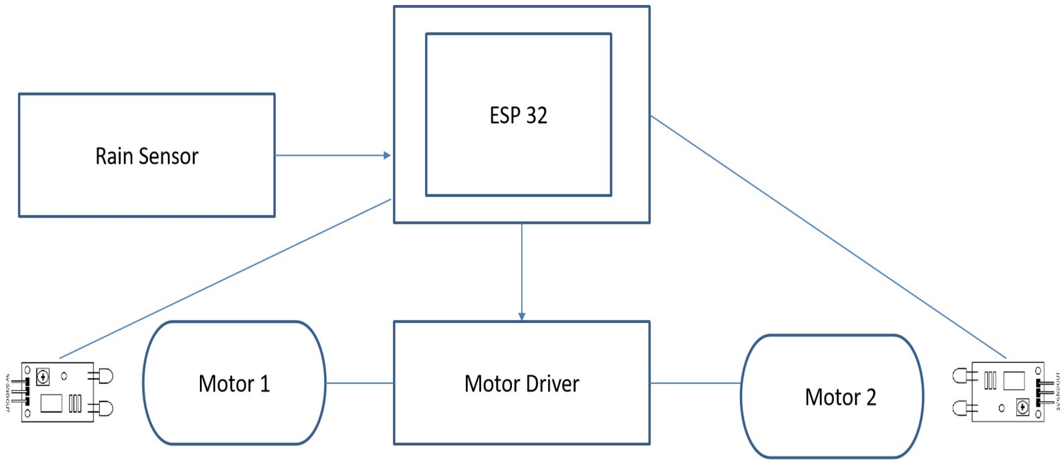


Figure 4.3: DFD-Level 1

4.2.3 Data Flow Level-2

DFD Level 2 : The system for crop protection from heavy rain integrates IoT devices, a Blynk app, and an alert system. It begins with the detection of heavy rain by an external system or sensor. This triggers the IoT devices to capture data related to the heavy rain event. The captured data is then transmitted to the Blynk app, where it is displayed for users to monitor. In case of heavy rain detection, the alert system is activated, sending notifications to relevant stakeholders through the Blynk app or other designated channels. This integrated approach enables proactive monitoring and timely responses to protect crops from damage caused by heavy rain.

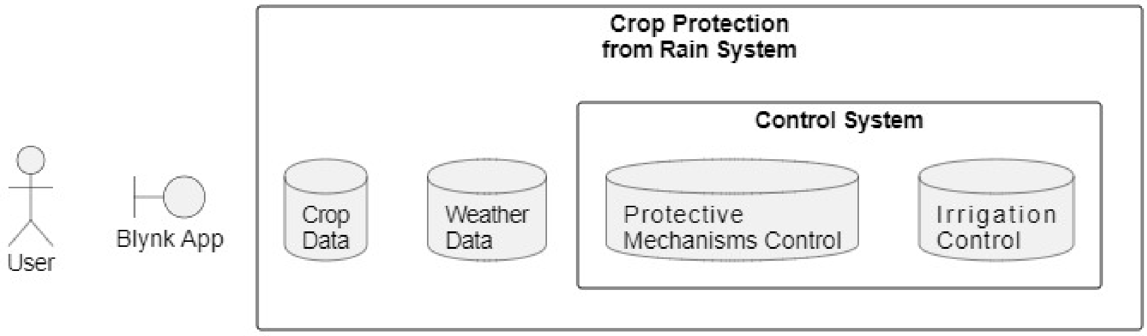


Figure 4.4: DFD-Level 2

4.3 UML Diagrams

4.3.1 Sequence Diagram

Sequence Diagram : In the Sequence Diagram depicting crop protection from heavy rain using IoT and the Blynk app, interactions unfold sequentially over time. It begins with the IoT device detecting heavy rain, followed by the transmission of this data to the Blynk app for display. If heavy rain is confirmed, the Blynk app triggers an alert, prompting the alert system to send notifications to users. This illustrates the flow of interactions between the IoT device, Blynk app, alert system, and users during heavy rain events, facilitating timely responses for crop protection.

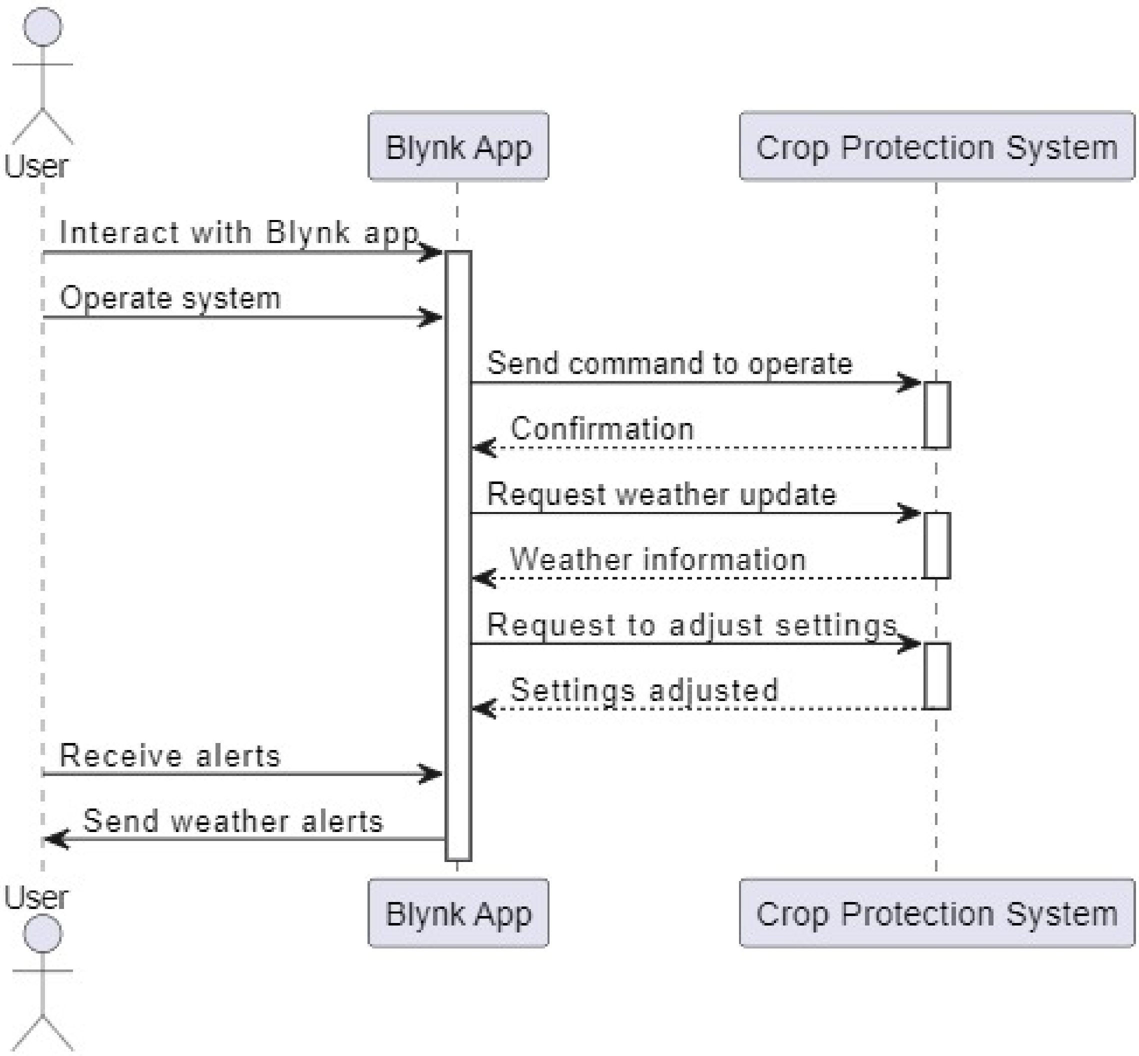


Figure 4.5: Sequence Diagram

4.4 Activity Diagram

Activity Diagram : In the Activity Diagram for crop protection from heavy rain using IoT and the Blynk app, the process initiates with the detection of heavy rain. Subsequently, data is captured by the IoT device and displayed on the Blynk app for monitoring purposes. The system then checks for heavy rain alert conditions. If heavy rain is confirmed, an alert notification is sent. Finally, the activity concludes once the entire process is executed. This diagram provides a visual representation of the sequential flow of activities involved in the system for crop protection from heavy rain.

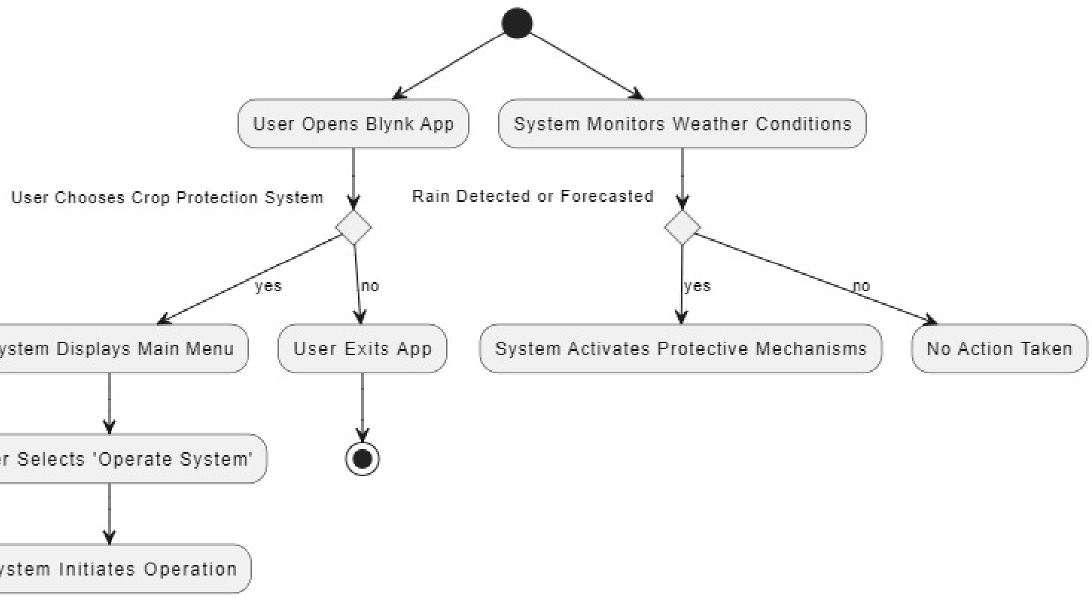


Figure 4.6: Activity Diagram

4.5 Use Case Diagram

Use Case Diagram : In the Use Case Diagram for crop protection from heavy rain utilizing IoT and the Blynk app, two main actors are identified: the IoT device and the user. The IoT device encompasses functionalities such as heavy rain detection, while the user actor engages in activities like monitoring crop status. These use cases represent the core functionalities of the system and illustrate the interactions between actors and system components. The diagram provides a high-level overview of how users and devices interact within the context of crop protection from heavy rain

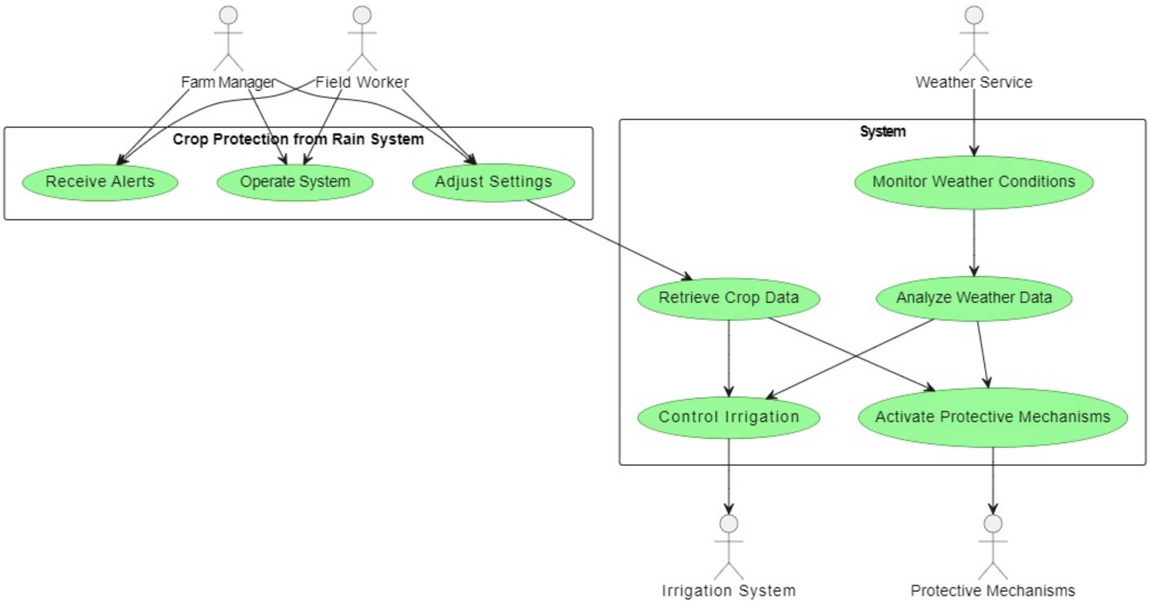


Figure 4.7: Use Case Diagram

CHAPTER 5

Project Plan

5.1 Define the project scope:

• Define the project goals and objectives.

• Identify the deliverables and milestones.

• Determine the project budget, timeline, and constraints.

• Identify the project stakeholders and their requirements.

5.2 Estimate project resources:

• Identify the resources required to complete the project, including personnel, equipment, and materials.

• Estimate the quantity and duration of each resource required.

• Determine the cost of each resource, including the hourly rate for personnel, the cost of equipment rental or purchase, and the cost of materials.

• Calculate the total cost of each resource based on the estimated quantity, duration, and cost.

• Allocate resources to each task based on the estimated quantity and duration.

5.3 Project Cost Estimate

Sr. No.	Name Of Component	Quantity	Unit Price	Rate
1	ESP 32	1	899	899
2	Dc Geared Motor - 45 RPM	2	Approx 10000	10000
3	Motor Driver -L293N	1	400	400
4	Rain Sensor Module	1	350	350
5	IR Sensor	2	180	360
6	Jumper Wire	30	15	450
7	Structure	1	Approx 45000	45000
8	Polythene Paper	1089 sq.meter	Approx 160 Rs per 1 sq.meter	174240 / 175000
9	Power Supply	1	-	-
TOTAL REQUIRED AMOUNT				232459 / 240000

5.4 Project Schedule

5.4.1 Project Planning

Major Tasks in the Project stages:

- Task 1: Literature Survey.
- Task 2: Study of Base paper.
- Task 3: Implementation of Base Paper.
- Task 4: Other Extra Modules Implementation.
- Task 5: Testing/ Document Writing.

5.4.2 Time Line Charts:

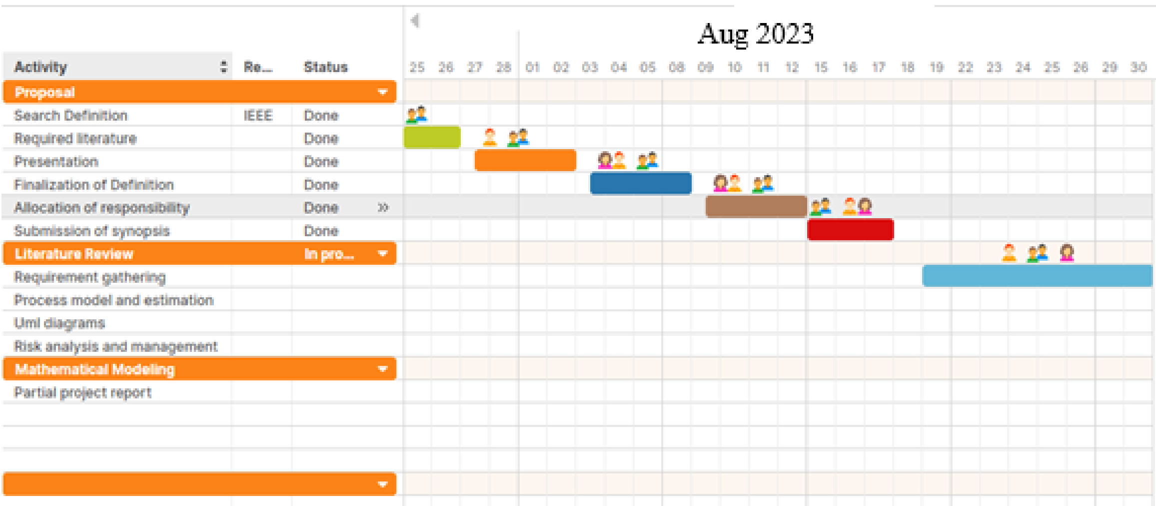


Figure 5.1: Project planner for July

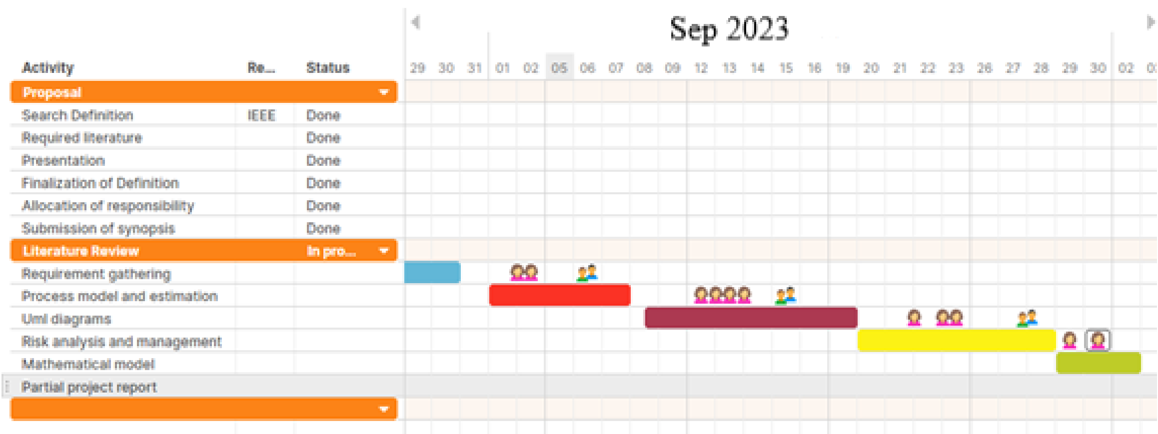


Figure 5.2: Project planner for August

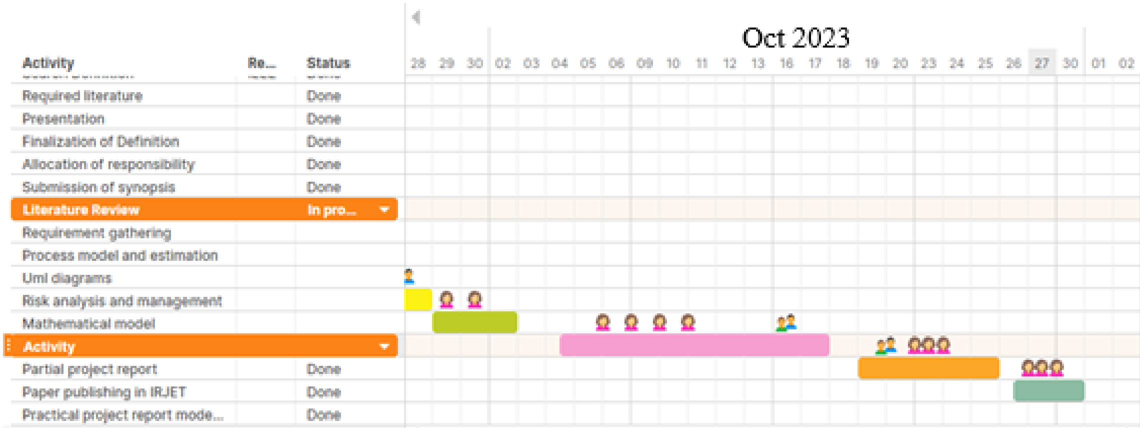


Figure 5.3: Project planner for September

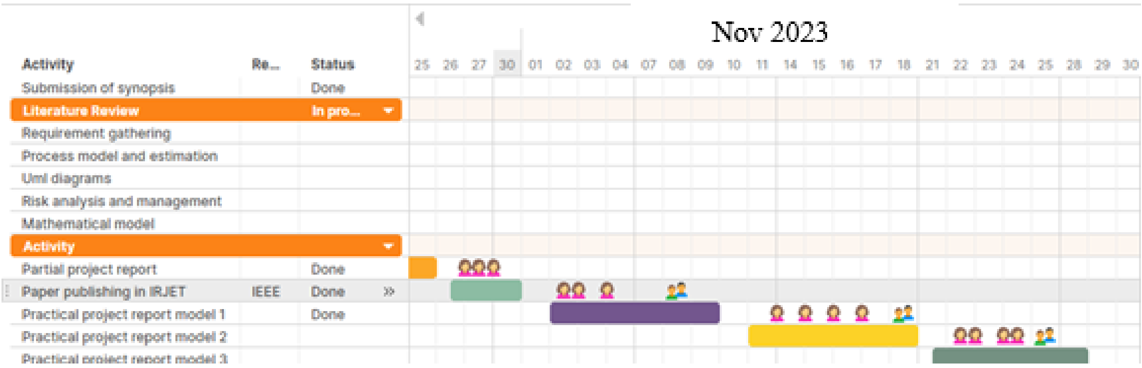


Figure 5.4: Project planner for October

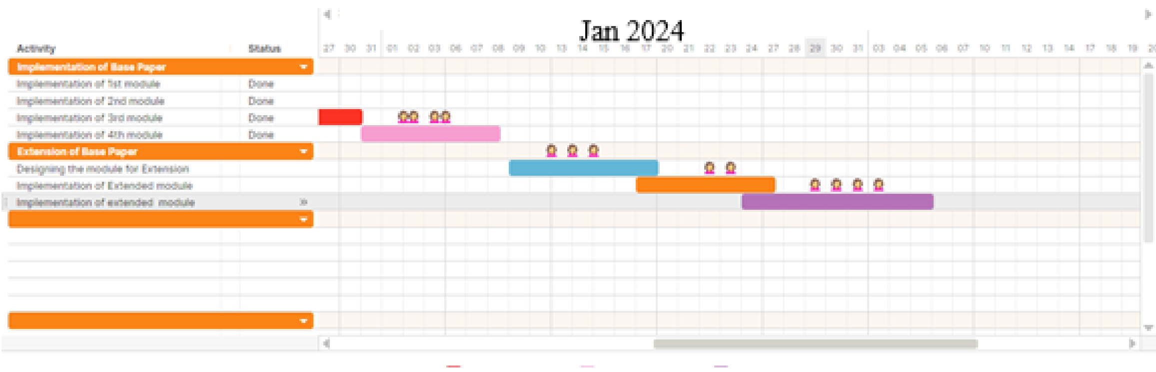


Figure 5.5: Project planner for December

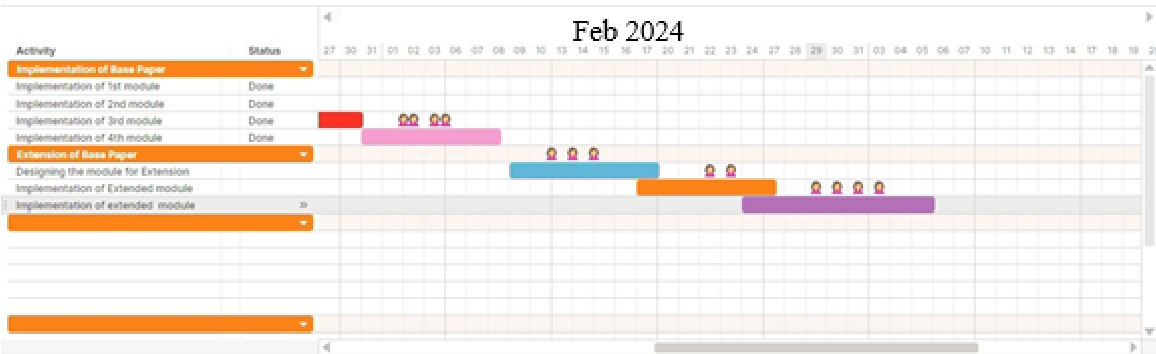


Figure 5.6: Project planner for January

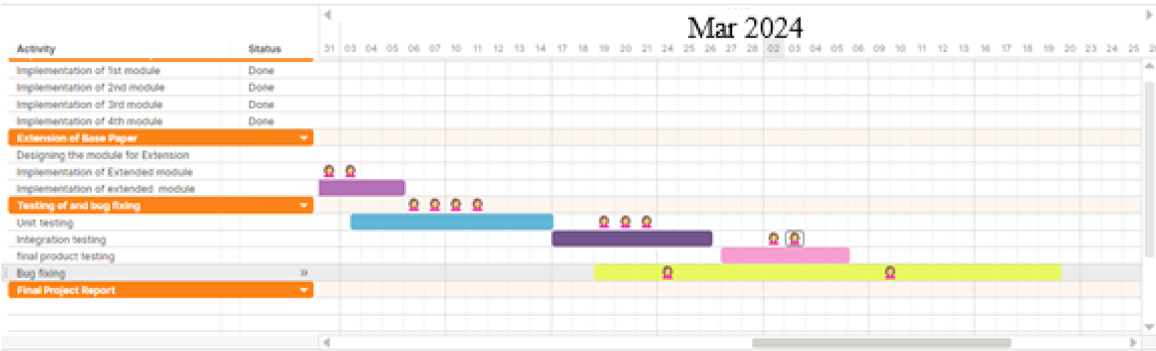


Figure 5.7: Project planner for February

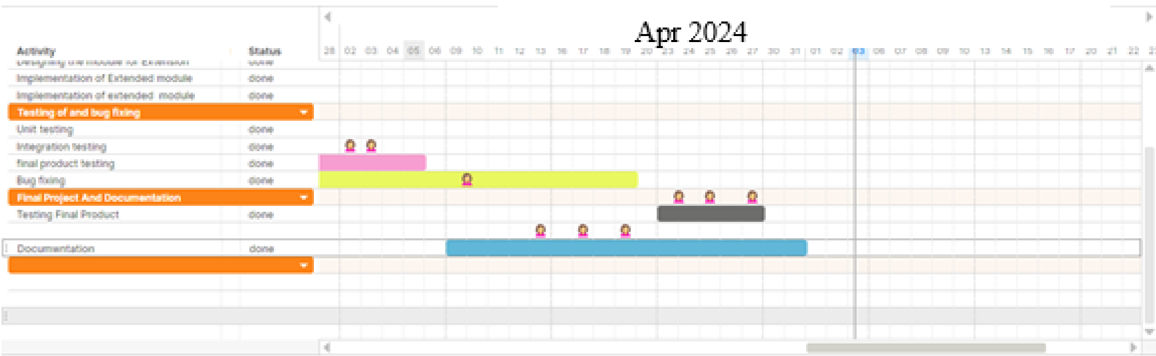


Figure 5.8: Project planner for January

CHAPTER 6

Project Implementation

6.1 Overview of the Project:

Automatic rain shed is used to protect the crop field from rains. When the water droplet falls on the rain sensor the shed opens whereas when the rain stops falling and the rain shed closes. So, this project has concluded with creation of automatic rain shed which protects crops from rains.

6.1.1 Tools and Techniques used

Arduino IDE : The Arduino IDE is an open-source software, which is used to write and upload code to the Arduino boards. The IDE application is suitable for different operating systems such as Windows, Mac OS X, and Linux. It supports the programming languages C and C++. Arduino Integrated Development Environment (IDE) is an open source IDE that allows users to write code and upload it to any Arduino board. Arduino IDE is written in Java and is compatible with Windows, macOS and Linux operating systems.

Blink App: Use the Blink Home Monitor app to check in on what's happening at home from anywhere at any time. The app connects your home to your phone in HD video so you can see and protect what matters most. With multi-system support, you can use Blink to watch your home, vacation home, or business all at the same time.

6.1.2 Implementation Steps:

Sensor Deployment: Install IoT sensors in the field to monitor environmental conditions such as rainfall intensity, soil moisture levels, and weather patterns.
Rainfall Monitoring: Use rain gauges or rain sensors to measure the amount and intensity of rainfall. This data will be crucial for assessing the risk to crops.

Alert System: Implement an alert system that notifies farmers when heavy rain is predicted. This allows them to take preventive actions such as harvesting crops in advance or covering them with protective materials.

Remote Control Mechanism: Provide farmers with the ability to remotely control irrigation systems or deploy protective covers using IoT-enabled devices like smartphones or computers.

Data Analytics: Utilize data analytics to identify patterns and trends in weather and soil conditions. This can help in making informed decisions and optimizing crop protection strategies.

Protective Covers or Structures: Consider deploying physical structures like greenhouses or temporary covers that can shield crops from heavy rain. IoT can be used to automate the deployment and removal of these protective measures.

Emergency Response Plan: Develop a contingency plan for extreme weather events. This plan should include steps for evacuating personnel, safeguarding equipment, and implementing additional protective measures for crops.

CHAPTER 7

Type of Testing

There are several types of software testing techniques, each serving a specific purpose. Here are some commonly used types:

Functional Testing: Ensuring that all functions of the Blynk app and the IoT devices work correctly, such as triggering alerts, activating protective measures, and monitoring sensor data.

Integration Testing: Verifying that the Blynk app integrates seamlessly with the IoT devices and that data is transmitted accurately between them.

Usability Testing: Assessing the user interface of the Blynk app to ensure it is intuitive and easy to use, especially during emergency situations like heavy rain.

Performance Testing: Testing the responsiveness and reliability of the Blynk app and IoT devices under different network conditions, including during heavy rain when connectivity might be affected.

Security Testing: Ensuring that the Blynk app and IoT devices are secure from unauthorized access and data breaches, which is crucial for protecting sensitive crop-related information.

Reliability Testing: Assessing the reliability of the system in accurately detecting heavy rain and triggering appropriate protective measures for the crops.

7.1 Test Cases And Test Results:

Test cases are specific scenarios or conditions that need to be executed during testing to verify the software's behavior. Test cases typically consist of the following elements:

Connection Test: Verify that the IoT device is properly connected to the internet and can communicate with the Blynk app. Verify that the Blynk app is able to receive data from the IoT device.

Rain Detection Test: Simulate heavy rain conditions by triggering the rain sensor or manually sending a signal indicating heavy rain. Verify that the IoT device accurately detects heavy rain conditions. Ensure that the detection threshold can be adjusted through the Blynk app.

Alert Notification Test: Trigger heavy rain conditions and verify that the Blynk app sends a notification to the user's device. Verify that the notification includes relevant information such as the location and intensity of the rain.

Actuation Test: Simulate heavy rain conditions and verify that the IoT device activates the crop protection mechanisms, such as closing protective covers or activating water drainage systems. Ensure that the crop protection mechanisms respond promptly and effectively to heavy rain events.

Manual Override Test: Test the manual override feature through the Blynk app, allowing users to manually activate or deactivate crop protection mechanisms regardless of rain conditions. Verify that manual overrides are reflected in real-time and do not interfere with automatic rain detection and actuation.

Power Failure Test: Simulate a power failure scenario and verify that the IoT device maintains its last known state upon power restoration.

Table 4 Test Cases for File Sharing Module

test5.png

Table 5 Test Cases for Profile Module

test6.png

CHAPTER 8

Results

8.1 Blynk App

Integrate the ESP32 with the Blynk app to provide real-time updates on the status of rain detection and crop protection.

Update the Blynk interface to reflect:

1) Rain detection status (e.g., ”Rain Detected in percentage).

2) Motor activation status (e.g., ”Forward/BAckward”).

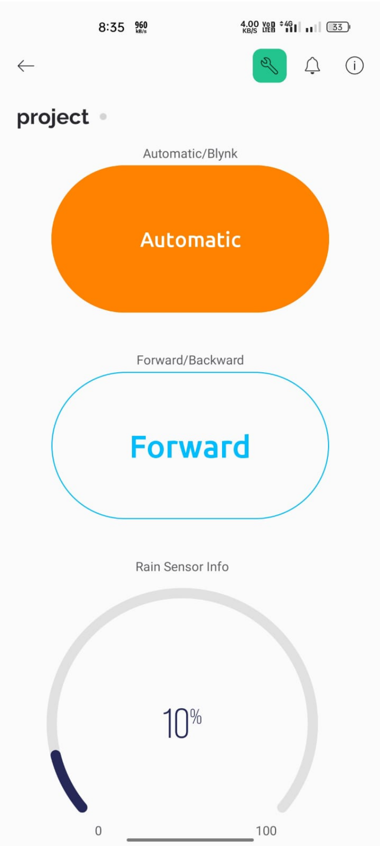


Figure 8.1: Forward process

8.2 Model Pictures

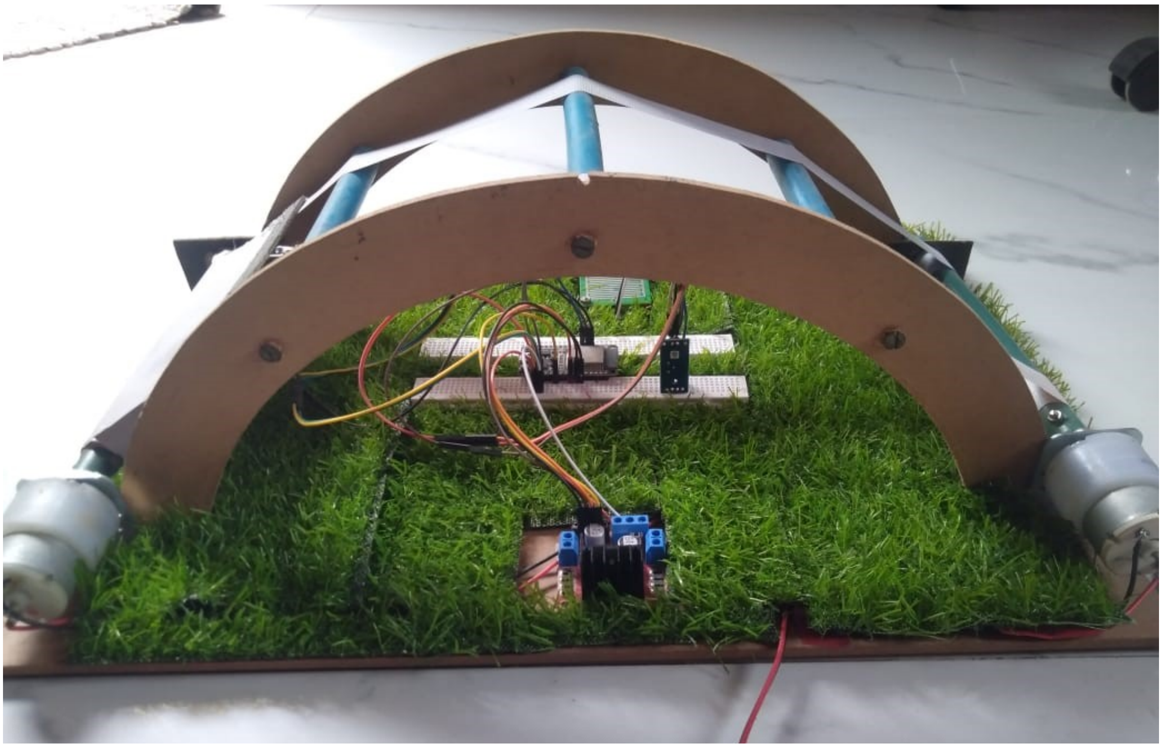


Figure 8.2

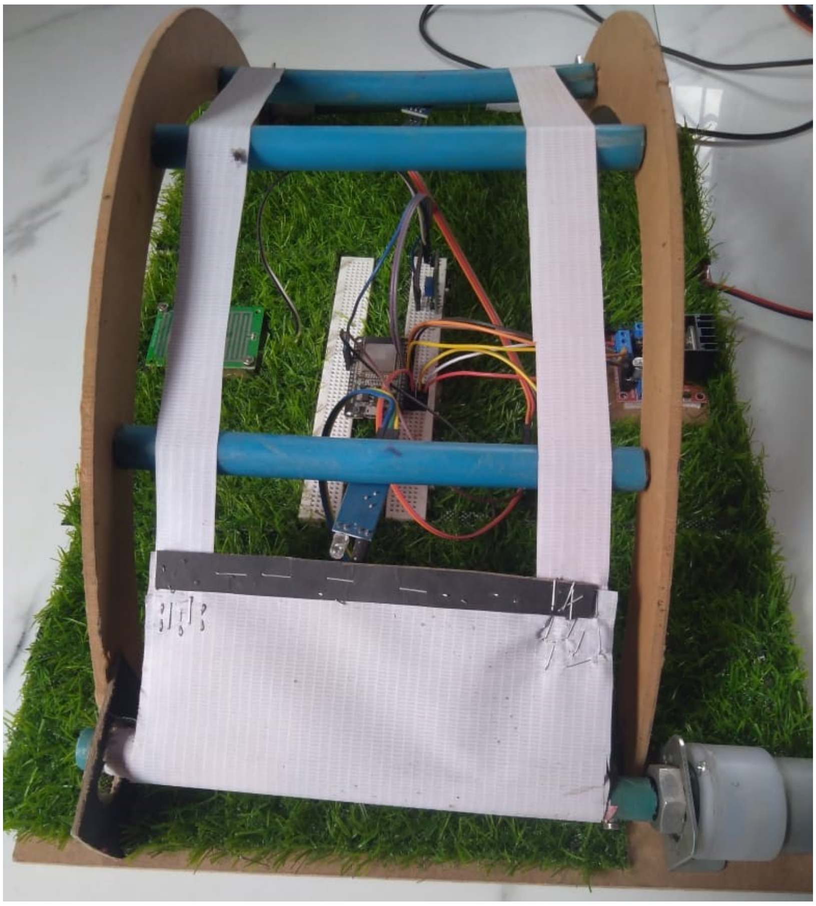


Figure 8.3

CHAPTER 9

APPLICATION

The application of Automatic Crop Protection From Heavy Rain Using IOT and Blynk App can be diverse and beneficial in various scenarios. Here are some potential applications:

- **1. Residential Use:** Automatic roof sheds can be installed in residential properties to cover outdoor areas such as patios, decks, or swimming pools. Homeowners can retract the roof during pleasant weather to enjoy sunlight and open skies and extend it during harsh weather conditions for protection from rain or excessive sun.

- **2. Commercial Use:** Restaurants, cafes, and bars often use automatic roof sheds to create versatile outdoor dining spaces. These establishments can quickly adjust the roof based on the weather or time of day, providing patrons with a comfortable dining experience year-round.

- **3. Event Venues:** Outdoor event venues, such as wedding halls or concert spaces, can benefit from automatic roof sheds to ensure events proceed smoothly regardless of weather conditions. The retractable roof allows organizers to customize the atmosphere according to the event's requirements.

- **4. Sports Facilities:** Stadiums and sports complexes can utilize automatic roof sheds to cover playing fields or spectator areas. This feature enables organizers to host events during inclement weather without compromising players' or spectators' safety and comfort.

- **5. Industrial Applications:** Automatic roof sheds can be employed in industrial settings to provide cover for outdoor work areas, storage yards, or loading docks. This ensures that operations continue uninterrupted despite adverse weather conditions.

- **6. Agricultural Use:** Farms and agricultural facilities can utilize automatic roof sheds to protect crops, equipment, or livestock from harsh weather elements. These sheds can be particularly useful for storing perishable goods or sensitive equipment.

- **7. Recreational Facilities:** Theme parks, zoos, and recreational centers can incorporate automatic roof sheds into their infrastructure to enhance visitor experiences. These sheds provide shelter during unfavorable weather conditions while allowing visitors to continue enjoying outdoor activities.

- **8. Educational Institutions:** Schools, colleges, and universities may install automatic roof sheds in outdoor areas such as courtyards or amphitheaters. This allows for outdoor learning activities or events to take place regardless of the weather.

Chapter 10

Conclusion

The ”Automatic Crop Protection from Heavy Rain using IoT and Blynk App” project stands as a testament to the power of innovation in agriculture. In an era where climate change and extreme weather patterns threaten crop sustainability, this project emerges as a beacon of hope for farmers worldwide. Through a combination of cutting-edge technology, data-driven decision-making, and a commitment to resource efficiency, this project has not only achieved its primary goal of protecting crops from heavy rainfall but has also paved the way for a more sustainable and resilient future in agriculture.

APPENDIX A

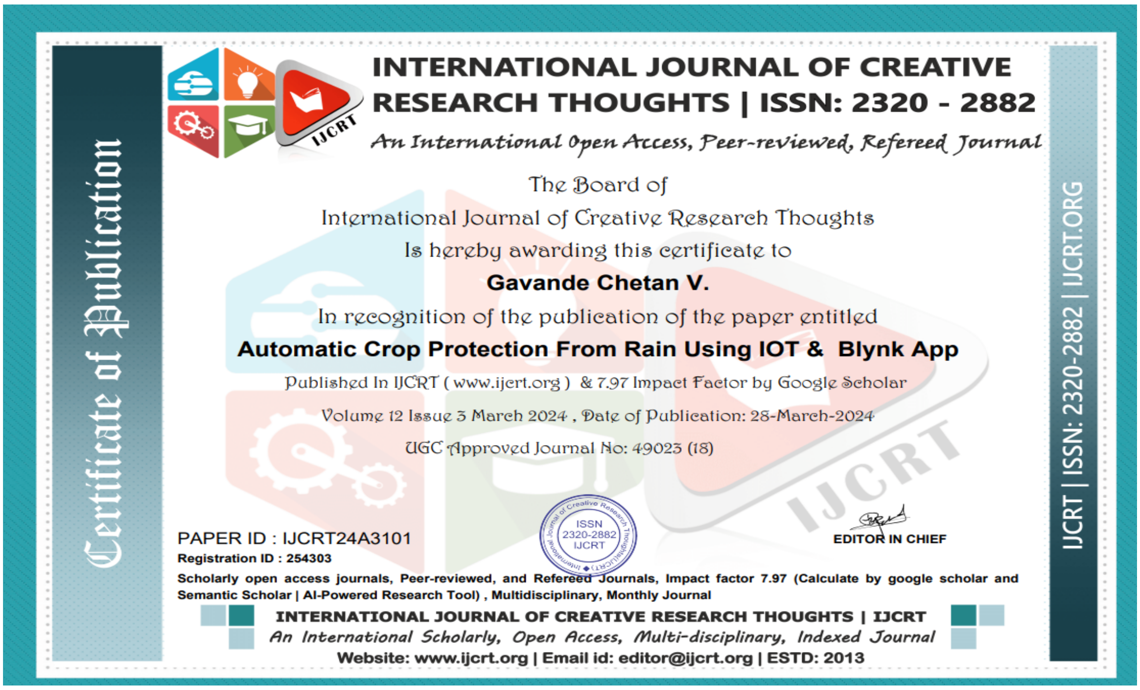
A.1 Paper published details

Sr.No	Name of Conference / Journal	National or International	ISSN No.	Month-Year
1.	Automatic Crop Protection From Rain Using IOT and Blynk App	International		April 2024

Table A.1: Paper published details

A.2 Certificates

A.2.1 Certificates of group members: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INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS | ISSN: 2320 - 2882

An International Open Access, Peer-reviewed, Refereed Journal

The Board of

International Journal of Creative Research Thoughts

Is hereby awarding this certificate to

Gavande Chetan V.

In recognition of the publication of the paper entitled

Automatic Crop Protection From Rain Using IOT & Blynk App

Published In IJCRT (www.ijcrt.org) & 7.97 Impact Factor by Google Scholar

Volume 12 Issue 3 March 2024 , Date of Publication: 28-March-2024

UGC Approved Journal No: 49023 (18)

PAPER ID : IJCRT24A3101

Registration ID : 254303

EDITOR IN CHIEF

Scholarly open access journals, Peer-reviewed, and Refereed Journals, Impact factor 7.97 (Calculate by google scholar and Semantic Scholar | AI-Powered Research Tool) , Multidisciplinary, Monthly Journal

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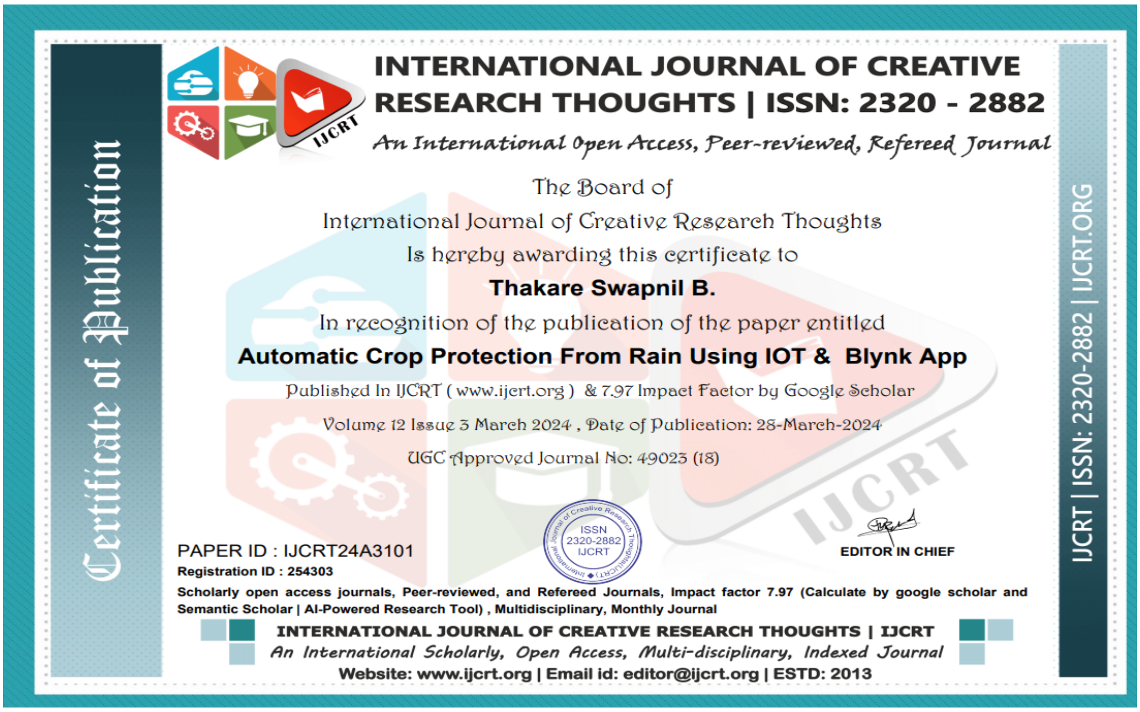
Website: www.ijcrt.org | Email id: editor@ijcrt.org | ESTD: 2013

IJCRT | ISSN: 2320-2882 | IJCRT.ORG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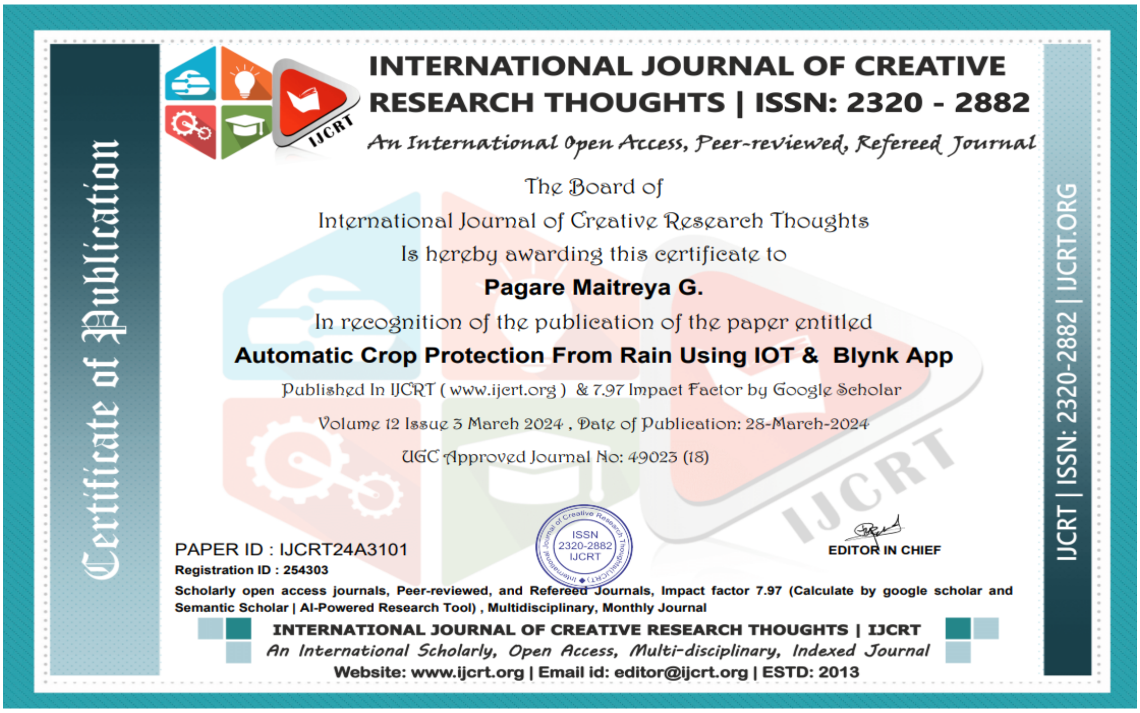

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APPENDIX B

B.1 National Level Project Competition Certificates:

B.1.1 SND College Of Engineering Research Center, Yeola: IDEA HACKATHON


Jagdamba Education Society
S.N.D.College of Engineering & Research Center,
Yeola,Dist - Nasik
Approved by AICTE & Govt.of Maharashtra,Affilated to SPPU Pune,Accredited by NAAC
In Association with
INSTITUTION'S INNOVATION COUNCIL
IDEA HACKATHON
CERTIFICATE
This is to certify that Mr./Miss Thakare Swapnil Babanrao
of SND COE & RC has Participated in a
A Idea Hackathon Competition & Exhibition
and Secured I / II / III Position.
Event Co-ordinator
Hod
IIC Incharge
Principal


Jagdamba Education Society
S.N.D.College of Engineering & Research Center,
Yeola,Dist - Nasik
Approved by AICTE & Govt.of Maharashtra,Affilated to SPPU Pune,Accredited by NAAC
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S.N.D.College of Engineering & Research Center,
Yeola,Dist - Nasik
Approved by AICTE & Govt.of Maharashtra,Affilated to SPPU Pune,Accredited by NAAC
B++
NAAC
In Association with
INSTITUTION'S INNOVATION COUNCIL
(Ministry of HRD Initiative)
IDEA HACKATHON
ISO 9001:2015
CERTIFIED
CERTIFICATE
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Event Co-ordinator
Hod
IIC Incharge
Principal

B.1.2 SND College Of Engineering Research Center, Yeola: TECH-FUSION

Figure B.1: Group photo


Jagdamba Education Society's
SND College of Engineering & Research Center
Babhulgaon, Yeola
Present's
National Level Technical Event
TECHFUSION
2K24
INSTITUTION'S INNOVATION COUNCIL
This is to Certify that Mr./Mrs./Ms. Gawande Chetan
of Institute S.N.D COE & RC, Yeola
Has Participated in a National Level Technical Festival "Techfusion 2K24" Competition
in the event Project competition on 4th April 2024
Organised by Department of Computer Engg.
We Congratulate him/her for securing Participation position.
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CONVENOR
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PRINCIPAL
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Jagdamba Education Society's
SND College of Engineering & Research Center
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Present's
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TECHFUSION
2K24
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We Congratulate him/her for securing Participation position.
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2K24
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Organised by Department of Computer Engg.
We Congratulate him/her for securing Participation. position.
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2K24
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Organised by Department of Computer Engg.
We Congratulate him/her for securing Partiticipation position.
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APPENDIX C

C.1 Plagiarism report of published paper

Sr.No	Chapter Name	Unique	Plagiarism
1.	Abstract	4%	96%
2.	Introduction	11%	89%
3.	Proposed system	9%	91%
4.	Design and architecture	9%	91%
5.	Implementation	4%	96%

Table C.1: Plagiarism report

Page 1

PLAGIARISM SCAN REPORT

Report Generation Date: 15-03-24

Words: 500

Characters: 3754

Excluded URL : N/A

4% Plagiarism	96% Unique
1 Plagiarized Sentences	23 Unique Sentences

Content Checked for Plagiarism

Automatic Crop Protection From Rain Using IOT & Blynk App

Prof. Gade Somnath.A1, Thakare Swapnil B.2, Gavande Chetan V.3 ,
Wakhare Rohan R.4 , Pagare Maitreya G.5
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rahanwakhare@gmail.com4 , matreyapagare@gmail.com 5

Abstract: As the fourth revolution continues, technology is also developing rapidly. One of its most important and effective uses is in agriculture. From irrigation systems to cropspecific fertilizer needs, technologies such as artificial
intelligence and the internet of things have brought about major changes. One of the problems that needs to be addressed is the protection of crops from heavy rains, which cause serious damage to crops and soil fertility and create great stress for the farmer. We solve this problem by providing automatic control and manual control in the proposed model.
The motivation behind our article is to protect crops from these heavy rains and save the same rains for the
future when water is scarce. Smart Crop Guardian presents an innovative crop protection system integrating Internet of Things (IoT) technology and the Blynk App, a dedicated mobile application. This

Your Paper Review Report :					
Registration/Paper ID:		254303			
Title of the Paper:		Automatic Crop Protection From Rain Using IOT & Blynk App			
Criteria:	Continuity	Text structure	Understanding and Illustrations	Explanatory Power	Detailing
Points out of 100%:	88%	90%	97%	85%	87%
Unique Contents: 95%			Paper Accepted: Yes		

APPENDIX D

D.1 Information of group members:

D.1.1 Member 1:

• **Name:** Mr. Chetan Vishnu Gavande

• **DOB:** 31-10-2001

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• **Paper Published:**IJCRT (Automatic Crop Protection From Rain Using IOT Blynk App)

D.1.2 Member 2:

- **Name:** Mr. Swapnil Babanrao Thakare
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- **Paper Published:**IJCRT (Automatic Crop Protection From Rain Using IOT Blynk App)

D.1.3 Member 3:

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- **E-mail:** rohanwakhare25@gmail.com
- **Paper Published:**IJCRT (Automatic Crop Protection From Rain Using IOT Blynk App)

D.1.4 Member 4:

- **Name:** Mr. Maitreya Gautam Pagare
- **DOB:** 12-03-2001
- **E-mail:** matreyapagare@gmail.com
- **Paper Published:**IJCRT (Automatic Crop Protection From Rain Using IOT Blynk App)

CHAPTER 11

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[1] P. Goutham Goud, N. Suresh, Dr. E. Surendhar, G. Goutham, V. Madhu kiran "Rain sensor automatically controlled drying shed for crop yield farmers", International Research Journal of Engineering and Technology (IRJET), 2010.

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