Sant Gajanan Maharaj College Of Engineering Mahagaon

Mega Project Presentation

Automatic Regulation for Precision Irrigation and Fertilization to root zone

❖**Project Guide : Prof. S . T. Matale**

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Outline

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SAVE ENVIRONTMENT

Our Vision

1. Using motor and man power

3. Drip Irrigation

2. Using sprinklers

1. By Throwing

2. Cultan Fertilization

How can we do it in Better way?

Problem Statement

Automatic regulation for release of water based upon soil moisture availability in the root zone ofthe crop and fertilization, Subsurface irrigation system.

SAVE ENVIRONTMENT

PROBLEM STATEMENT DETAILS

Problem Statement ID	1293
Problem Statement Title	Automatic regulation of valves for release of water based upon soil moisture availability in the root zone of the crop, using artificial intelligence, in a piped and micro irrigation network of irrigation system.
Description	In modern agricultural practices, efficient water management plays a critical role in achieving optimal crop yields, conserving water resources, and maintaining ecological balance. However, existing irrigation systems often lack the precision required to deliver water tailored to the actual needs of crops, leading to water wastage, suboptimal plant growth, and environmental degradation. This problem is particularly pronounced in piped and micro irrigation networks, where traditional methods of manual control fail to adapt dynamically to varying soil moisture conditions within the root zone of crops. The core issue lies in the absence of an automated mechanism that can regulate the release of water based on real-time soil moisture availability. The inconsistency in water distribution and the inability to synchronize irrigation with crop water requirements result in detrimental outcomes for both the agricultural yield and water conservation efforts. To address this problem, there is a compelling need for an innovative solution that leverages artificial intelligence (AI) to enable the automatic regulation of valves for water release in piped and micro irrigation networks. By incorporating AI-powered soil moisture monitoring and
Organization	Ministry of Jal Shakti
Category	Hardware
Domain Bucket	Agriculture, FoodTech & Rural Development
Youtube Link	
Dataset Link	NA

Introduction

The Automatic Regulation for Precision Irrigation and Fertilization project aims to revolutionize traditional irrigation and fertilization systems byintegrating advanced technologies. By employing a, the project ensures precise control over water distribution and control of overdose of fertilizers in agricultural fields and it can also provide the information about fertilizers that needs for growth of plant.

SAVE [illegible] ENVIRONMENT

Objective

- **Resource Conservation**

  Contribute to the conservation of water and fertilizers. By avoiding unnecessary irrigation and optimizing fertilization, the project aims to conserve valuable resources, promoting sustainable agriculture and environmental responsibility and use only necessary power supply

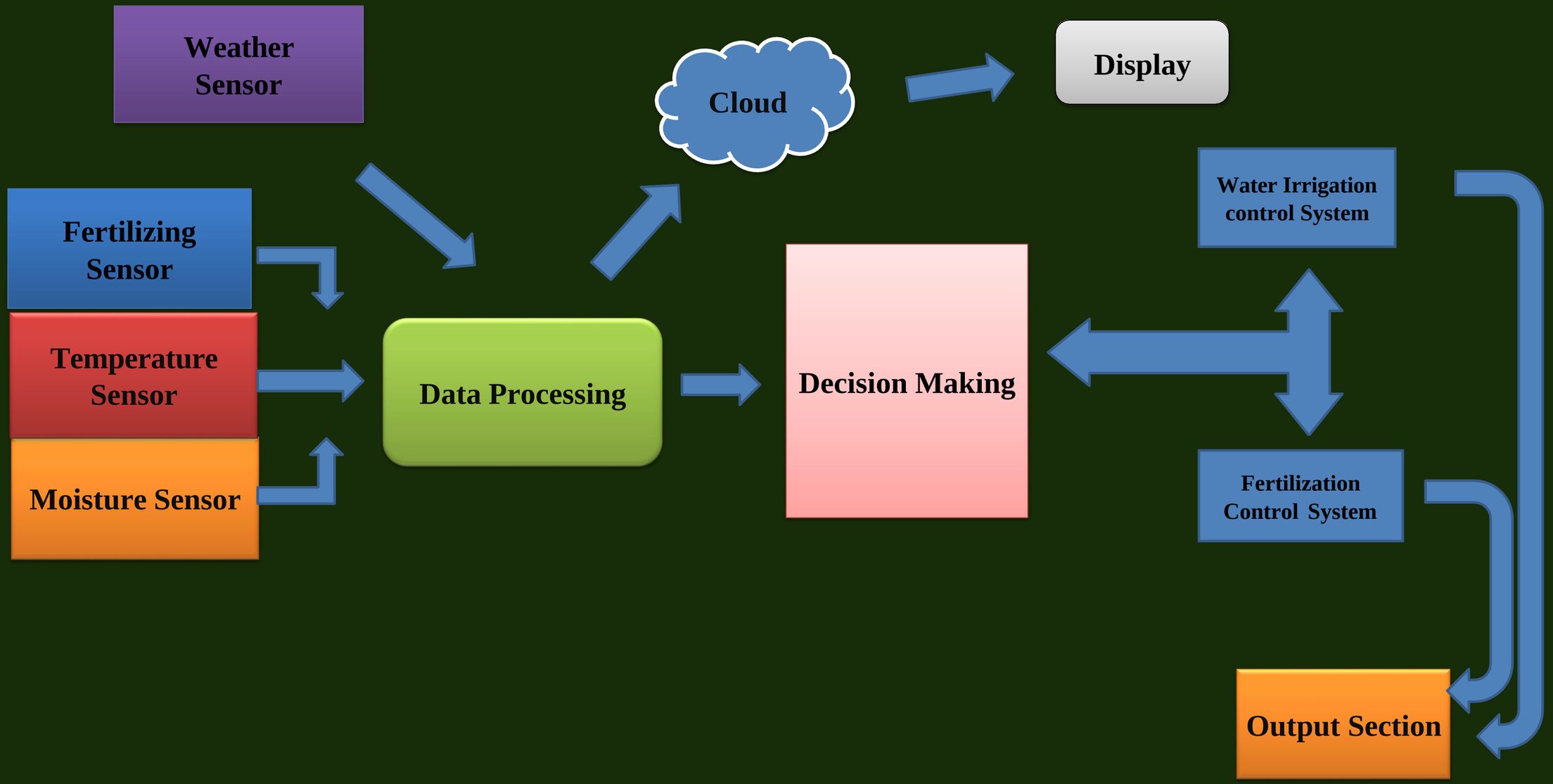
- **Real-time Monitoring**

  Implement real-time monitoring of soil moisture levels and nutrient content. The system should be capable of adapting irrigation and fertilization strategies dynamically based on changing environmental conditions and crop needs, ensuring precise and timely adjustments.

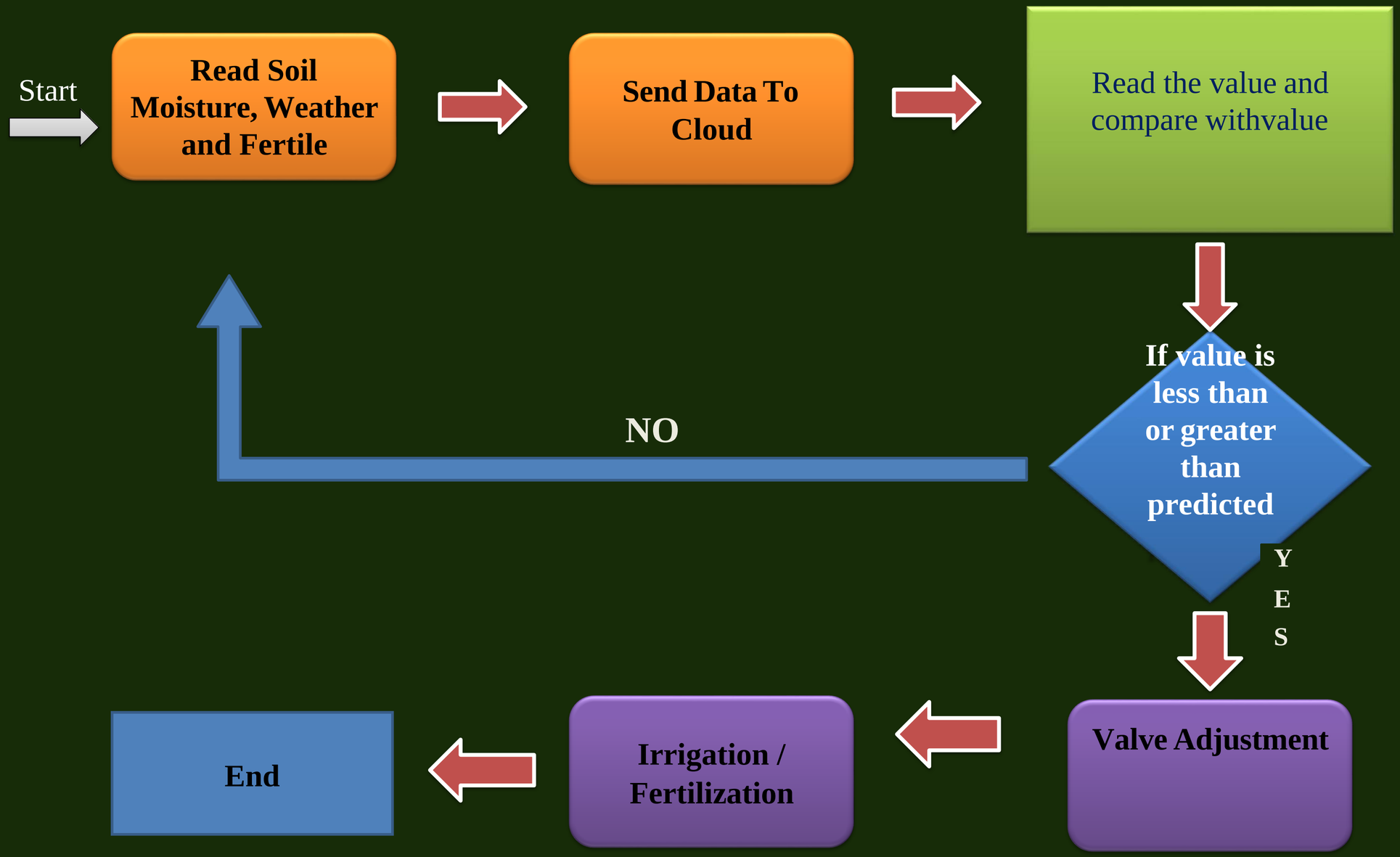
- **Improve Crop yield and Quality:**

  Improving crop yield and quality through AI driven valve regulation is a key goal of precision agriculture , aiming to maximize the plant growth.

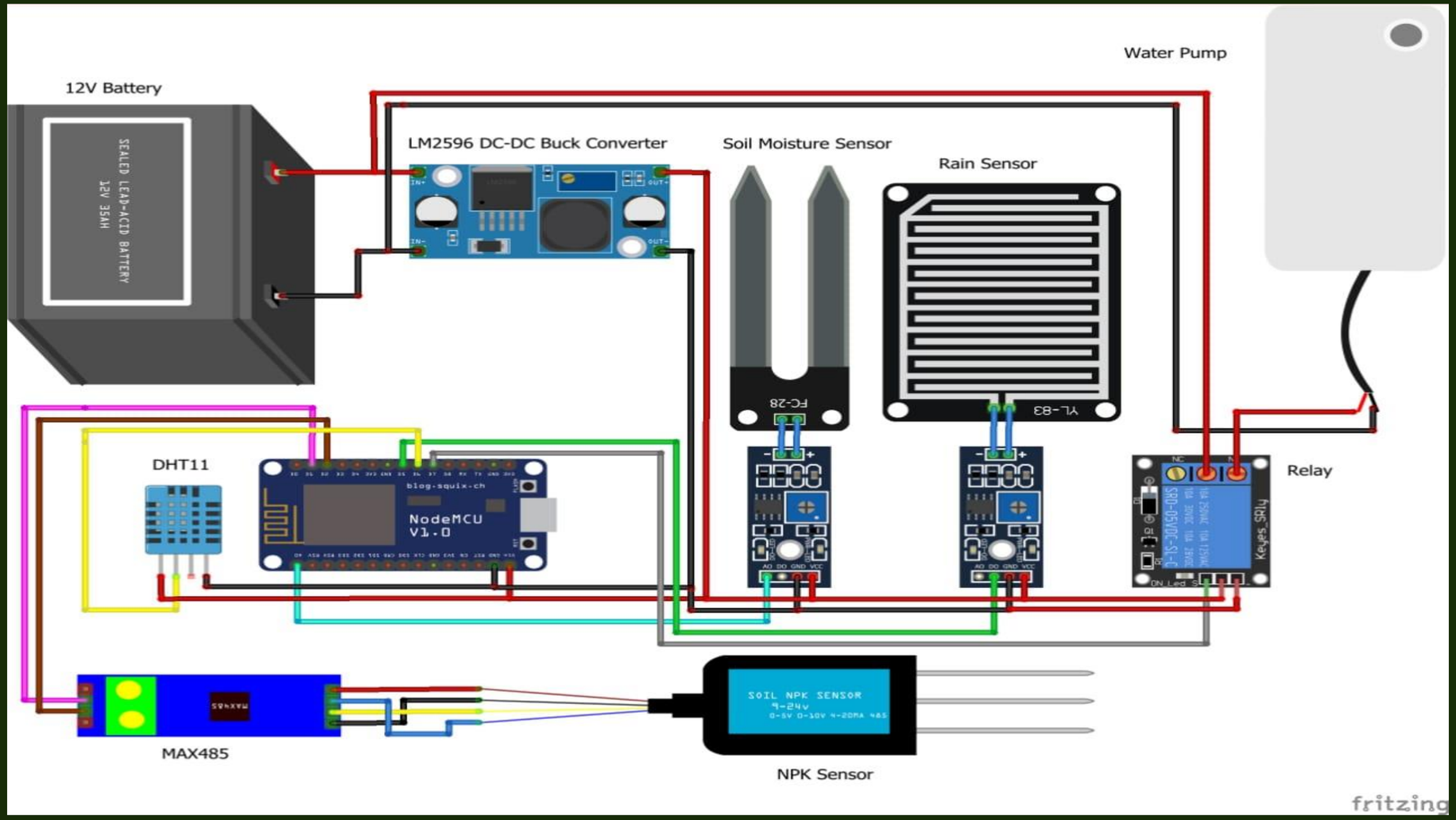
Proposed Block Diagram



Flowchart


Start
Read Soil Moisture, Weather and Fertile
Send Data To Cloud
Read the value and compare withvalue
If value is less than or greater than predicted
NO
YES
Valve Adjustment
Irrigation / Fertilization
End

CIRCUIT DIAGRAM OF SYSTEM



Working of Our Module

1. Irrigation Process:

1. The system utilizes a soil moisture sensor to measure the moisture level in the soil. This sensor continuously provides moisture data to an ESP8266 microprocessor.
2. When the soil moisture falls below a predefined threshold, indicating the need for watering, the microprocessor triggers the irrigation process.
3. The microprocessor controls the irrigation system, which likely includes valves or pumps connected to water sources.
4. Water is then delivered from Storage 2, which holds irrigation water, to the soil through a network of pipes or drip irrigation systems.
5. This automated process ensures that plants receive water when needed, optimizing their growth and health.

2. Fertilization Process:

1. Fertilization in this system is manually initiated.
2. The user manually starts the motor responsible for mixing fertilization liquids.
3. These liquids are stored in Storage 1, specifically designated for fertilization purposes.
4. Once the motor is activated, it initiates the mixing process, blending the fertilization liquids as required.
5. After mixing, the fertilization solution is transferred from Storage 1 to Storage 2. Storage 2 contains water meant for irrigation purposes.
6. The mixed fertilization solution is then available in Storage 2 for irrigation.
7. Similar to the irrigation process, when the soil moisture level indicates the need for watering, the system delivers the mixed fertilization solution to the soil alongside irrigation water.

Result and Conclusion

The implementation of a multifaceted sensor system within the agricultural framework has yielded promising results. The NPK sensor accurately measures crucial soil nutrients—Nitrogen, Phosphorus, and Potassium—providing farmers with precise data to optimize fertilization strategies. Integrated with the Node MCU ESP8266, this system ensures efficient data collection and transmission to Firebase, facilitating real-time analysis through an intuitive Android app interface. Furthermore, the inclusion of the DHT11 sensor enables comprehensive environmental monitoring, while the soil moisture sensor and rain drop sensor enhance irrigation management by providing valuable insights into soil hydration levels and rainfall patterns.

THANK YOU