

# Automated Farm Assistance

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**Abstract:** This project presents a Smart Farm Monitoring and Automatic Irrigation System using ESP32-CAM and Arduino to improve farming efficiency and reduce water wastage. The system provides real-time farm monitoring through live video streaming and automatically controls irrigation based on soil moisture levels. An Arduino UNO reads data from a soil moisture sensor and activates a water pump via a relay when the soil becomes dry. The ESP32-CAM displays live video, soil moisture data, and pump status on a Wi-Fi web dashboard, allowing remote monitoring through a smartphone or computer. The proposed system is low-cost, easy to implement, and suitable for small-scale farming and educational applications..

**Keywords:** Smart Agriculture, ESP32-CAM, Automatic Irrigation System, Soil Moisture Sensor, IoT-based Farming, Arduino UNO

## I. INTRODUCTION

Agriculture is an important sector that supports the economy and food production, especially in countries like India. Traditional farming methods require significant manual effort and often result in inefficient use of resources such as water. With the advancement of embedded systems and automation, smart agriculture has emerged as an effective solution for improving farming efficiency. One major challenge in agriculture is proper water management, as over-irrigation can cause water wastage and damage crop health. Automated irrigation systems using soil moisture sensors help monitor soil conditions in real time and provide water only when needed, improving crop growth while conserving water.

## II. THEORY

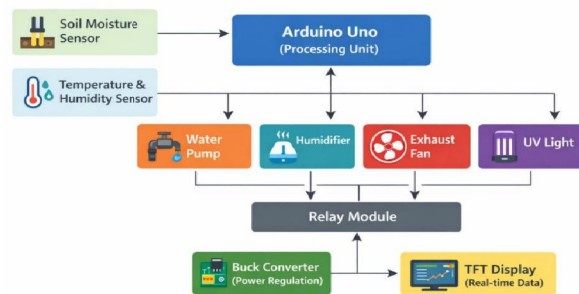


Fig.1. Block Diagram of Smart Environmental Monitoring and Control System using Arduino Nano

### Description

This system is an automated environmental monitoring and control system using Arduino Uno. The soil moisture sensor and temperature-humidity sensor continuously monitor environmental conditions.

The Arduino Uno acts as the processing unit and controls devices such as the water pump, humidifier, exhaust fan, and UV light according to sensor readings. A relay module is used to switch these devices ON and OFF safely.



A buck converter provides proper voltage regulation to the system, while the TFT display shows real-time sensor data and system status. This system helps in maintaining suitable conditions automatically for smart farming or greenhouse applications.

### III. FLOWCHART

#### Soil NPK Monitoring System using ESP32 and RS485 Sensor

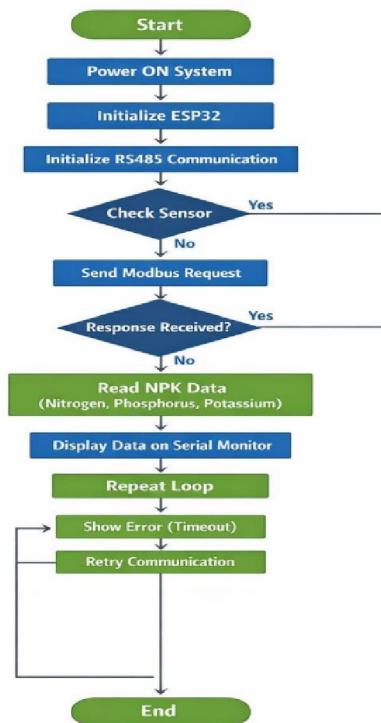


Fig.2. Flowchart

#### Description

The Soil NPK Monitoring System is used to measure the amount of Nitrogen (N), Phosphorus (P), and Potassium (K) present in soil. In this system, the ESP32 microcontroller communicates with the NPK sensor through RS485 Modbus communication.

First, the system powers ON and initializes the ESP32 and RS485 communication. Then, the ESP32 checks the sensor connection and sends a Modbus request to read soil nutrient values. If the sensor responds correctly, the NPK data is received and displayed on the Serial Monitor. If no response is received, the system shows a timeout error and retries communication. This process continuously repeats for real-time soil monitoring.

### IV. CONCLUSION

The Smart Agriculture System using Arduino Uno is an efficient and reliable solution for automating farming activities. It monitors soil moisture, temperature, and humidity, and automatically controls devices like water pumps, humidifiers, exhaust fan, and UV light. The system reduces manual effort, saves water and resources, and provides real-time monitoring through a TFT display. Overall, it is a cost-effective and practical system for smart farming with future scope for IoT and advanced automation.



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