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# IOT Based Tomato Plant Irrigationand Management System

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**ABSTRACT:** The IoT-based Tomato Plant Irrigation Management System is an intelligent agricultural solution integrating humidity and temperature sensors to monitor soil moisture and ambient conditions. A microcontroller processes this data, executing a decision algorithm that triggers irrigation, fertilizer, and pesticide dispensing based on real-time environmental insights. Actuators, such as pumps and implement these decisions. The system allows remote monitoring and control through a user-friendly interface, accessible via a wifi and web platform. Stored data enables historical analysis, aiding users in optimizing cultivation strategies. This innovative approach enhances agricultural efficiency, ensuring precise resource utilization and optimal growth conditions for tomato plants. The system's adaptability and scalability make it a valuable tool for modern, technology-driven agriculture, promoting sustainable practices and increased crop yield system.

**KEYWORDS:** Wifi modem Esp8662, Driver, Dc motor pump, Temperature sensor, Humidity sensor, Soil moisture sensor.

## I.INTRODUCTION

In modern agriculture, the integration of advanced technologies has revolutionized traditional farming practices, leading to the emergence of smart agricultural systems. One such innovative solution is the IoT-based Tomato Plant Irrigation Management System. This project aims to leverage the power of Internet of Things (IOT) technology to enhance the cultivation of tomato plants by automating irrigation, fertilizer application and pest control processes. Tomatoes are a widely cultivated crop with diverse environmental requirements, making precise management of water, nutrients, and pest control essential for optimal growth and yield. Traditional methods of manual observation and intervention often result in inefficiencies and suboptimal resource utilization. Hence, there is a pressing need for automated systems that can continuously monitor environmental conditions and respond dynamically to plant needs. The IOT-based Tomato Plant Irrigation Management System addresses these challenges by incorporating humidity and temperature sensors to monitor soil moisture levels and ambient temperature. These sensors feed real-time data to a central microcontroller, which analyzes the information using a decision-making algorithm.

## OBJECTIVES

- Develop a system to continuously monitor soil humidity and ambient temperature,
- Ensuring real-time data on the plant's immediate environment.
- Enable remote monitoring and control through a user-friendly interface, allowing usersto access and manage the system from anywhere using a mobile app and web platform

## II. PROPOSED WORK

- The proposed IoT-based Tomato Plant Irrigation Management System involves integrating humidity and temperature sensors for real-time environmental monitoring.
- A microcontroller processes this data using a decision-making algorithm to autonomously trigger irrigation, fertilizer, and pesticide dispensing based on optimal conditions. Actuators, including pumps and dispensers, implement these decisions precisely.
- The system allows remote monitoring and control through a user-friendly interface accessible via a mobile app

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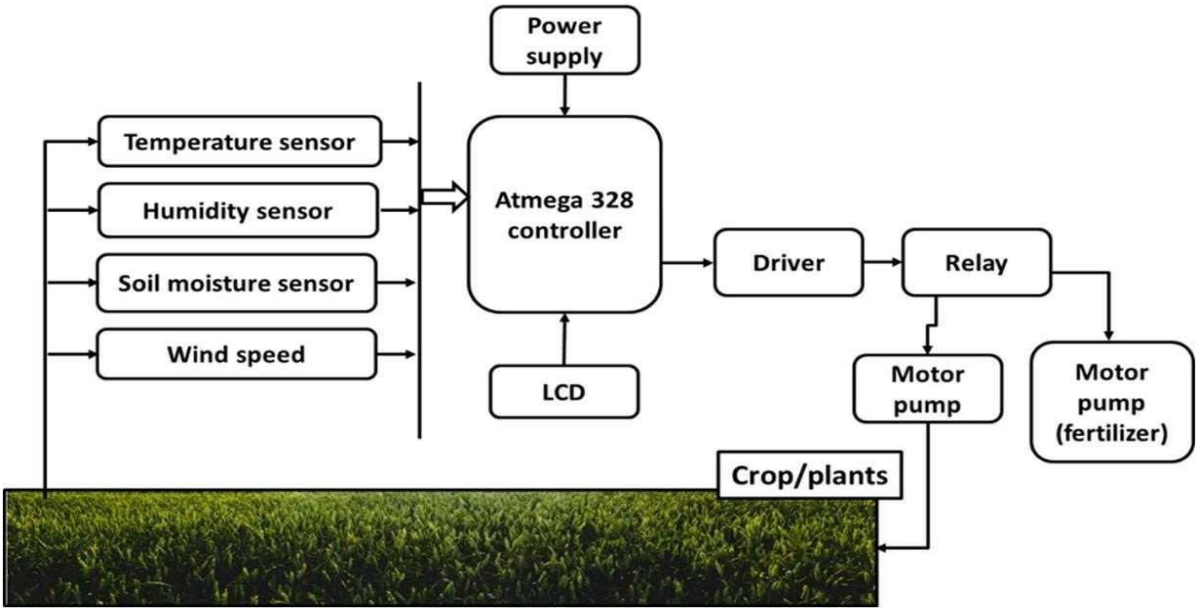
or web platform. Data storage facilitates historical analysis for insights into plant growth patterns. The proposed method aims to improve efficiency by automating tasks, ensuring precise resource utilization, and promoting sustainability.

- This comprehensive approach provides a technologically advanced solution for modern agriculture, enhancing crop yield and environmental conservation.

## III. BLOCK DIAGRAM OF PROPOSED SYSTEM




## DESCRIPTION

**TEMPERATURE SENSOR**: In the IoT-based Tomato Plant Irrigation Management System, the temperature sensor continuously measures the ambient temperature. This data is transmitted to the atmega328p, microcontroller, which uses it to assess the environmental condition.

**SOIL MOISTURE SENSOR: Soil moisture sensors** measure the volumetric **water content** in soil. Sincethe direct t of free soil moisture requires removing, drying, and weighting of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction , as a proxy for the moisture content.

**HUMIDITY SENSOR:** The DHT11 Temperature & Humidity Sensor features a temperature& humidity sensor complex with a calibrated digital signal output. By using the exclusive digital-signal-acquisition technique and temperature & humidity sensing technology, it can ensures high reliability and excellent longterm stability.

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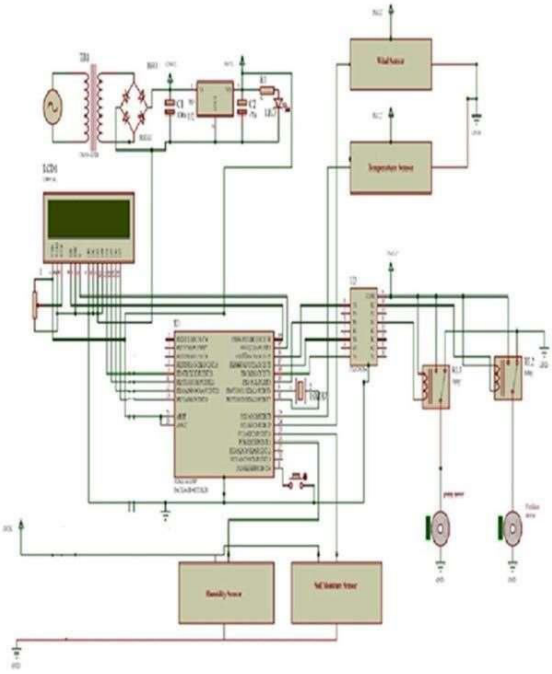
**RELAY :** Relays are switching devices. Switching devices are the heart of industrial electronic systems.When a relay is energized or activated, contacts are made or broken. They are used to control ac or dc power. They are used to control the sequence of events in the operation of a system such as an electronicheater, counter, welding circuits, and, alarm systems .

**DRIVER: DRIVER:** Driver is used for drive the relay. ULN2003A IC is used as driver. This IC has to some special features Seven Darlington's per package output current 500ma per driver (600ma peak)output voltage 50v to 55 V integrated suppression diodes for inductive loads outputs can be paralleled for higher current.

**DC MOTOR PUMP:** The DC motor pump is employed to deliver water from a water source water tank, fertilizer tank, pesticides tank to the tomato plants through a network of irrigation pipes or drip lines. When activated by the microcontroller based on the system's decision algorithm, the DC motor pump receives an electrical signal to start pumping water.

**CIRCUIT DIAGRAM**



## IV. CONCLUSION

- The project's data storage and analysis components to provide valuable insights into plant growth patterns, contributing to informed decision-making for resource utilization.
- This innovative solution is not only improves efficiency in agricultural practices but also aligns withsustainable farming by minimizing water and nutrient wastage and reduce manual work. The scalability and adaptability of the system offer potential applications beyond tomatoes, making it aversatile and valuable tool for various crops.

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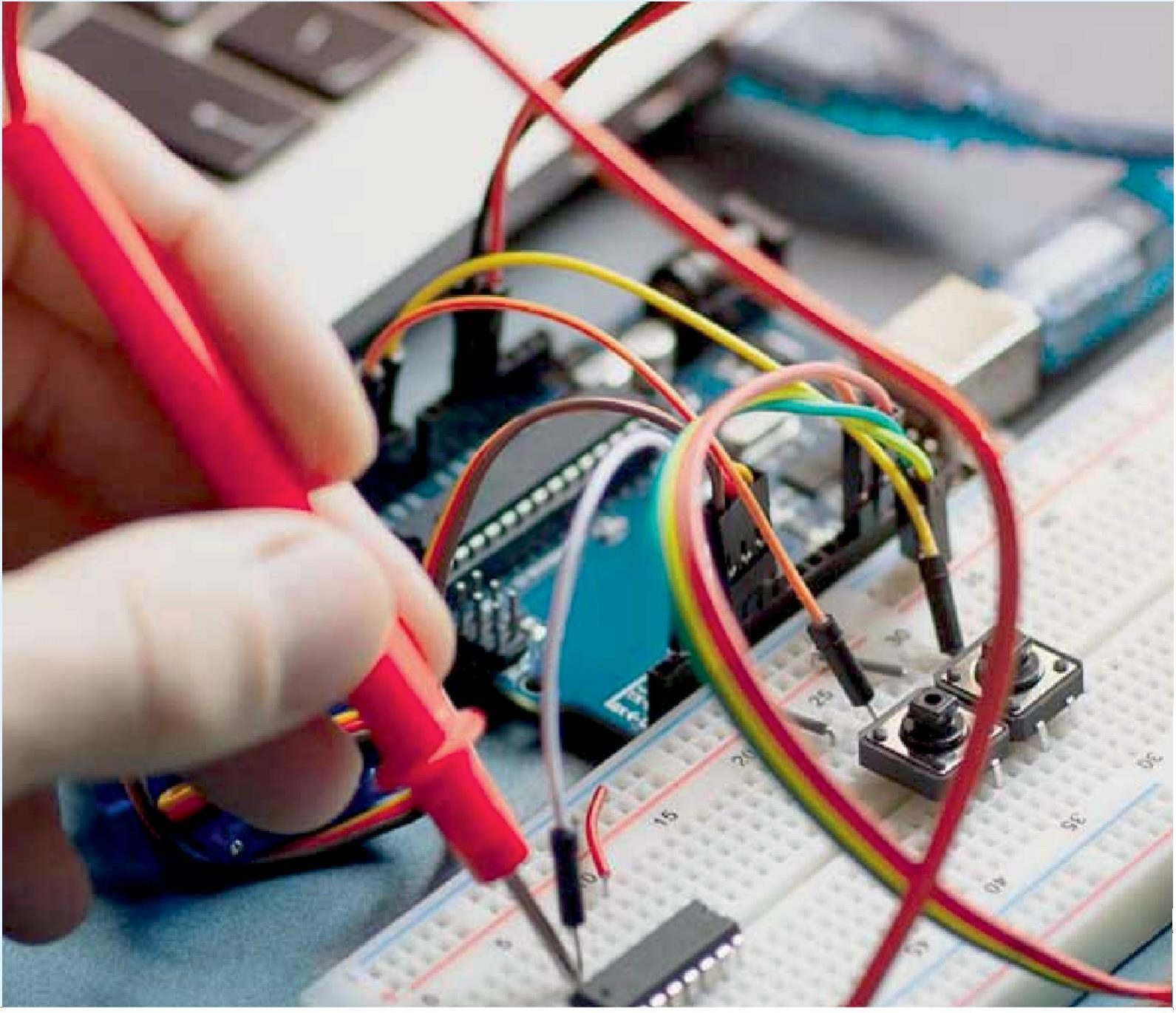

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