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SMART IRRIGATION SYSTEM USING IOT

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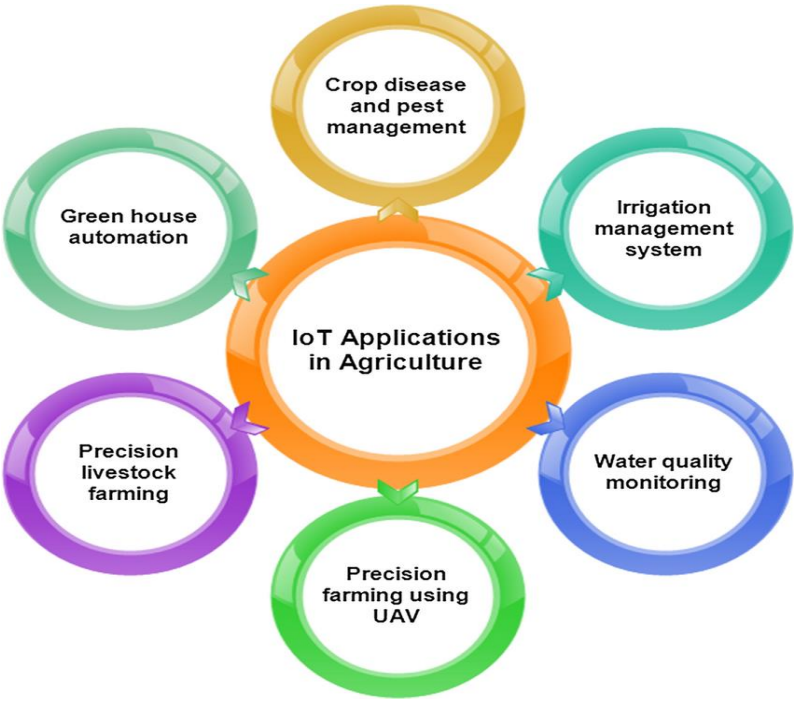
ABSTRACT

The A smart irrigation system using IOT is an IoT based systems that can be used in the smart farming applications. The first case study an IoT based greenhouse monitoring and controlling system. As the limitation of existing greenhouse plants is that it is not operated automatically and has to be operated manually with different records. For achieving better plant growth continuous monitoring and controlling of environmental parameters such as temperature, humidity, soil moisture, light intensity etc. are necessary for our greenhouse system. The system will show the undeniable common conditions, such as moistness, soil immersion, temperature, closeness of fire, etc. If any condition crosses certain limits related actuator will be turned ON. The sensors gives the signal and our microcontroller read it and choose correct action. The all information can easily get user by the android mobile phones. The second utility is an IoT based smart irrigation system. (IoT) is reworking the agriculture business and sanctioning farmers to content with huge challenges they face during observation, conservation observation and plant & soil observation area unit the challenges wherever IoT are often an answer. The innovative IoT applications address the problems in agriculture and increase the standard, quantity, property and price effectiveness of agricultural production.

Keywords: Node MCU, Arduino, sensors, LM593 Driver, Relay module, DC Motor, Internet of Things,.

I. INTRODUCTION

In today's industrial landscape, the efficiency and reliability of machines are paramount for uninterrupted operations. To address this need, the integration of IoT (Internet of Things) technology has become increasingly prevalent, offering real-time monitoring and control capabilities. This report explores the development and implementation of an IoT-based Smart Irrigation System for a Greenhouse an open-source IoT platform based on the ESP8266 microcontroller Node MCUs compatibility with networking modules allows for internet connectivity, enabling remote monitoring and control of machines from anywhere with an internet connection. This feature is particularly advantageous for industries with distributed operations or remote assets. Operators can remotely access real-time data, diagnose issues, and even perform maintenance tasks or adjustments, reducing the need for on-site personnel and expediting response times to maintenance issues. Agribusiness assumes a genuine part for the prosperity of a country. Districts that region unit made with water and soil substance can have the option to produce food things beginning from rice, wheat, grains, heartbeats, vegetables and natural products. Right now once the populace is expanding and water save region unit diminishing there's a desperate need of defensive water in horticultural practices misuse trendy strategy and cutting edge innovation



Details of Design, Working & Process

The design consists of two main part hardware and software. The hardware contains:

- Node MCU
- Arduino
- Relay Module
- Temperature Sensor
- Soil Moisture Sensor
- LM2596 Driver
- DC Motor
- LCD Display
- Power Supply

Software consists of different programming concepts which are used in our project. Software contains:

- Arduino IDE Software
- Blynk IOT Software

II. METHODOLOGY

Problem Statement

In greenhouse farming, managing irrigation effectively is critical for plant health and resource conservation. A smart irrigation system leveraging IoT aims to optimize water usage in agriculture by dynamically adjusting irrigation based on real-time data, unlike traditional manual methods. However, current implementations using platforms like NodeMCU and Arduino may have limitations in scalability, data processing capacity, and long-term maintenance

Motivation

The motivation for this project came from the countries where economy is based on agriculture and the climatic conditions lead to lack of rains & scarcity of water. Our country mostly depends on agriculture. The farmers working in the farm lands are solely dependent on the rains and bore wells for irrigation of the land.

Objectives

The irrigation is done only when there is not enough moisture in the soil and the sensors decide when the pump should be turned on/off. This saves a lot time for the farmers. This also gives much needed rest to the farmers, as they don't have to go and turn the pump on/off manually.

III. MODELING AND ANALYSIS

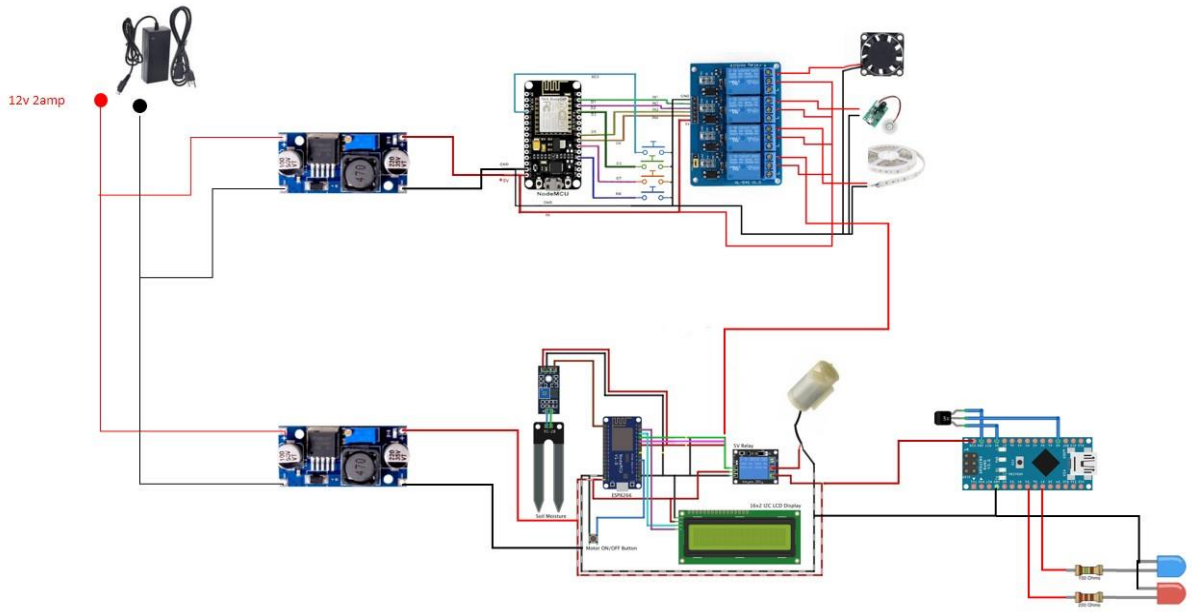


Figure 4: System Overview Design

The image depicts a system for system that integrates various components for monitoring and controlling environmental factors, possibly related to a greenhouse or automated system. Here's a breakdown of the system's components and their connections: The 12V input powers the entire system. The temperature sensor sends data to the ESP-12E NodeMCU. The Esp8266 NodeMCU counts humans and displays the count on the 12x2 LCD. The Arduino processes data from the temperature sensor and potentially other inputs. The Arduino controls the 16x2 LCD to display relevant information. The relay module, managed by the Arduino, controls the fan. The ESP-12E NodeMCU communicates with the ESP-01 module to control the water pump. Arduino: Serves as the main control unit, processing data from

sensors and managing other components. ESP8266 NodeMCU: Likely used for human counting and display on the 12x2 LCD. ESP8266 NodeMCU: Possibly handles temperature sensing and communication with the ESP-01 module. Temperature Sensor: Measures the ambient temperature. 12x2 LCD Human Counter: Displays the count of humans, likely detected by a sensor connected to the Enpp-12E NodeMCU.16x2 LCD: General-purpose display for showing system information. Relay module: Controls the power supply to the fan, enabling on/off functionality. Fan: Used for cooling or ventilation. Water Pump: Controlled by the ESP-01 module for irrigation or water circulation. ESP-01 module Connector: Facilitates. communication between the ESP-12E Node MCU and the water pump, likely for remote control or data logging. Indicator: It's connected to the 16x2 LCD and its function is unclear without more context, but it might be a visual signal related to system status or alerts.

IV. RESULTS AND DISCUSSION

The image shows the output of the smart irrigation system using IOT. As a result, our project is Smart irrigation systems using IoT offer several advantages including water conservation, reduced energy consumption, improved crop health, and enhanced efficiency. These systems monitor soil moisture, weather conditions, and crop needs in real-time, enabling precise and automated irrigation Reduces water wastage by irrigating only when needed based on real-time soil moisture data. Lowers water and electricity bills due to optimized irrigation schedules. Allows users to monitor and manage irrigation remotely via smartphones or web apps. Maintains optimal soil moisture, promoting healthier plant growth. Provides insights through sensors and analytics for better farm management. Minimizes manual labor by automating the irrigation process.

Figure 5: Output

V. CONCLUSION

Process is to Currently, farmers control irrigation metho by manually and irrigate their area at a systematic period of time. These mechanisms deplete high amount of water and the outcome is water less. While dry area's have less rainfall and irrigation is challenging. Therefore,ESP8266 Wi-Fi based communication system has been taken because of the ease of application, maintenance and price. The gadget is automated that will accurately monitor and control the water requirement and reliable. The communication through the website authorized the user to interact with sensor from anywhere in the world in nanosecond which is fruitful for the user to interact with sensor from anywhere in the Arduino that diminish power consumption by ascending the system life executes on large for relatively small investment. The system can also be designed for temperature sensor based cooling system. Even after then they need to wait until the field is properly watered, which makes them to stop doing other activities. Here is an idea which helps not only farmers even for watering the gardens also, which senses the soil moisture and switch the pump automatically when the power is ON.

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