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IoT Based Smart Plant Monitoring System

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Abstract:– The agricultural sector is in transition thanks to the Internet of Things (IoT), which is also helping farmers overcome the many obstacles they confront. The problems that IoT can help with are plant and soil monitoring, livestock monitoring, and conservation monitoring. Innovative IoT applications improve agricultural productivity in terms of quality, quantity, sustainability and cost-effectiveness while meeting industry challenges. This project automates the watering process while monitoring soil factors such as temperature, electrical conductivity, and moisture content. A microcontroller is used to make decisions. When a user is acknowledged in the field whether there is a text message variation from the anticipated values. This research also includes plant pest detection in addition to soil metrics. This guarantees whole system health. In contrast, greenhouses are regulated environments where plants are grown. The primary goal of this project is to create an Arduino- based system that is easy to use, inexpensive, and can be used to continuously upload and alter environmental parameter values in order to maximize plant growth and yield.

I. INTRODUCTION

The term "Internet of Things" refers to the broad concept of the ability of Internet devices to sense and collect information about their environment, share it over the Internet, and process it for various exciting purposes. The Internet of Things is emerging rapidly. The term "Internet of Things" (IoT) refers to the system of physical objects that we communicate with each other online. Things or objects can transmit information wirelessly without human intervention. "In the context of the Internet of Things, 'things' can include any natural or man-made object that can be given an IP address and the ability to transmit data over a network, such as a person with an implanted heart monitor, a pet with a biochip transponder, a car. sensors built in to warn the driver when tire pressure is low, or any other combination of these. Utilizing a variety of current technologies, these gadgets gather valuable data and then autonomously transfer the data across other gadgets. Examples of products on the market right now are washer/dryers with Wi-Fi- enabled remote monitoring and smart thermostats.

As for this project, we will be learning about the IoT Based Smart Agriculture & Automatic Irrigation System with Nodemcu ESP8266. For agricultural nations to prosper, agriculture is essential. A few agricultural- related problems have traditionally impeded the nation's progress. Thus, smart agriculture—a modernization of the current traditional agricultural methods—is the only way to address this issue.

Thus, automation and Internet of Things technologies are being used to make agriculture smarter. Numerous applications, such as automatic irrigation decision support and crop development monitoring and selection, are made possible by the Internet of Things (IoT). We suggested the ESP8266 IoT Automatic irrigation system as a way to update as well as raise agricultural output.

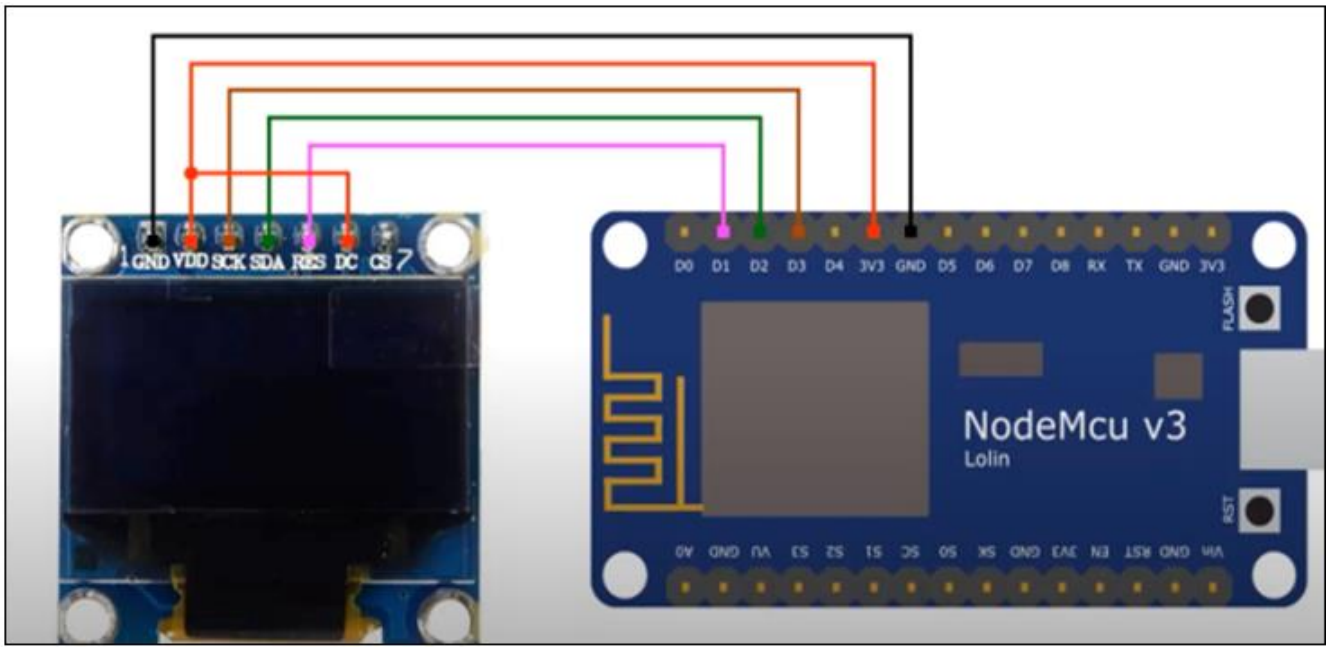

Fig 1 Node MCU

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II. REVIEW STUDY

In the year 2016, Abhishek Gupta proposed the idea to reduce the effect of daily watering of plant so that we can improve the growth of plant. This can be done by using various sensors like DTH11 sensor, soil moisture sensor. It is suitable for plant which may help to start a better growth of plant and also it may support to control the usage of water. Agriculture plays an important role in the development of an agricultural country like India. Livestock problems have always hindered the development of the country. In the year 2017 S. Rajagopal, V. Krishnamurthy together proposed the ideas of smart husbandry by contemporizing the current traditional styles of husbandry. Recently, water scarcity has increased due to population growth and deforestation. A. Arsenio gave the idea to develop the Internet of Things with a solar irrigation system using an effective embedded method in agriculture. The Internet of Things (IoT) is an emerging technology that connects the world with digital communication by making Internet connected devices communicate with each other. It conceptualizes the remote connection and monitoring of real-world objects through the Internet. D.K. In 2017, Sreekantha presented the idea of a smart irrigation system developed for an irrigation system using IoT (Internet of Things). The main purpose of the system is to monitor soil moisture, humidity and temperature at regular intervals, which is much needed. for crops. , according to the requirements, water is pumped to the field and at the same time the farmer receives real-time information on the farmer's smartphone. IoT based smart farming system can prove to be very useful for farmers of year and low irrigation is not suitable for farming. Threshold values can be set for climatic conditions such as humidity, temperature and humidity based on the environmental conditions of that area. oh Daniela gave the idea of a SMART FARMING SYSTEM based on IoT, which focuses on real-time monitoring of environmental data such as temperature, humidity and other data, depending on the sensors integrated in it. In 2017, R.K. Kodali proposed the concept of "Plug and Sense" where farmers can implement smart agriculture as such by taking the system to the field and receiving real-time data streams to various devices such as smartphones, tablets, etc. and the data generated by the sensors can. to be used by Agricultural consultants with the integration of cloud computing technology can easily share and see them remotely from anywhere. The system also allows analyzing different data from time to time using Big Data Analytics. The proposed agricultural irrigation system can measure soil moisture, field temperature, and transmit real-time data to the user via Wi-Fi and IoT server, if the control value is out of range, the user can send a command via the IoT server to. to maintain the fixed value of the parameter to ensure proper watering, and the proposed items Internet based irrigation system is better than other irrigation systems that have been proposed recently. Karthik Sivarama Krishnan presented a dynamic irrigation system that uses sensors and a flow camera to conserve water resources and avoid pesticides. This system is tested using sensors and outputs are obtained using proteus7 simulation software. So we can get into unmanned irrigation. In 2019, Neha K. nawandar launched a farm monitoring and automatic irrigation system with three modules: (i) Unified Sensor Hub (USP), a low-cost and smart IoT-based module, (ii) Irrigation Unit (IU) and (iii) Sensor Information Unit (SIU). For user access, the USP initially stays in management mode for a while, where it receives yield, planting date and soil data, which it uses to calculate steam and irrigation schedules in a one-time setup mode. In 2020, Le Huang Son presented the idea that agricultural irrigation control is one of the most important advantages of agriculture. This study mainly focused on fuzzy logic to achieve higher accuracy so that water can be used efficiently for irrigation. With the result of the simulation, water use is determined according to the field parameters in the cultivated field. Implemented device deployment and irrigation control via Android phone app. Tests have proven that we can achieve excellent results.

III. GAP IDENTIFICATION

Distinguishing long-term crevices in an IoT-based savvy water system framework includes considering challenges that will emerge as the innovation advances and the framework is conveyed over an expanded period. Guaranteeing strong information security measures to secure delicate agrarian information collected by IoT gadgets from cyber dangers and unauthorized get to over the long term. Creating procedures to preserve framework unwavering quality and execution over time, counting standard support of IoT gadgets, sensors, and communication foundation in unforgiving rural situations. By tending to these long-term crevices, partners can guarantee the life span, adequacy, and maintainability of IoT-based keen water system frameworks in farming as they proceed to advance and develop.

A. Working Principle

An IoT-based keen water system framework with NodeMCU ESP8266 ordinarily works by utilizing different sensors, such as dampness sensors, temperature sensors, and stickiness sensors, to screen natural conditions. The NodeMCU ESP8266, acting as a microcontroller, accumulates information from these sensors and sends it to a central server or cloud stage by means of Wi-Fi network. The central server analyses the information and applies calculations to decide when and how much water is required for water system. Based on this examination, the server sends enlightening back to the NodeMCU ESP8266, which controls the water system framework, turning on or off the water supply as required. Generally, the framework points to optimize water utilization by giving exact water system custom fitted to the particular needs of plants, in this way moderating water and advancing healthier growth.

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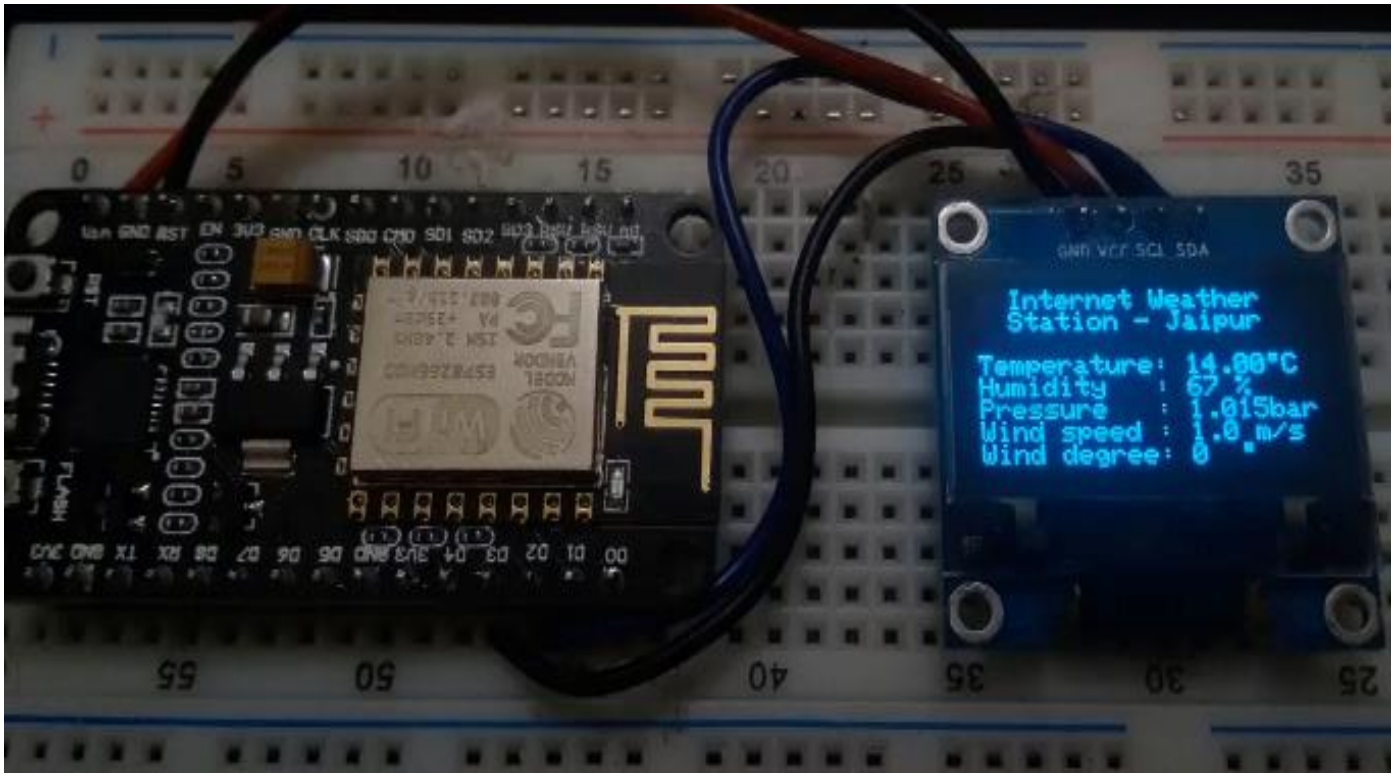

Fig 2 Circuit Diagram

IV. CONCLUSION AND FUTURE SCOPE

In this project, we have implemented an automatic watering system that can be easily controlled from home through a simple website. Work would disappear and we would get accurate results. The proposed system can reduce the efforts of farmers and ensures high yield. It also saves water for irrigation by placing the sensor in the right place above the ground. This work showed that plants can still tolerate low humidity when temperatures are moderate. Analysing more than one parameter has made this system effective in field management. Long run scope of IoT-based shrewd water system frameworks is endless and holds awesome potential for changing horticulture within the long term. Expanded integration of fake insights (AI) and machine learning calculations to analyse information from IoT gadgets, sensors, and chronicled designs to optimize water system plans, foresee trim water prerequisites, and upgrade by and large cultivate efficiency. Utilization of blockchain innovation to improve information security, straightforwardness, and traceability in keen water system frameworks, empowering secure exchanges and information sharing among partners whereas guaranteeing the astuteness of rural information.

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