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Solar Based Automatic Irrigation System Using IOT

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Abstract: ***This paper focuses on reducing the manual involvement of farmer in the field by using an automated irrigation system. So we have included IOT in our project and the coding required in it is done in the Arduino IDE platform. We have taken a microcontroller that is Node MCU and had connected all the sensors in it to operate respectively. We have set a particular value to which if the moisture content detects less than the motor will on automatically or else it will be off. It conserves the water and also manages the amount of water efficiently for plants. It results in reducing human labour, effort, and errors due to human negligence. During the day, solar panels give power to the system and store the energy, allowing it to run at night. It detects the amount of moisture in the soil using a moisture sensor. The pump mechanism is triggered when the moisture content of the soil falls below a specified level for the plant/crop, and the plant/crop is irrigated. On receiving the desired level of irrigation the pumping system is switched off automatically.***
Keywords: IOT, Automated Irrigation, Solar Source, Save Water.

I. INTRODUCTION

Water is the main source of living and it is our indeed duty to preserve and conserve and use efficiently for ourselves and our future generation also. Of the total available water about 97.2% is salt water in oceans and 2.8% is available as fresh at any time in the planet earth. 2.2% is available as surface and 0.6% is available as ground water. Out of 2.2%, 2.15 is fresh water in glaciers and ice caps. 0.01 is available in lakes and streams and 0.04 is available in other forms. Out of 0.6% groundwater, only about 0.25% can be economically extracted with the present drilling technology. India occupies only 3.2q million square km geographical area i.e. 2.4% of the world's land area and supports our 15% of the world's population. Thus, one of the fundamental needs for harvesting a decent crop that can be a cause of additional types of nutrients, either nano or macro, for their correct growth is retaining adequate water in the soil. Every year, rain plays a vital role in determining the outcome of these crops and also the farmers. Overuse of ground water has resulted in a dramatic reduction in ground water levels during the previous 15 years.

As a result, it is imperative that we use each and every drop of water carefully so that future generations can benefit from it as well. Our project's name, AUTOMATIC IRRIGATION SYSTEM with Solar power, is a step toward implementing some novel engineering methodologies. This strategy will be a very good choice for middle farmers who struggle every year due to crop failures that occur every year. This technology's use has a lot of potential in the near future.

II. LITERATURE SURVEY

IOT basically stands for Internet of Things and can be used all around to automate any electrical item. We can get all the data related to the items in our smartphones through internet. Making the irrigation system automatic will ease our daily process.

1) Seal, Binoy, *et al.* (2014) "Solar Based Automatic Irrigation System." International Journal of Research in Advent Technology 2.4. On the basis of LDR sensor data, the developed single axis solar tracker device orients the PV panel in accordance with the position of the sun. The irrigation pump can be controlled in a variety of ways.
2) Alex, G., & Janakiranimathi M. (2016). *et. al* Solar based plant irrigation system: A solar-powered autonomous irrigation system is proposed in this research.. Irrigation Scheduler monitors a number of variables, including humidity, temperature, and soil moisture. In this research, a novel type of solar panel, called a Spin Cell, is employed, which generates 20 times more current than typical flat panels, and the irrigation pump is controlled in two modes: automatic and GSM.
3) Shiraz Pasha, B. R., & Yogesha, D. B. (2014) *et. al* Microcontroller based automated irrigation system. The International Journal of Engineering And Science (IJES). The Microcontroller-based Automated Irrigation System efficiently monitors and manages all drip irrigation system functions. The Microcontroller Based Automated Irrigation System is a useful instrument for exact soil moisture control in highly specialized greenhouse vegetable production, as well as a simple and precise irrigation approach. It also saves time, eliminates human mistake in adjusting available soil moisture levels, and maximizes net earnings.

4) Tusher, M. M. I.,*et. al* (2019) Solar Based Automatic Irrigation System with GSM Module. The main components are an ATmega 2560 microprocessor, sensors, a GSM module, an LCD, and a solenoid valve. Finally, the pump has been set to operate based on the amount of water required. As a result, it is possible to save a particular quantity of water and power, which has been calculated. The manual and automatic operation modes were also proven.

III. PROBLEM STATEMENT AND OBJECTIVES

A. Problem Statement

Many parts of our country still lacks in proper flow of electricity all the time and unaware of new technologies and methodologies. Uneven distribution of rainfall also leads to lack in farming and thus due to improper yielding farmers are been bound to take negative steps. Hence they are needed to be educated about the new technologies and different ways through which they can improve their yieldings.

B. Objectives

1) To reduce the wastage of water in deep percolation and seepage losses.
2) To reduce the power consumption for irrigation.
3) More than half part of our country is not properly supplied electricity, this technical methodology of irrigation will help in better production in those areas.
4) Due to uneven and indeterminate distribution of rainfall that cause drought and farmer suicide which can be reduced up to a certain level by this project.

IV. PROPOSED SYSTEM

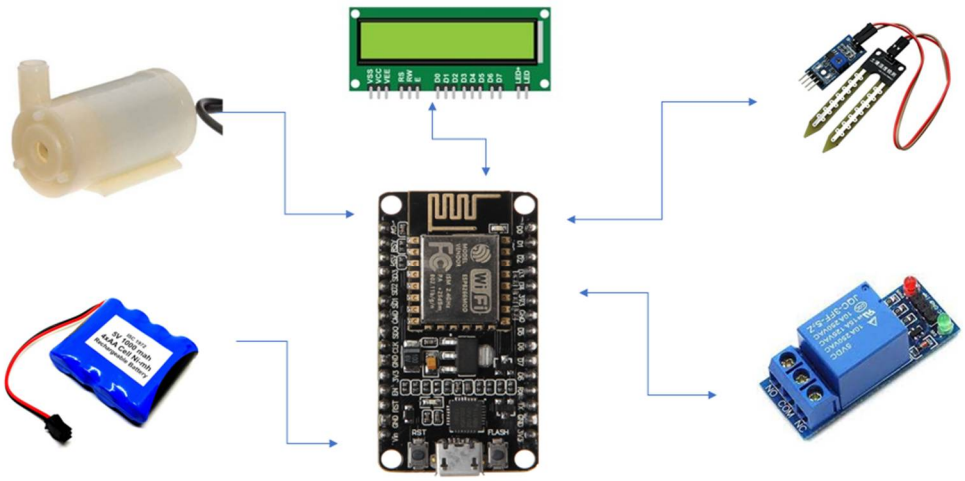
This system's functioning idea is straightforward and simple to implement because all of the components are wired to the microcontroller, when the power is turned on, the NodeMCU and all of the components turn on as well. The soil moisture sensor measures the moisture content of the soil and turns on the motor automatically if the moisture content is low.

At the same time, information about the motor is presented on the LCD, as well as the moisture content value. Similarly, when the soil moisture sensor detects a high moisture content, the engine turns off automatically and information is shown on the LCD. Simultaneously, through the Blynk IoT application, we'd get all the information of what's going on in our mobile, such as whether the engine is on or off and how much soil moisture content there is.

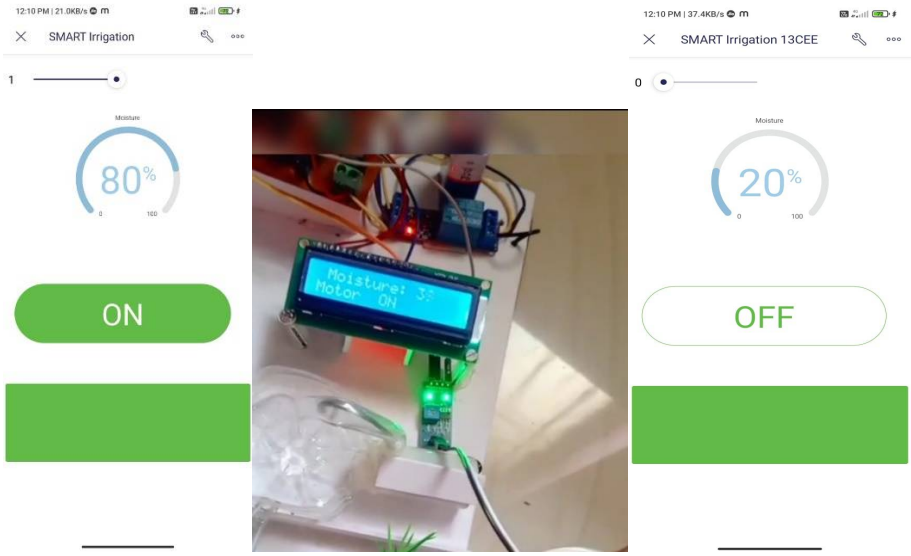
All of this is accomplished with the help of an ESP8266 wi-fi module that is connected to the internet and sends data to our phone. Because everything is done automatically over the internet, we can conclude that our project is built on IoT.

As a result, the automated system is functional. In the event of an automatic system failure, the pump can alternatively be operated by a switch; however this requires a trip to the field to turn on the switch. After the watering is completed, the switch must be turned off once more. Aside from irrigating the area, the pump can also be utilised for other purposes by manually switching it on and off.

V. ARCHITECTURE DIAGRAM



VI. OUTPUTS



Soil Moisture LCD Display Motor Indication Reading

VII. CONCLUSION

1) Farmers, in particular, are having severe difficulties watering their agricultural fields these days because they have no clue when the power will be available to pump water. They must wait until the land is properly watered even after that, which forces them to abandon other pursuits. Here's a concept that benefits not just farmers but also gardeners by sensing soil moisture and immediately switching on the pump when the power is turned on.

2) The main applications for this project are for farmers and gardeners who do not have abundant time to water their crops/plants. It also covers those farmers who are wasteful of water during irrigation. The project can be extended to greenhouses where manual management is far and few in between. The principle can be extended to create completely automated gardens and farmlands. Collective with the principle of rain water harvesting, it could lead to massive water savings if applied in the right way. In agriculture lands with severe shortage of rainfall, this model can be effectively applied to attain great results with most types of soil.

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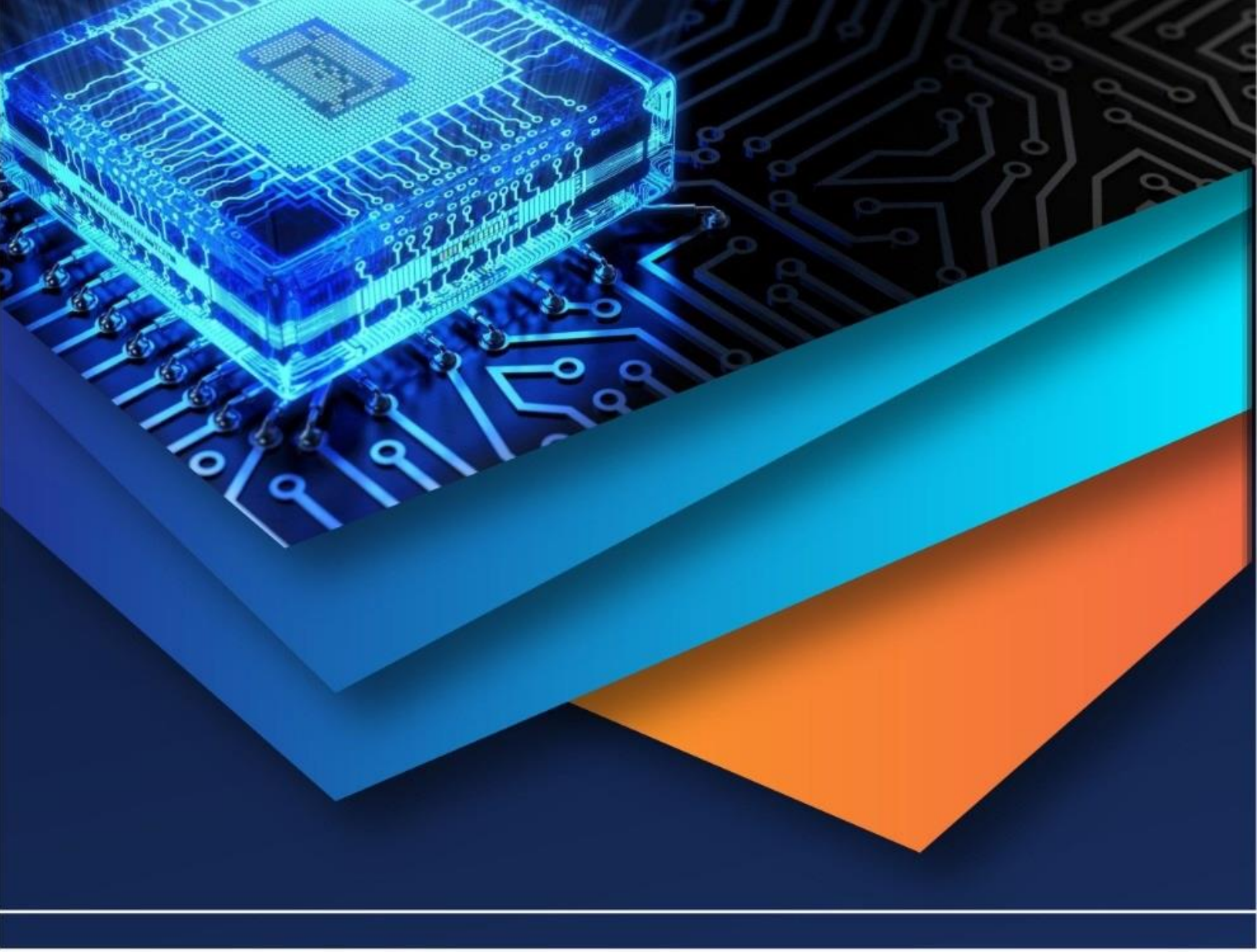

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