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Automatic Water Saving Irrigation System Using IoT

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Abstract: ***Automation of farm activities can transform agricultural domain from being manual and static to intelligent and dynamic leading to higher production with lesser human supervision. This paper proposes an automated irrigation system which monitors and maintains the desired soil moisture content via automatic watering. SoC ESP8266 Wi-Fi module platform is used to implement the control unit. The setup uses soil moisture sensors which measure the exact moisture level in soil. This value enables the system to use appropriate quantity of water which avoids over/under irrigation and the ph sensor measure the ph value of water finally the DHT11 used to analysis the temperature of atmosphere. IOT is used to keep the farmers updated about the status of sprinklers. Information from the sensors is regularly updated on a webpage using internet through which a farmer can check whether the water sprinklers are ON/OFF at any given time. Also, the sensor readings are transmitted to cloud storage to generate graphs for analysis***

Keywords: Automation, SoC, ESP8266, DHT11, IOT, Cloud storage

I. INTRODUCTION

Agriculture is the unquestionably the largest livelihood provider in India. With rising population, there is a need for increased agricultural production. In order to support greater production in farms, the requirement of the amount of fresh water used in irrigation also rises. Currently, agriculture accounts 83% of the total water consumption in India . Unplanned use of water inadvertently results in wastage of water. This suggests that there is an urgent need to developsystems that prevent water wastage without imposing pressure on farmers. Over the past 15 years, farmers started using computers and software systems to organize their financial data and keep track of their transactions with third parties and also monitor their crops more effectively. In the Internet era, where information plays a key role in people's lives, agriculture is rapidly becoming a very data intensive industry where farmers need to collect and evaluate a huge amount of information from a diverse number of devices (eg., sensors, faming machinery etc.) in order to become more efficient in production and communicating appropriate information . With the advent of open source ESP8266 boards along with cheap moisture sensors, it is viable to create devices that can monitor the soil moisture content and accordingly irrigating the fields or the landscape as an when needed. The proposed system makes use of microcontroller SoC on ESP8266 platform and IOT which enable farmers to remotely monitor the status of sprinklers installed on the farm by knowing the sensor values thereby, making the farmers' work much easier as they can concentrate on other farm activities.

II. LITERATURE REVIEW

Primary investigation is carried out under the following stages, such as Understanding the existing approaches, Understanding the requirements, developing an abstract for the system. In this paper, soil moisture sensor, temperature and humidity sensors placed in root zone of plant and transmit data to web application. Threshold value of soil moisture sensor that was programmed into a microcontroller to control water quantity. Temperature, humidity and soil moisture values are displayed on the web application. This paper on "WATER SAVING IRRIGATION SYSTEM USING IoT" is intended to create an automated irrigation mechanism which turns the pumping motor ON and OFF on detecting the dampness content of the earth. In this paper only soil moisture value is considered but proposed project provided extension to this existed Project by adding temperature and humidity values. Remote Monitoring in Agricultural Greenhouse Using Wireless Sensor and Short Message Service (SMS).

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In this paper they are sending data via sms but proposed system sends the values to mobile application. This proposed paper is arduino based remote irrigation system developed for the agricultural plantation, which is placed at the remote location and required water provides for plantation when the humidity of the soil goes below the set-point value. But in this we did not aware about the soil moisture level so to overcome this Drawback proposed system included with extra feature soil moisture value and Temperature value which displayed on the farmer mobile application. "Irrigation Control System Using Android and GSM for Efficient Use of Water and Power" this system made use of GSM to control the system which may cost more so to overcome that proposed system used ESP8266 board which already consist of in build wifi module .

By referring above papers it is found that no such systems are existed with all integrated features but proposed system includes these all features such as displaying temperature, humidity and soil moisture values,ph value and also automatic switching on and off of motor by considering soil moisture values

III. PROPOSED SYSTEM

This below Figure 1.0 is a overall block diagram of ESP8266 based automatic irrigation system which consist of three sensors which are connected to controller and sensed values from these sensors are send to the web application .

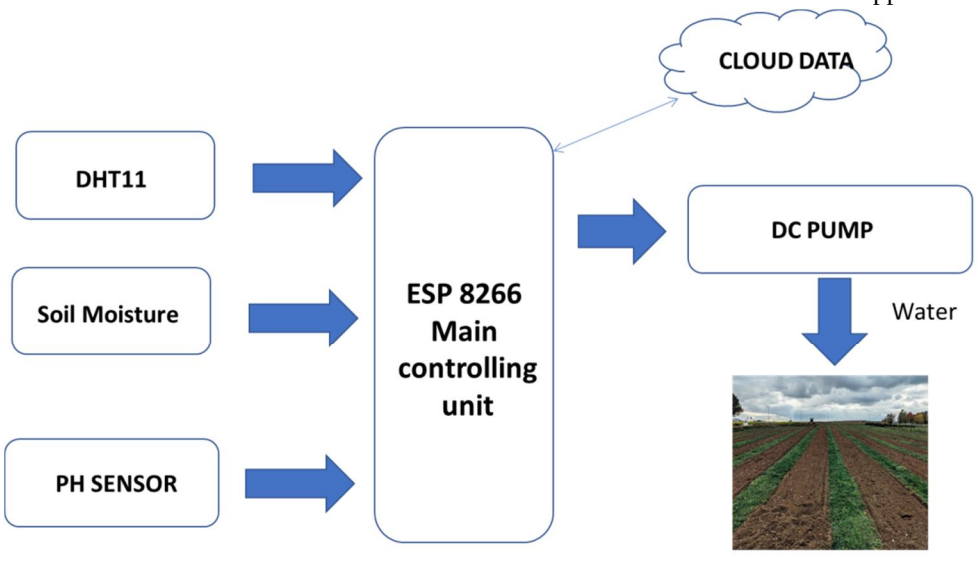


Figure 1.0: Block Diagram of Water Saving Irrigation System Using IoT

Figure 1.0 shows the block diagram of smart irrigation system with IoT. Farmers start to utilize various monitoring and controlled system in order to increase the yield with help of automation of an agricultural parameters like temperature, humidity and soil moisture are monitored and control the system which can help the farmers to improve the yield. This proposed work includes an embedded system for automatic control of irrigation. This project has wireless sensor network for real-time sensing of an irrigation system. This system provides uniform and required level of water for the agricultural farm and it avoids water wastage. When the moisture level in the soil reaches below threshold value then system automatically switch ON the motor. When the water level reaches normal level the motor automatically switch OFF. The sensed parameters and current status of the motor will be displayed on user's web application.

IV. HARDWARE COMPONENTS

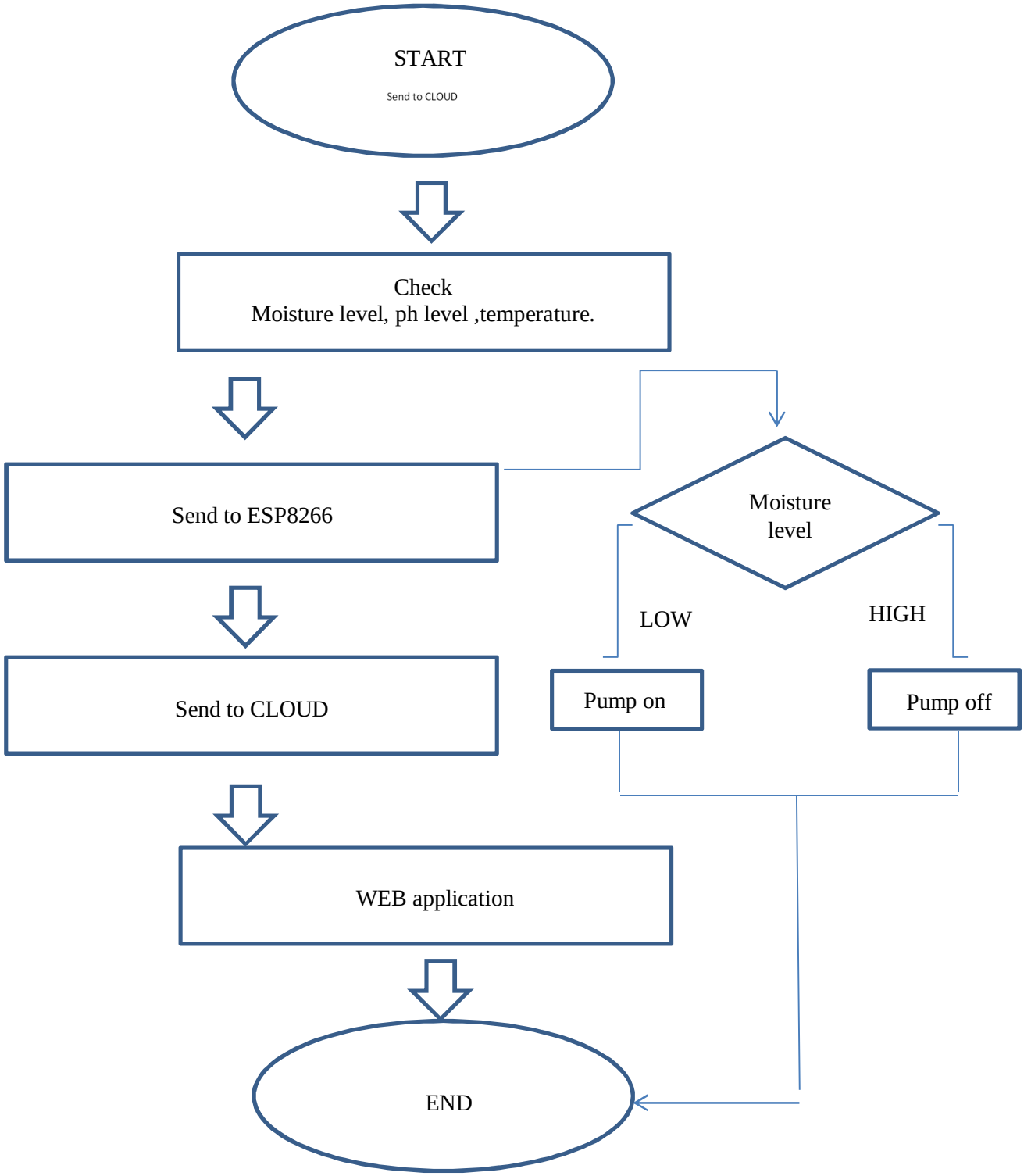
1) ESP8266
2) DHT11
3) Soil Moisture Sensor
4) PH Sensor
5) DC pump
6) Power Supply

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V. SOFTWARES USED

A. Arduino IDE
B. Web application
C. Cloud storage eg:Firebase,AWS etc..

Flow Chart



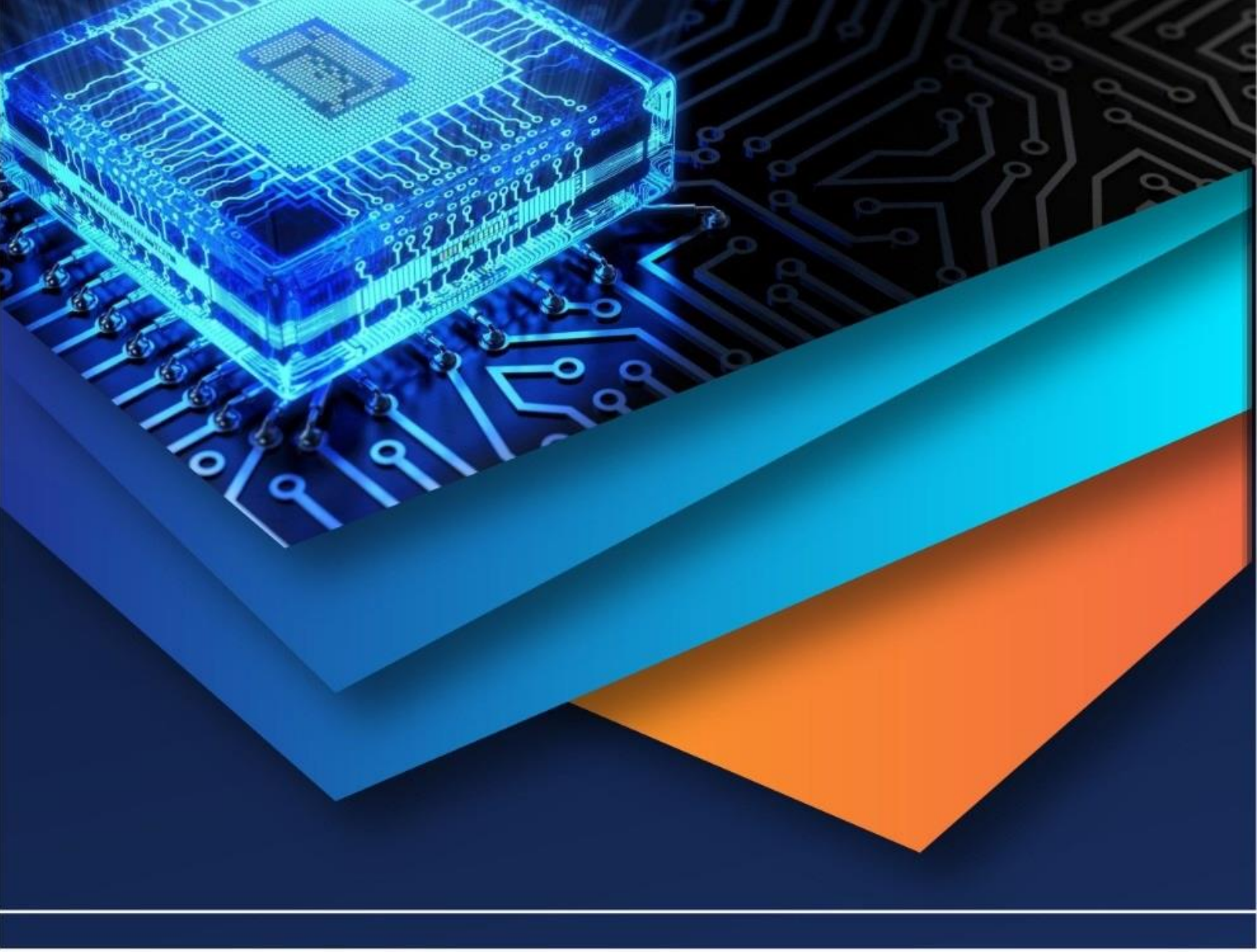
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VI. CONCLUSION

The application of agriculture networking technology is need of the modern agricultural development, but also an important symbol of the future level of agricultural development; it will be the future direction of agricultural development. After building the agricultural water irrigation system hardware and analyzing and researching the network hierarchy features, functionality and the corresponding software architecture of precision agriculture water irrigation systems, actually applying the internet of things to the highly effective and safe agricultural production has a significant impact on ensuring the efficient use of water resources as well as ensuring the efficiency and stability of the agricultural production. With more advancement in the field of IoT expected in the coming years, these systems can be more efficient, much faster and less costlier. In the Future, this system can be made as an intelligent system, where in the system predicts user actions, rainfall pattern, time to harvest, animal intruder in the field and communicating the information through advanced technology like IoMT can be implemented so that agricultural system can be made independent of human operation and in turn quality and huge quantity yield can be obtained.

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