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SMART AGRICULTURE AND DAM MANAGEMENT SYSTEM

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ABSTRACT

Despite the perception people may have regarding the agricultural process, the reality is that today's agriculture industry is data-centered, precise, and smarter than ever. The rapid emergence of the Internet-of-Things (IoT) based technologies redesigned almost every industry including ''smart agriculture'' which moved the industry from statistical to quantitative approaches. Such revolutionary changes are shaking the existing agriculture methods and creating new opportunities along a range of challenges. This article highlights the potential of wireless sensors and IoT in agriculture, as well as the challenges expected to be faced when integrating this technology with the traditional farming practices. IoT devices and communication techniques associated with wireless sensors encountered in agriculture applications are analyzed in detail. What sensors are available for specific agriculture application, like soil preparation, crop status, irrigation, insect and pest detection are listed.For the sake of obtaining the interest data, wireless sensor networks (WSNs) are used to collect the interest data in the farm field and send the obtained data to the servers via wireless communication. Since the WSNs usually operate in the unlicensed spectrum ,the available resource elements (REs) are scarce especially when a large number of sensor nodes are deployed in the farm field.

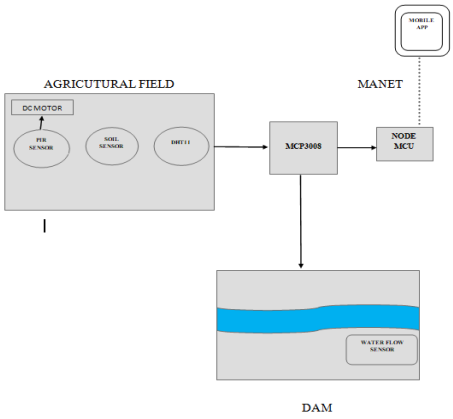
I INTRODUCTION

To improve the agricultural yield with fewer resources and labour efforts, substantial innovations have been made throughout human history. Owing to the increment in population and corresponding decrement in rainfall amount, there is a substantial scarcity of food and water – which are the most basic needs of life. The main target of this study is small farms, in other words, farms capable of planting several types of products, such as vegetables and fruits in a small area. Thus, the main goal of this study is increasing production with minimal costs and, ultimately, increase net revenue. Technology supported agriculture with concepts of wireless sensor networks (WSN) and the Internet of Things (IoT) can help to gradually shift from primitive agricultural practices. WSNs collect information from different sensors in large and small networks so end users can get and process data. These networks can be used in the monitoring of people health, weather conditions, control traffic, and air pollution. IoT is an environment where objects, animals or people are equipped with unique identifiers capable of data transmission over the internet without the need for human or computer interactions.

Smart Agriculture is used for automated estimate of the climate , humidity of soil , dampness, temperature etc for practical farming with more accurate measurements. Smart Agriculture using IOT reduces the cost and updates the productivity of standard developing. Dam management system detects and reduces the disaster to be caused. In our proposed system, we collect different data via sensor nodes.We use wireless sensor networks for remote access and notifications.

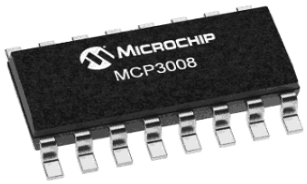
II SYSTEM OVERVIEW

The system is a smart agriculture and dam management system which uses sensors like DHT11,PIR,waterflow sensor and soil moisture sensor for monitoring the soil conditions while also monitoring the water flowing through the dam and alerting the residents of the nearby village in case of chance of any flood caused due to overflow of water from the dam.



III COMPONENTS

1.MCP3008



MCP3008 is A eight-channel 10-bit AD. It has its own circuitry. It can be programmed to provide a four input pair or eight single-ended inputs.It has a DNL (Differential Non-linearity) . Its serial interface is compatible with the SPI protocol. It can operate on a supply voltage in the range of 2.7 to 5.5V.It is used in sensor interfaces, data acquisition, battery operated systems, etc.

2.Node MCU

NodeMCU is an open source firmware and kit which is used for IOT based projects because it provides the capability of wireless communication which is an essential part in projects related to IOT. In this project, it is used for sending crop related data to user's mobile application.

3.DHT11

This DHT11 Temperature and Humidity Sensor is used for sensing the temperature as well as the humidity of the surroundings. In this project, it is used to sense the climatic conditions surrounding the farm field for more efficient farming.

4.Soil Moisture sensor

Soil moisture sensors measure the volumetric water content in soil. It is used for monitoring the condition of the soil in which the crops are sown. It uses properties of soil like electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content.

5.WaterFlow sensor

Water flow sensor has a plastic valve through which water can pass. It also has a rotor which is used to sense the rate of water flowing through the sensor. When water flows through the valve, the rotor spins and its speed is calculated which gives the rate at which water is flowing through the sensor. In this project, it is used to detect the rate at which water flows out of the dam.

6.PIR sensor

A passive infrared **sensor** (**PIR sensor**) is an electronic **sensor** that uses IR(infrared) to detect any living bodies in the area. It detects the presence of a living creature through its body heat. In this project, this sensor is used for detecting any insects in the field, and turning the motor on which will spray pesticides to kill the insects.

IV WORKING

The system integrates the concept of smart agriculture with dam management system wherein a common microcontroller is used for both dam management as well as management of the agricultural field.

On one hand,the agricultural fields of the farmers is managed in such a way that the process of farming is made smarter and more efficient with the use of various sensors like soil moisture sensor, temperature and humidity sensor,PIR sensor etc. The temperature and humidity sensor(DHT11) measures the temperature and humidity of the land which is of concern. The soil moisture sensor measures the amount of tenderness in the soil and passes this information to the microcontroller. The PIR(Passive InfraRed sensor) sensor is used to detect the presence of any insects in the farm field. It detects whether there is any living body present in the field by using infrared rays and triggers the turning of the motor which sprays pesticides onto the field to kill the insects. The PIR sensor has 2 LEDs in it, each having the same infrared reading at the beginning. When a living body passes by, it first crosses one part of the PIR sensor and intercepts one of the LEDs thereby creating a positive difference between the 2 LEDs. When the body leaves, the exact opposite of this happens and a negative difference is created between the 2 LED's infrared readings. All these readings are sent to the microcontroller(mcp3008) from which the data is passed to the user app which is used to view these sensor readings through the Wifi module(NodeMCU). The farmers can then alter their farming based on these observed readings from the sensors.

On the other hand, the dam which is nearby the residential areas of the farmers is also managed such that in case of excessive rains,the damage due to floods by flowing of water at high volumes from the dam to the village is identified and alerted to the people living in the are beforehand so that they can take precautionary measures to minimize the damage due to flood. This is done by placing a waterflow sensor at the opening of the dam. This waterflow sensor is used to measure the amount of water flowing out of the dam. The waterflow sensor measures the waterflow in litres/hour. When there is high rain, the dams may get filled easily,hence the dam gates are opened slightly in the beginning, therefore the water flow is very less. But incase there is excessive rain and even after slightly opening the dam, the dam seems to be filling quickly, in such circumstances, the dam gates are opened completely therefore a high amount of water is flown out of the dam which can also cause flood, In this situation, the waterflow sensor will detect high amount of waterflow from the dam and sends this information to the microcontroller which sends alert message to the residents of the nearby villages, who can then take measures to minimize their loss due to the forecoming flood.

V FUTURE ENHANCEMENT

The system along with providing crop and field related data like soil moisture level, temperature and humidity of the field area will also provide suggestions on which crop can be sown at that period of the year according to the observed data from sensors. Also the system will automatically open or close the dam the required amount according to the level of water in the dam.

VI CONCLUSION

The smart agriculture and Dam management system will provide a way of effective and reliable farming without much man power.This system can be used to increase the quality of farming and can be further enhanced to provide advanced farming in the future like further management of larger lands and larger water resources.

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