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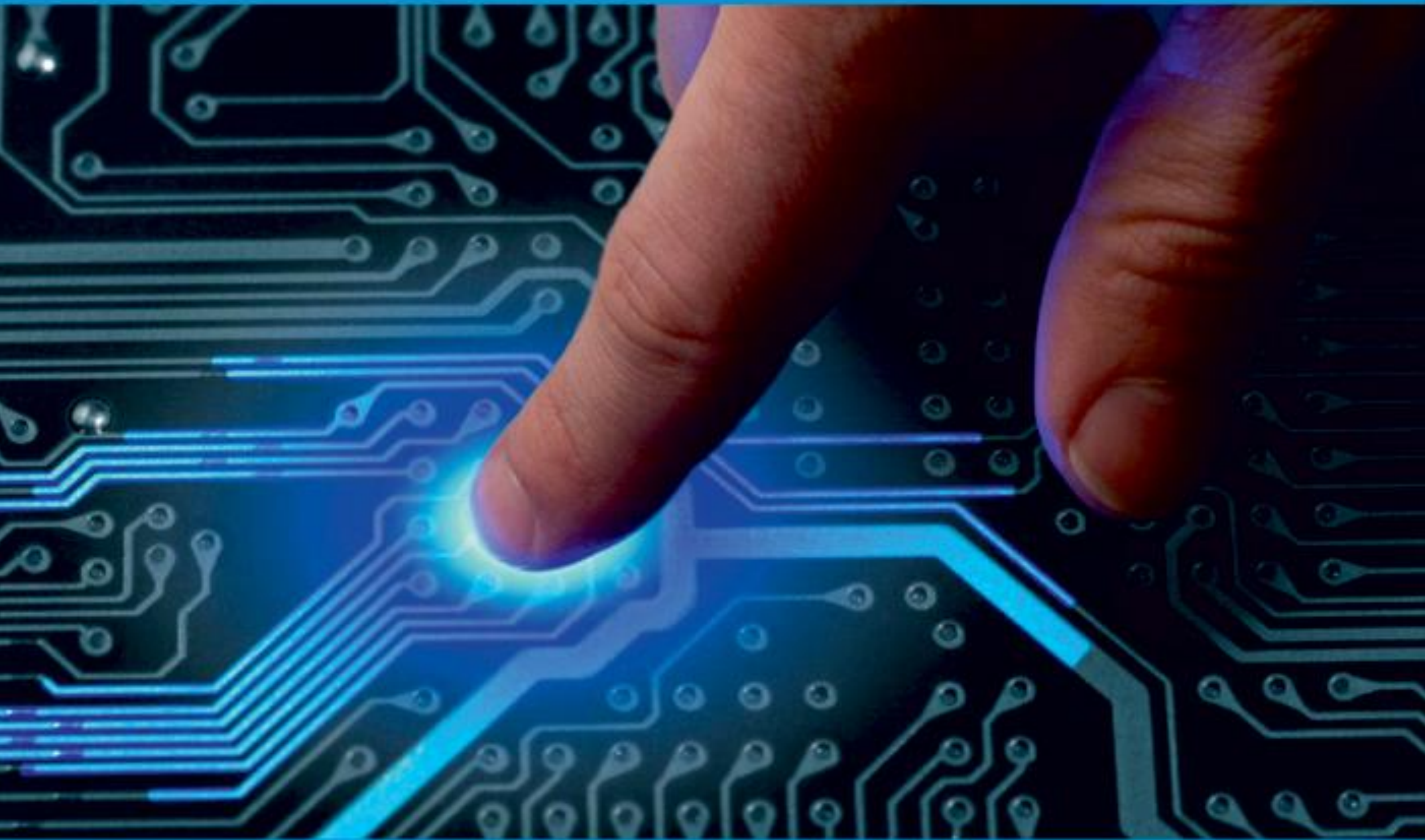

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Smart Plant Surveillance Using Internet of Things

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ABSTRACT: Water management systems to be efficient is a major concern in many agricultural fields. This paper deals with the control of an irrigation system by designing the variable rate irrigation with the help of a wireless sensor network, and software for real-time in-field sensing are implemented. This irrigation system is made of two various sensors and a micro-controller unit with an embedded cloud communication module. The communication among the sensors, microcontroller, and farmer is established by their respective Login ID using Internet of Things (IoT). In this paper the farmer can communicate to this irrigation system through android mobile application. The farmer can check the status of their land at any time using the app.

KEYWORDS: IOT, Sensing, Monitoring, Controlling action, Reporting, Android Application,
Water level monitoring.

I. INTRODUCTION

From an era of doing every task by hand to an era of automating everything, the humans have had a wonderful transition. It all started with a vision to reduce human effort and make their life easier and today its reach and horizons are boundless. Machines have always been known to create a revolution. The world witnessed the Industrial Revolution in 18th Century for the first time when all the tough labour of human was replaced with specialized machines for the job. No one could ever imagine, then, that machines could not just reduce effort and act according to our orders but also start acting on their own without our intervention. The Internet of Things is defined as physical inter-connection of physical objects embedded with electronics, sensors, software, actuators via Internet which enables the objects to communicate and exchange data. Kevin Ashton, co-founder of the Auto-ID Centre at MIT, first mentioned the internet of things in a presentation he made to Procter & Gamble (P&G) in 1999. Wanting to bring radio frequency ID (RFID) to the attention of P&G's senior management, Ashton called his presentation "Internet of Things" to incorporate the cool new trend of 1999: the internet. MIT professor Neil Gershenfeld's book, When Things Start to Think, also appearing in 1999, didn't use the exact term but provided a clear vision of where IoT was headed. IoT has evolved from the convergence of wireless technologies, micro-electro-mechanical systems (MEMS), micro services and the internet. The convergence has helped tear down the silos between operational technology (OT) and information technology (IT), enabling unstructured machine-generated data to be analysed for insights to drive improvements. IoT evolved from machine-to-machine (M2M) communication, i.e., machines connecting to each other via a network without human interaction. M2M refers to connecting a device to the cloud, managing it and collecting data. Taking M2M to the next level, IoT is a sensor network of billions of smart devices that connect people, systems and other applications to collect and share data. As its foundation, M2M offers the connectivity that enables IoT.

II. RELATED WORK

This paper related work has done uniquely by two different ways, for example, one is physically and the alternate one is either mechanically or semi mechanically. The smart way systems embody IoT and the normal system. Name itself says IoT described project[1] has been introduced to irrigate the field by fully automatic by using gsm. The GSM module is used to control the irrigation system by sending text messages and alert messages from the module for a flood control system. Then, it is overcome by [2] consists of a water flow level sensor which is used to measure and monitor the flow level of water in the drip irrigation pipe lines to minimize the excess of water by enhancing the plant growth. But for wheat and paddy fields always having excess of water in the field. Nitrogen in percolation water is used in paddy and wheat fields' soil to predict rice and wheat rotation.

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III. EXISTING METHOD

The agriculture farm is controlled by monitoring and automation with embedded technology. The drip irrigation system is used to water the plant to reduce human system. Implementation of agri monitoring without inbuilt wifi module.

Drawbacks of Existing Systems

The drawbacks of the current system include the following:

• Placing of the soil moisture sensor in the fields is very sensitive.
• Water and electricity risks.
• Organic debates
• System failure threats.

IV. PROPOSED METHOD

The Proposed system is to eliminate the manual operation and to implement an entire automatic irrigation system. This system requires additional sensors with respect to the size of the farmer's land. By the implementation of this system, the farmers can able to know about their crops health in all seasons by login with their respective user id into the mobile app to check the status of their irrigation system. In case of power cut, the system can connect to a mini up because the system consumes only less power or once the power reconnects; the system will automatically connect to the Wi-Fi and starts operating automatically. The values from the sensors are sent to the microcontroller. The microcontroller will send this information to the cloud which is connected to the mobile app.

Advantages of Proposed System

• This system reduces the risk of electric shocks.
• Water motor controlling through Wi-Fi.
• Monitoring of sensor data through Wi-Fi..
• Efficient and low-cost design.

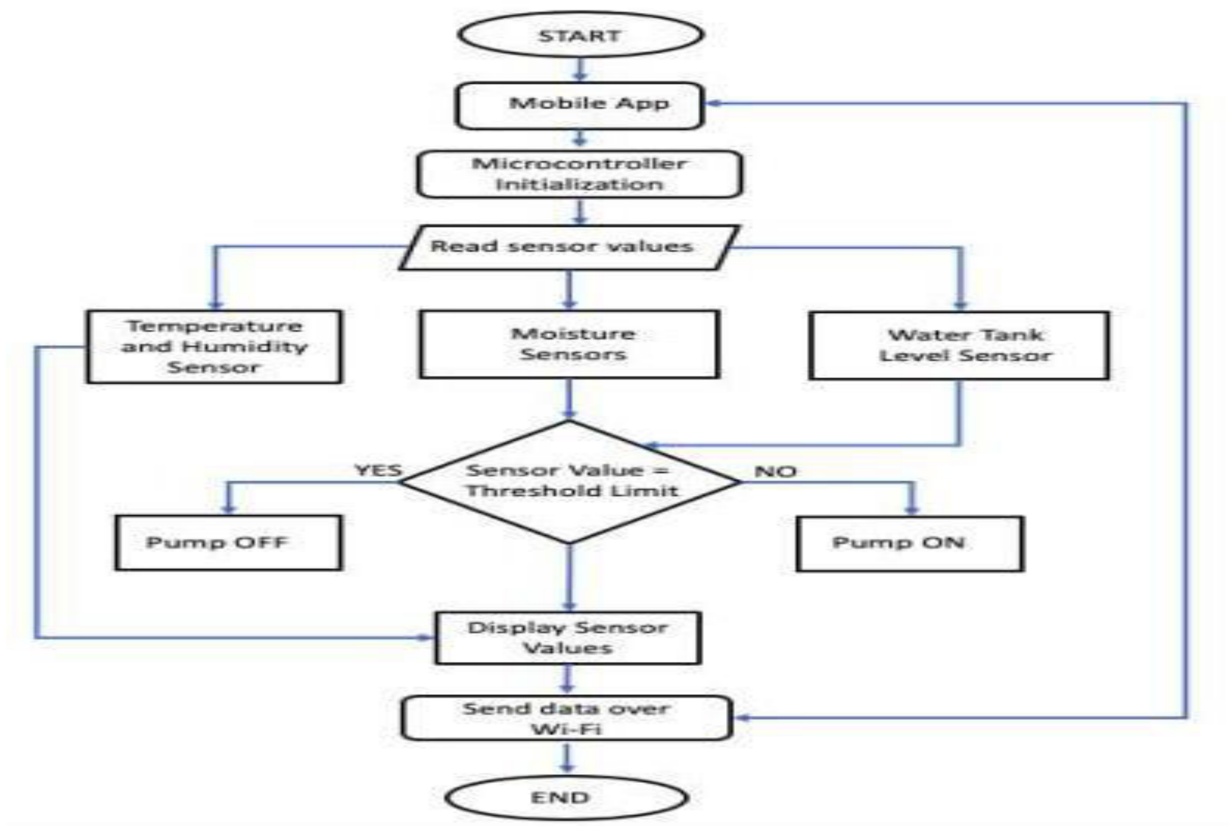

Fig 1: Flow Chart

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V. RESULTS

The application that we used in this project is BLINK application. Through this application we can control the motor based on the data that is shown by the moisture, temperature, humidity. The readings shown in the application is collected by the particular sensors. Based on the data shown in the application we can monitor or control the motor based on our requirement. For programming the ESP8266 NodeMCU module, only the DHT11 sensor library is used as external library. The moisture sensor gives analog output which can be read through the ESP8266 NodeMCU analog pin AO. Since the NodeMCU cannot give output voltage greater than 3.3V from its GPIO so we are using a relay module to drive the 5V motor pump. Also, the Moisture sensor and DHT11 sensor is powered from external 5V power supply.

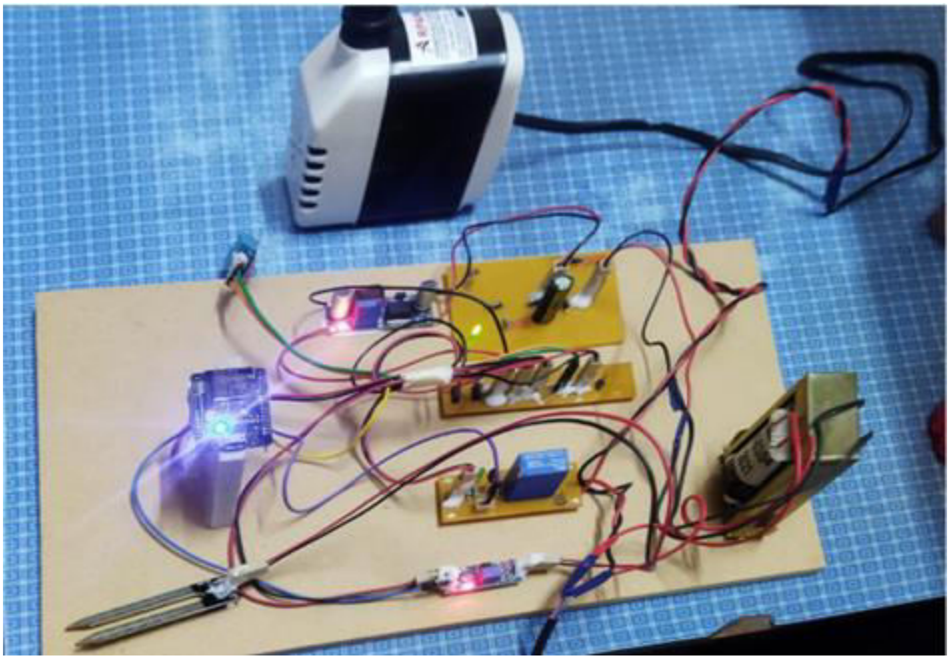

Fig 2: Microcontroller Connection

Fig 3: Mobile Application

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Fig 4: Field Chart 1

Fig 5: Field Chart 2

Fig 6: Field Chart 3

VI. CONCLUSION AND FUTURE WORK

We have proposed and developed a system that can monitor crops remotely. The important parameters required for plant growth (Temperature, Humidity, Moisture) can be monitored with an ease. Manually turning on/off the motor is no more required which decreases deaths due to short-circuit, physical burden of travelling to farm only just to control the motor. Integrating features of all the hardware components have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus, the project has been successfully designed and tested.

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In future, we would like to enhance the application by adding following features:

• We can build a Robotic bot with sensors attached to its limbs which can move around and read the attributes in order to get accurate values of total farm.

• We can read the nutrients value in the soil and automate the process of adding the fertilizers.

• This project can be extended by using the temperature controlling systems where coolants can be used to control the temperature.

• This project can be extended to drip irrigation, so we can save more water.

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