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SMART IRRIGATION OF AGRICULTURAL FIELD VIA IOT

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Abstract

Smart Farming is a farming management concept using modern technology to increase the quantity and quality of agricultural products. Farmers in the 21st century have access to GPS, soil scanning, data management, and Internet of Things technologies. An IOT based smart irrigation system for efficiency for many purposes like water management and Soil Parameters like soil moisture, pH, Humidity are measured and the nutrition of crop, weather forecasting and the observed values are collected by microprocessor and further sent to the user mobile. The GSM module has been used to establish a communication link between the farmer and the agricultural field. The current field status will be sent to the farmer through SMS. The farmer can access the server about the field condition anytime, anywhere thereby reducing the manpower and time.

Keywords: *Farmer, Farming, IoT, Irrigation, Agriculture*

I. INTRODUCTION

Agriculture plays an important role in every country's GDP because it contributes a lot to the economy of India. It is seen that 85% of the population of India depends on agriculture for their income. IOT is helping the farmers to solve most of the agriculture problems. As India is the second largest country in the growth of population so it is necessary to increase the production rate of agriculture to meet the population food consumption rate. Many initiatives have already been taken by the government of India to promote Agriculture. The smart irrigation system based on IOT has been built to resolve the excess flow of water into the field of agricultural land. Via the use of a temperature sensor, temperature readings are permanently observed and sent to wireless mobile communication systems via the GSM module[1]. The picture of the crop on agricultural land was taken using a web camera. Then the original crop picture was compared to a healthy leaf with the aid of a digital imaging process and the nutrient value of

the plant was found and data was collected. Via assigned IP addresses, Android applications continuously collect data from databases to which they are connected. When the temperature values are exceeded the particular value then the relay, which is connected to the arduino to control the DC motor. The android application, with 4 options which includes status of motor, values of temperature. The status of motor provides the current status of the water pump and pesticide pump[2].

Internet of Things (IoT) is the interconnection or network of physical devices that are interrelated computing devices, digital and mechanical machines, people or animals, objects that can sense, accumulate and transfer data over the web without any human involvement. With a unique id, all is given. It is an advanced analysis and mechanized process that utilizes the identification, organization, enormous knowledge and creativity of man-made consciousness to convey a complete framework for an administration. IoT is simply about expanding the Internet's influence beyond mobile phones and computers. IoT has changed today's world. Smart cities, smart cars, smart homes everything around us can be turned into a smart device with the help of IoT. It also has applications in agriculture, business sectors, healthcare, transport and logistics.

The Internet of Things is a technology where a wireless mobile device is used to keep eyes on the function of a system. The Internet of Things is anxious with internal connecting communicating objects which are installed at various locations which are possibly far from one another. Internet of Things is a type of network technology, which collects the information from different sensors and makes anything connected to the Internet to transfer information. It can be used to boost the system's status[3], [4]. In order to collect data from the sensors and to be transmitted to the user's wireless computer, the Arduino microcontroller unit is also connected to communication devices. Using an advanced networking system such as a Wi-Fi module can do this. The data that the Arduino microcontroller gathers is translated into purposeful data and transmitted to the user. With the assistance of a wireless device such as an android tablet or cell phone, the user can observe the data. Water shortage today is an immense issue for farmers. This paper allows farmers with an IOT-based irrigation system to irrigate their agricultural land in a simple way.

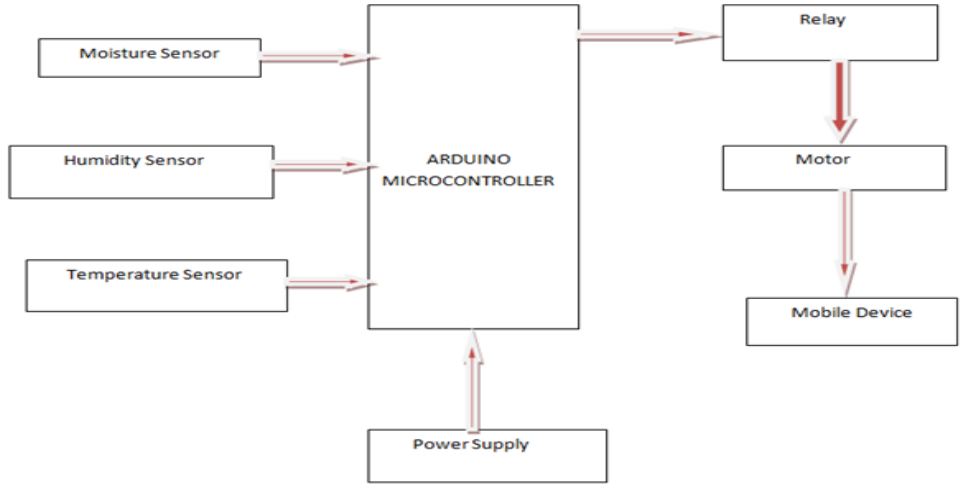

Fig 1: Block diagram of smart Irrigation system.

Fig 1 shows the block diagram of a smart irrigation system which is composed of Moisture Sensor to detect the Moisture of the field, Humidity Sensor to detect humidity of the field, Temperature sensor to measure temperature of the field. IOT based smart irrigation system provides Nutrient value of the crop with help of oil nutrient sensor, it also provides weather forecasting information, soil moisture information, surrounding temperature information with the help of Electronic devices and sensors used in the Smart irrigation system.

There are four main components of IoT-

i. Low power embedded system- High performance and less battery consumption are the inverse factors that play an important role in the design of electronic systems.
ii. Cloud computing- Data collected from devices is stored on reliable storage servers so here cloud computing comes into action.
iii. Availability of Big Data- as IoT is highly dependent on sensors that are real time. So the usage of electronic devices is spread throughout every field that is going to trigger a massive flux of data.

A. Network connection:-For communication, internet connectivity is necessary where each physical object is assigned by an IP address. A network connection is built between the devices with the help of these addresses.

There are many advantages of IOT based smart irrigation system

1. No human power required: - The advance irrigation system is completely IOT based; it does not require any manpower

2. Helps in water conservation: - There is fixed water supply; there is no overflow of water or less water to the irrigation field. Hence implementing this system can help in water conservation[5].

3. Flexible: - The system is flexible and can be connected to irrigation systems. It can be used for different varieties of soil and crop. The Particular value can be fixed for the water supply depending on the soil type.

4. Affordable: - It is an open source technology; it requires less maintenance and it is less expensive also. It can be desegregated to the previous irrigation system without any additional cost.

5. Power consumption: - The system runs at 5V. It can also run on solar energy. It can also be connected to batteries or AC power supply.

6. Low maintenance: - The system is fully automated so daily checks for its smooth operation. It does not require high maintenance.

7. Remote Operation: - The system can be operated from anywhere remotely through wireless android smartphone developed applications and the data can be collected through the internet.

II. CONCLUSION & DISCUSSION

Smart agriculture is an emerging concept, because IOT sensors are capable of providing information about agriculture fields and then act upon based on the user input. The feature of this paper involves the creation of a device capable of tracking temperature, water level, humidity and even motion if any occurs in the field that can kill crops in the agricultural field using sensors using the Arduino UNO board. Smart farming is an evolving concept since IOT sensors are capable of providing agricultural field information and then acting on the basis of user feedback. The project aims to make use of technology that is emerging, i.e. Smart agriculture and IOT using automation. Once the hardware has been developed, the software needs to be modified based on changes in specifications and technology. The upgraded hardware is called the latest software edition. This new version needs to be checked in order to ensure that improvements made in the old version work properly and that other parts of the programmer do not cause bugs. This is important because in another part of the hardware, upgrading one part of the hardware could have some undesirable effects.

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