

SMART AGRICULTURAL FIELD IRRIGATION SYSTEM

Asha K S

Faculty of Engineering and Technology

Jain (Deemed-to-be University), Ramnagar District, Karnataka - 562112

Email Id- ks.asha@jainuniversity.ac.in

Abstract

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 programme 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.

Keywords: Internet of Things (IOT), Smart Agriculture using IOT, Arduino, Soil Moisture Sensor, Water level Sensor.

I. INTRODUCTION

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. For human beings to sustain their life, agriculture is the most important field. This raises the value of handling food for people all over the world. Most farmers follow very conventional strategies for growing their crops. To track crops, they used to be physically present on their farm. Using technology will make this activity simpler and more time-efficient. The Internet of Things (IoT) is a technology that, using the Internet, can send or receive any data to a server. Using this

technology, farmers without being present in their field may track the actual condition of the crops. In this paper, with the help of IoT technology, we have proposed a framework to track the farming sector. This framework enables data to be transmitted over the Internet by different devices and sensors. It allows farmers to use a smartphone or a computer to track their fields remotely from their home.

Almost every field embraces the Internet of things (IoT) revolution. Agriculture has seen many transformations and has adopted many machines to improve the yield. Field (soil and environmental parameters) and crop health monitoring are important factors for the yield to be of better quality. There have been several technological developments in agriculture in recent years that have resulted in an improvement in crop production and immunity. The agricultural sector absorbs about 70 percent of the freshwater available in the world, and we can optimise the irrigation process and water usage with the aid of a soil moisture sensor. The Internet of Things is the technology that plays a main role in this (IoT). Because of the Internet of Things (IoT) penetration in the agricultural sector, conventional agriculture is turning into smart agriculture. The IoT networks are reducing human labor requirements by monitoring crop health and field environment remotely [1].

For these monitoring and control applications, IoT uses a wireless sensor network (WSN) as the backbone for gathering information. The monitoring system consists of end devices equipped with a range of sensors to track different parameters such as temperature, humidity, pH, soil moisture, etc. and can communicate this information to the other devices. By tracking the growth phases of the crop and estimating the yield, IoT helps farmers by giving otherwise restricted low-power, low-cost devices access to higher processing capabilities via the Internet [2]. They are diminishing the role of satellites in monitoring and capturing images for agriculture by providing control and flexibility. In order to be affordable for farmers, IoT systems for agricultural monitoring should be low-cost. Depending on the network topology and area of the sector, there are several sensor nodes, sink nodes and a gateway inside a monitoring network. The sink node gathers data and uploads it to the cloud server from the sensor nodes. So we suggested a low-cost and easily accessible IoT-based smart agriculture in this paper with a double-tier architecture to store all sensor data [3].

Smart farming research aims to develop a decision-making support system for farm management. Smart farming claims that the problems of population development, climate change and labour that have received a great deal of technical attention, from crop planting and watering to health and harvesting, need to be tackled. A system for monitoring the crop field with the aid of sensors (light, humidity, temperature, soil moisture, etc.) and automating the irrigation system is installed in IOT-based smart agriculture. In an agricultural sense, IOT (Internet of Things) refers to the use of sensors, cameras, and other devices to translate into data every aspect and activity involved in farming. In order to grow and evolve from what it currently is, farmers need smart agriculture, since this activity would greatly reduce the

negative environmental externalities of modern agriculture. Smart cities use devices such as connected sensors, lights, and metres from the Internet of Things (IOT) to capture and analyse data. This knowledge is then used by cities to develop infrastructure, public utilities and facilities, and more. For farmers, understanding technical terminology and the use of technology is difficult for them, and it is also a cost-effective sector. It should utilize minimum resources in terms of hardware and cost. This overcomes the manual operations required to monitor and maintain the agricultural farms in both automatic and manual modes. It should be able to measure the increase or decrease in level of water as well as moisture in the soil.

II. IMPLEMENTATION OF IOT IN THE FIELD OF SMART AGRICULTURE

By 2050, the global population is expected to hit 9.6 billion, which presents a major challenge for the agricultural industry. Despite addressing problems such as severe weather conditions, growing climate change, and the environmental effects of agriculture, the demand for more food must be met. Agriculture has to turn to modern technologies to fulfil these rising needs. The new IOT-based smart farming applications will allow the agricultural industry to reduce waste and increase productivity. It is the application in agriculture of modern ICT (Information and Communication Technologies). In IOT-based smart farming, a device is constructed with the aid of sensors to track the crop area (light, humidity, temperature, soil moisture, etc.). Farmers from anywhere can track the field conditions.

A. Implementation of Soil moisture sensor in smart agriculture: -

Soil humidity sensors measure the volumetric content of water in the soil. Reflected microwave radiation is influenced by the moisture in the soil and is used in hydrology and agriculture for remote sensing. Farmers or gardeners may make use of portable probe equipment. Sensors for soil moisture help effective irrigation management. Good management of irrigation produces healthier crops, utilizes less inputs, and improves profitability. Soil moisture sensors allow irrigators to know what is happening in a crop's root zone.

B. Implementation of Water Level Sensor in smart agriculture: -

Water source is necessary and an important factor in agricultural and farm production and is a key to our quality of life as well. In agriculture, controlling the water level of a water supply, such as the water tank or bore well, etc., plays a key role. A water source's water level control, such as a water tank or bore well, etc., plays a vital role in the management of water. It is possible to keep track of the water level in a water supply to conserve water and to research the age of the water. The control of the level of water is therefore an important activity in agriculture. In this prototype experiment, the Arduino UNO board and Ethernet shield for Internet connectivity are used in the proposed framework. In this prototype, the water level sensor is only used for demonstration purposes.

To provide efficient decision support system using wireless sensor network which handle different activities of farm and gives useful information related to farm. Information related to Soil moisture, Temperature and Humidity content. Water level rise Farmers get a lot of distractions due to the weather conditions, which is not ideal for agriculture. The water level is handled by farmers using the mobile application in both Automatic/Manual. It will make farmers more relaxed. It takes a lot of time to cultivate agriculture. Monitoring of soil moisture using IoT enabled Arduino sensors with neural networks to boost soil conservation for farmers and to forecast seasonal rainfall in North Karnataka, India, to prepare future harvests. The data was transmitted to the Web server servers using a Wi-Fi module. But in real life, Wi-Fi is hard to find in the field of agriculture. And there are several other related works that use IoT technology to make the conventional agricultural system intelligent [4].

III. CONCLUSION & DISCUSSION

In olden Days Farmers used to figure the ripeness of soil and influenced suspicions to develop which to kind of yield. They did not think about the humidity, water level and especially climate condition that increasingly horrible a farmer The Internet of Things (IOT) is remodeling the agribusiness enabling farmers to deal with challenges in the field through the wide range of techniques, for example, accuracy as well as realistic farming. IOT modernization helps to assemble information on conditions such as atmosphere, humidity, soil temperature and fruitfulness, crop web-based examination enables wild plant discovery, water level, position of bugs, disturbance of creatures in the field, creation of trims, horticulture. IOT uses farmers from wherever and at any point to get linked to his home. For monitoring the homestead conditions, remote sensor systems are used and smaller scale controls are used to manage and mechanize the home shapes. Remote cameras have been used to see conditions such as photos and video remotely. The development of IOT will reduce the cost and update standard development efficiency.

IV. REFERENCES

- [1] R. M. S. KUMAR, "IoT BASED SMART AGRICULTURE MONITORING FRAMEWORK WITH AUTOMATION," *i-manager's Journal on Embedded Systems*, vol. 6, no. 2, p. 22, 2018, doi: 10.26634/jes.13.2.13982.
- [2] P. Lashitha Vishnu Priya, N. Sai Harshith, and N. V. K. Ramesh, "Smart agriculture monitoring system using IoT," *International Journal of Engineering and Technology(UAE)*, vol. 7, no. 4, pp. 308–311, 2018, doi: 10.14419/ijet.v7i2.7.10603.
- [3] M. Parashar, *Candidate Declaration "Iot Based Smart Agriculture Monitoring System,"* no. 151042. .
- [4] A. Nayyar and V. Puri, "Smart farming: Iot based smart sensors agriculture stick for live temperature and moisture monitoring using arduino, cloud computing & solar

technology,” *Communication and Computing Systems - Proceedings of the International Conference on Communication and Computing Systems, ICCCS 2016*, no. November 2016, pp. 673–680, 2017, doi: 10.1201/9781315364094-121.