

**Ideation phase  
Literature Survey**

Team ID	PNT2022TMID51472
Project Name	Smart Farmer-IOT Enabled Smart Farming Application
Maximum Mark	2 Marks

## **IOT ENABLING SMART FARMING APPLICATION**

### **Abstract**

The Internet of Things is the hot point in the Internet *field*. The concepts help to interconnect physical objects equipped with sensing, actuating, computing power and thus lends them the capability to collaborate on a task in unison remaining connected to the Internet termed as the "Internet of things" IoT. With the help of sensor, actuators and embedded microcontrollers the notion of smart object is realized. Wherein these smart objects collect data from the environment of development, process them, and initiate suitable actions. Thus, the Internet of things will bring hitherto unimaginable *benefits* and helps humans in leading a smart and luxurious life. Because of the potential applications of IoT (Internet of Things), it has turned out to be a prominent subject of scientific research. The importance and the application of these technologies are in sizzling discussion and research, but on the *field* of agriculture and forestry, it is quite less. Thus, in this paper, applications of IoT on agriculture and forestry has been studied and analyzed, also this paper concisely introduced the technology IoT, agriculture IoT, list of some potential applications domains where IoT is applicable in the agriculture sector, *benefits* of IoT in agriculture, and presents a review of some literature.

### **INTRODUCTION**

Most important factors for the quality and productivity of plant growth are temperature, humidity and light. Continuous monitoring of these environmental variables provides valuable information to the grower to better understand, how each factor affects growth and how to maximize crop productiveness.

flexibility, cost, autonomy and robustness compared to wired ones. Moreover, with the onset of IoT and M2M communications, it is poised to become a very significant enabling technology in many sectors, like military, environment, health, home and other commercial areas . IoT is a general term, covering a number of technologies that allows devices to communicate with each other, with or without human intervention. This paper presents a novel approach to implement wireless greenhouse automation and monitoring system which in a timely manner provides a

possibility for screen monitoring of detailed data about the conditions of the greenhouse. Furthermore, the suggested setup can be incorporated with other internet and messaging services (i.e. Web, WAP, SMS) to provide communication for farmers. The wireless sensor network (WSN) is one of the most significant technologies in the 21st century and they are very suitable for distributed data collecting and monitoring in tough environments such as greenhouses.

## **Arduino**

The Arduino UNO is a widely used open-source microcontroller board based on the ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board features 14 Digital pins and 6 Analog pins.

## **Soil Moisture Sensor**

The Moisture sensor is used to measure the water content (moisture) of soil. When the soil is having water shortage, the module output is at high level else the output is at low level. This sensor reminds the user to water their plants and also monitors the moisture content of soil. It has been widely used in agriculture, land irrigation and botanical gardening

## **LITERATURE SURVEY**

In the literature there are numerous examples of versatile IoT application-oriented studies. In an example of control networks and information networks integration with IoT technology has been studied based on an actual situation of agricultural production. A remote monitoring system with combining internet and wireless communications is proposed. Furthermore, taking into account the system, an additional information management sub-system is designed. The collected data is provided in a form suitable for agricultural research facilities. In their work Liu Dan et al. Take a CC2530 chip as the core and present the design and implementation of an Agriculture Greenhouse Environment monitoring system based on ZigBee connectivity. Additionally, the wireless sensor and control nodes take CC2530F256 as a core to control the environment data. This system comprises front-end data acquisition, data

processing, data transmission and data reception. The ambient temperature is real-time processed by the temperature sensor of the terminal node and is send to the intermediate node through a wireless ZigBee based network. Intermediate node aggregates all data, and then sends the data to the PC through a serial port. At the same time, staff may view, and analyze the data, storage of the data on a PC is also provided. The realtime data is used to control the operation of fans and other temperature control equipment and achieve automatic temperature control in the greenhouse. Kun Han et al. Proposed the design of an embedded system development platform based on GSM communications. Through its application in hydrology monitoring management, the authors discuss issues related to communication reliability and lightning protection, suggest detailed solutions, and also cover the design and realization of middleware software

Greenhouse technology was started by Dr APJ Abdul Kalam with the help of Swaminathan. It was first started in Leh-Ladakh to grow vegetables for the defence during extreme climatic conditions.

A greenhouse (also called a glasshouse) is a structure with walls and roof made chiefly of transparent material, such as glass, in which plants requiring regulated climatic conditions are grown.

## **1. PROBLEM STATEMENT**

This paper focused on a basic trade that is Agriculture, which is closely related to the welfare of any nation and the people's livelihood. In India, Agriculture sector is shrinking day by day which disturbs the ecosystem's production capacity. There is a burning requirement to resolve this problem in the area to reestablish vitality and place it back on higher progression.

The reemerging of the worldwide recession has caused flows across both the developed and the developing economies. Agriculture domain required to be more competent and irrepressible to ensure universal food security. Farmers of India are at excessive detriment in terms of technology, size of farms, government policies, trade, etc. The Internet of Things technology can diminish some of the problems of Indian farmers.

While in the world, agriculture is experiencing industrialization, it is very significant to develop "agricultural information network". Agricultural information network has become the trend of enlargement for the world's agriculture. In concern of the Indian agriculture development, "agricultural information network" is a major concern in stimulating agricultural development and its transformation. In India, there are many problems in the

agricultural information system. For example, here more importance is given to hardware instead of software and cannot deliver high eminence information to get production requirements of farmers. Besides, information is not adequately used by the farmers of India and the influence of information on a rural area, agriculture, and farmers are not remarkable.

The demand and supply of agricultural products has not been controlled properly, because of the demand and the consumption of the agricultural crops could be anticipated quantitatively, nevertheless, the deviation in crop and production by the weather change, change in cultivated area of farms, damage by insects, disease in crop, etc., could not be truly predicted. To change this situation and endorse the speedy development of agricultural information network, it is required to use the Internet of Things to appreciate smart agriculture.

## **2. Applications of IoT in Agriculture**

In the domain of digital Agriculture, IoT supports a variety of applications like soil and plant monitoring, crop growth observing and selection, precision agriculture, irrigation assessment support, greenhouse environment monitoring and control systems, monitoring of food supply chain etc. Following are the established technologies that are used in applications of IoT in agriculture:

*Sensor Technology in Agriculture:* Vast variety of sensors are used in agricultural products such as soil moisture sensors, water-level sensors, equipment used to sample the state of the atmosphere at a given time meteorological sensors (monitors the current state of atmosphere), heavy metal detection sensors, biosensors (detection of an Analyte), gas sensors (detects presence of gas), and so on.

*RFID Technology:* RFID is extensively used in animal tracking and identification. It helps to achieve intelligent monitoring, recognizing, traceability of animals, and their management.

*Radio Transmission Technology in Agriculture:* Self-organizing wireless data transmission can be achieved with ZigBee wireless sensor networks. In large-scale farming, it has been widely used for data transmission.

*Intelligent irrigation Technology:* Based on satellite positioning network and “shallow wells underground cables + field + automatic irrigation system pipe” [technology, it can accumulate irrigation water, irrigation, electricity, and time data to accomplish automation of farmland irrigation and through a complete analysis of information technology software to monitor irrigation.

*Technical Quality Safety of Agricultural Products:* In the agricultural industrial chain (production–circulation–sales), recording and monitoring of the chain can understand the entire procedure of regulation.

*Precision Seeding and Spraying Techniques:* Depending on the technology combined with Global Positioning System (GPS) navigation technology, seeding technology, and fertilization at a variable rate, it can achieve identical implementation of the spraying, planting, and refining the consumption of pesticides, seeds, and so on.

### **3. Benefits of IOT in Agriculture**

There are various benefits and advantages to use IoT in agricultural sector some of the benefits are as follows:

*Efficiency of input:* It will improve the efficiency of inputs of agriculture like Soil, Water, Fertilizers, Pesticides, etc.

*Cost reduction:* It will reduce the cost of production. *Profitability:* It will increase the profitability of farmers. *Sustainability:* Improves sustainability.

*Food safety:* It will help to accomplish the Food Safety Mission.

*Environment protection:* It plays important role in the environment protection.

### **Conclusion**

Issues regarding agriculture, rural area, and farmers have been always deterring India's growth. Agricultural modernization is the only solution to these three problems. Still, India's agriculture is far away from modernization. The use of IoT in agricultural modernization will possibly solve the problems. Based on features of IoT and cloud computing, cloud service, SOA (service-oriented architecture) and visualization technologies can generate huge data involved in agricultural production. RFID with IoT technologies can help to build plant factory that can control agricultural production automatically. A perfect use of modern technology and IoT and blend of them can stimulate the rapid development in the modernization of agricultural system. Use of smart IoT in agriculture could effectually solve the issues concerning farmers, agriculture, and rural area.

According to the above analysis, information technology personnel and agricultural scientist should be encouraged to exchange ideas. Especially, those personals understand

planting and understand IT can innovate and promote the modernization of farming.

Modernization of farming can improve agricultural production and management, the goal of environmental protection and energy saving could be achieved. By using IoT in agricultural, farmers would be able to understand the current choice of agricultural soil, they would be able to know which crops are appropriate for farming in the current stage, other environmental information of farmland, through intelligent analysis and better management.