**Smart Farming**

**SmartFarmer - IoT Enabled Smart Farming Application**

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**ABSTRACT**

IoT innovative farming solutions are a system built for monitoring the crop field with the help of sensors (light, humidity, temperature, soil moisture, crop health, etc.) and automating the irrigation system. The farmers can monitor the field conditions from anywhere. The IoT is a network of interconnected devices that can transmit and receive data over the internet and carry out tasks without human involvement. Agriculture provides a wealth of data analysis parameters, resulting in increased crop yields. The use of IoT devices in intelligent farming aids in the modernization of information and communication.

**INTRODUCTION**

The next era of Smart Computing will be totally based on the Internet of Things (IoT). Internet of Things (IoT), these days is playing a crucial role in transforming “Traditional Technology” from homes to offices to “Next Generation Everywhere Computing”. “Internet of Things” (Weber, R.H, 2010) is gaining an important place in research across the nook and corner of this world, especially in the area of modern wireless communications. The term, Internet of Things (Suo et al, 2012) refers to uniquely identifiable objects, things, and their respective virtual representations in the Internet structure which was proposed in the year 1998. Internet of Things (IoT) technology has brought a revolution to each and every field of the common man’s life by making everything smart and intelligent. IoT refers to a network of things that make a self-configuring network. The development of Intelligent Smart Farming IoT-based devices is day by day turning the face of agriculture production by not only enhancing it but also making it cost-effective and reducing wastage. The aim/objective of this paper is to propose a Novel Smart IoT-based Agriculture Stick assisting farmers in getting Live Data (Temperature, Soil Moisture) for efficient environment monitoring which will enable them to do smart farming and increase their overall yield and quality of products. The Agriculture stick being proposed via this paper is integrated with Arduino Technology, Breadboard mixed with various sensors, and a live data feed can be obtained online from Thingsspeak.com. The product being proposed is tested on Live Agriculture Fields giving high accuracy of over 98% in data feeds. Keywords: Internet of Things (IoT), Agriculture, Agriculture IoT, Agriculture Precision, Arduino Mega 2560, DS18B20 Temperature Sensor, Smart Farming, Soil Moisture Sensor, Cloud Computing, Solar Technology, ESP8266, Thingspeak.com of Things was discovered by “Kevin Ashton” (Weber, R.H, 2010) in 1999 with regard to supplying chain management. These days, the strength and adaptability of IoT have been changed, and nowadays it is being used even by a normal users. From the point of a normal user, IoT (Ashton, 2009) has laid the foundation for the development of various products like smart living, e-health services, automation, and even smart education. And from a commercial point of view, IoT these days is being used in business management, manufacturing, intelligent transportation, and even agriculture

IoT-Based Software Applications Used in Agriculture IoT-based technologies have been successfully adopted in different contexts. Due to this fact, several companies are investing in IoT-based software development for agriculture. Nowadays, there are several software products available in the market focused on supporting different agricultural processes. For instance, AG-IoT [23] is an unmanned aerial vehicle that locates and assists IoT-based devices available on the ground to form groups for the transmission of data. On the other hand, Agro 4.0 [38] implements high-performance computational methods, a sensors network, connectivity between mobile devices, cloud computing, and analytical methods to process large volumes of data and provide decision support systems. Agro-Tech [39] records, stores, and updates the data obtained from various sensors available in a specific area of the crop. Also, this software allows farmers to access this information aiming to monitor their crop. Malthouse [31] is an Artificial Intelligence system that allows prescribing configurations and schedules in precision farming and food manufacturing areas.

**Benefits of IoT in Agriculture**

The main benefits of IoT in agriculture identified in this literature review are briefly described below.

• Community agriculture in urban and rural areas takes advantage of hardware and software resources and large amounts of data.

• Logistic and qualitative traceability of food production that allows reducing costs and the waste of inputs through the use of real-time data for decision making.

• Generation of business models [31] in the agricultural context that allow establishing a direct relationship with the consumer.

• Crop monitoring that allows reducing costs as well as the theft of machinery.

• Automatic irrigation systems [41] that work according to temperature, humidity, and soil moisture values that are obtained through sensors.

• Automatic collection of environmental parameters through sensor networks for further processing and analysis.

• Decision support systems that analyze large amounts of data to improve operational efficiency and productivity

The Internet of Things (IoT) is the internet-based connectivity of a huge number of devices (IoT). A unique identity links each item, allowing data to be sent without human involvement It makes it possible to develop strategies for improved natural resource management. Smart gadgets with sensors, according to the IoT concept, enable interaction with the physical and logical worlds. The proposed system in this study is built on the Internet of Things and uses real-time input data. Over a wireless sensor network, a smart farm irrigation system uses an Android phone to remotely monitor and regulate drips. Between sensor nodes and base stations, Zigbee is utilised to communicate. A web-based java graphical user interface is used to process and present the server's real-time observed data. Field irrigation system wireless monitoring eliminates human interaction and enables for remote monitoring and control using an Android phone.

Cloud computing is a potential choice due to the large volume of data created by the wireless sensor network. This research presents and examines a cloud-based wireless communication system for monitoring and controlling a collection of sensors and actuators in order to determine the water needs of plants.The concept of automating agricultural production has been around since the early 1990s, and one of the primary challenges that both scientists and farmers confront is irrigation. Irrigation is a dynamic system that is heavily reliant on outside influences. This article describes a method that uses a custom-built mathematical model to handle data from wireless sensors on Google Cloud, resulting in a smart system. An IoT-enabled design that can scale up to big farms. According to Holistic Agricultural Studies, around 35 have been damaged by animals and people. This intelligent system uses the Tensor flow and deep learning neural networks to recognize animals depending on their threat level, as well as human intruders who are not authorized on the farm and to alert the farmer immediately. An android application is included with the device, which allows for remote access and surveillance through live video streaming.

**CONCLUSION**

IoT Based Agriculture Stick for Live Monitoring of Temperature and Soil Moisture has been proposed using Arduino, Cloud Computing, and Solar Technology. The stock has high efficiency and accuracy in fetching the live data of temperature and soil moisture. The Agriculture stick being proposed via this paper will assist farmers in increasing the agriculture yield and take efficient care of food production as the stick will always provide a helping hand to farmers for getting accurate live feed of environmental temperature and soil moisture with more than 99% accurate results.

**FUTURE SCOPE**

Future work would be focused more on increasing sensors on this stick to fetch more data, especially with regard to Pest Control and by also integrating GPS module in this IoT Stick to enhance this Agriculture IoT Technology to a full-fledged Agriculture Precision ready product.

**REFERENCES**

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