SMARTFARMER-IOT ENABLED SMART FARMING APPLICATION

Abstract-In this project, we are going to build a **Smart Farming System using IoT**. The objective of this project is to offer assistance to farmers in getting Live Data (Temperature, Humidity, Soil Moisture, Soil Temperature) for efficient environment monitoring which will enable them to increase their overall yield and quality of products. This smart agriculture using IoT system powered by node MCU consists of a DHT11 sensor, Moisture sensor, DS18B20 Sensor Probe, LDR, Water Pump, and 12V led strip. When the IoT-based agriculture monitoring system starts, it checks the Soil moisture, temperature, humidity, and soil temperature. It then sends this data to the IoT cloud for live monitoring. If the soil moisture goes below a certain level, it automatically starts the water pump. We previously build Automatic Plant Irrigation System which sends alerts on mobile but doesn't monitor other parameters. Apart from this, Rain alarm and soil moisture detector circuit can also be helpful in building Smart Agriculture Monitoring System.

Keyword-IOT based smart farmer, sensor, moisture detector, rain alarm, smart farming.

I. INTRODUCTION

The evolution of Internet of Things (IoT) has enabled the vision of smart farming by improving productivity, increasing crop yields and profitability by reducing the environmental footprint. Sensors are installed in the fields to monitor the temperature, pH and moisture levels of the soil, precipitation, leaf water potential, fertiliser presence and soil morphology. This data is transmitted back to the cloud for further analysis. Traditional farming would be focused on acres of land, making general decisions based on historical data, experience and 'feel'. These decisions could determine the use of fertiliser, irrigation, pesticides and harvesting. With the advent of IoT, Smart Agriculture and precision farming utilise sensors, GPS, mapping and data analytics to provide accurate, real-time insights that you can use to tailor your activity and investment for maximum return. Systems can recommend calibrated doses of fertiliser, targeted irrigation and early identification of diseases or substandard conditions. Intelligent software can make recommendations, trigger alarms and allow you to visualise the data. You can access the reports and insights using a web browser, mobile or tablet device.

II. LITERATURE REVEIW

[1] Andreas Kamilaris, Feng Gao, Francesc X. Prenafeta-Boldu and Muhammad Intizar Ali "Agri-IoT: A Semantic Framework for Internet ofthings-enabled Smart Farming Applications."

With the recent advancement of the Internet of Things (IoT), it is now possible to process a large number of sensor data streams using different large-scale IoT platforms. These IoT frameworks are used to collect, process and analyse data streams in real-time and facilitate provision of smart solutions designed to provide decision support. Existing IoT-based solutions are mainly domain-dependent, providing stream processing and analytics focusing on specific areas (smart cities, healthcare etc.). In the context of agri-food industry, a variety of external parameters belonging to different domains (e. g. weather conditions, regulations etc.) have a major influence over the food supply chain, while flexible and adaptive IoT frameworks, essential to truly realize the concept of smart farming, are currently inexistent. In this paper, we propose Agri-IoT, a semantic framework for IoT-based smart farming applications, which supports reasoning over information sources and linked open datasets and streams available on the web. various heterogeneous sensor data streams in real-time. Agri-IoT can integrate multiple cross-domain data streams, providing a complete semantic processing pipeline, offering a common framework for smart farming applications. Agri-IoT supports large-scale data analytics and event detection, ensuring seamless interoperability among sensors, services, processes, operations, farmers and other relevant actors, including online information sources and linked open datasets and streams available on the web.

[2] Reuben Varghese and Smarita sharma "Affordable Smart Farming Using IoT"—2018.

Each year many crops go waste due to a lack of optimal climatic conditions to support crop growth. Losses to the tune of over 11 billion dollars are reported each year in India alone. In this paper, we develop an affordable system which when deployed will give an insight into the real time condition of the crop. The system leverages Internet of Things (IoT) and Machine learning to produce an affordable smart farming module. This system uses state-of-the-art methods in order to improve the accuracy of the results and automate the monitoring of crops thereby requiring minimal human intervention. IoT is used to connect the ground module which includes the sensors to the cloud infrastructure. In the cloud, machine learning based real-time analytics is performed to predict the future condition of the crops based on its past data.

[3] Nahina Islam, Biplob Ray and Faezeh Pasandideh "IoT Based Smart Farming: Are the LPWAN Technologies Suitable for Remote Communication?" --2022

The Internet of Things (IoT) has changed the definition of smart farming and enhanced it' s capabilities to monitor and assess crop and soil quality; to plan planting locations to optimize resources and land area. The Low-Power Wide-Area Network (LPWAN) technologies have enhanced these capabilities by increasing the wireless communication range, by eliminating the dependency of Backhaul networks and by reducing power consumption. In this paper, we have presented an experimental analysis of LPWAN literature with the support of simulation and actual implementation of a Long-Range Wide Area Network (LoRaWAN) based IoT network for smart farming. Based on our evaluation and experiment of the existing work and the practical implementation of IoT based smart sprinkler using LoRaWAN communication protocol, this paper has presented a comparison and evaluation of different LPWAN technologies for remote smart farming. The empirical equation of wireless communication range of LoRaWAN gateways and power consumption model of LoRaWAN end devices helped us to determine that, the LoRaWAN communication system enables an IoT network to be deployed over 10 kilo meters wirelessly in remote settings without being dependent on a Long-Term Evolution (LTE-4G/5G) or other backhaul network and the end devices consume as low energy as only 15.36mAh per day.

[4] Jinsuk Baek, Munene W. Kanampiu "A Strategic Sensor Placement for a Smart Farm Water Sprinkler System"—2021.

Internet of Things (IoT) networking has attracted research with many emerging applications requiring remote control and automation. Effective deployment of IoT sensors is a major concern since it primarily determines the performance of the IoT network. Since multiple mobile sensors are generally involved, it is possible that the sensors are randomly distributed in a remote region at the initial phase then later relocated to some pre-computed optimal location with their full autonomy enabled. In this paper, we propose a computation for the optimal location of water sprinkler sensors of an IoT smart farm network in terms of the relative physical distance between them. The resulting sensor's locations ensure minimal overlap coverage area and no uncovered area exists in the candidate farming region. With the proposed strategic deployment of smart water sprinklers sensors, farmers can be assured of the right water distribution for any given area of their farm.

[5] Nattapol Kaewmard and Saiyan Saiyod "Sensor Data Collection and Irrigation Control Using Smart Phone and Wireless Sensor Networks for Smart Farm" –2014.

Feeding of the world in the 21st century is the biggest challenge, especially for smart farm business. The smart farm has used agriculture automation system instead of traditional agriculture. Traditional agricultural methods employed by the local people are highly sustainable, although the all-inclusive cost is not cheap. Our research goal is to provide long term sustainable solution for automation of agriculture. Agriculture automation has several methods to getting data from vegetable crop like sensor for environmental measurement. Therefore, we developed a portable measurement technology including soil moisture sensor, air humidity sensor and air temperature sensor. Moreover, irrigation system using wireless sensor network has installed these sensors, with the purpose for collecting the environment data and controlling the irrigation system via smart phone. The purpose of the experiment is to find better ways of controlling an irrigation system with automatic system and manual control by smart phone. In order to control an irrigation system, we have developed the communication methodology of the wireless sensor network for collected environment data and sending control command to turn on/off irrigation system. It is successful for controlling the irrigation system and controlling the water near the vegetable roots. In this paper, we have attempted to demonstrate the automation of the irrigation system that is useful for farm business which make it comfortable than using traditional agriculture by using smart phone for monitoring and controlling the system. Accordingly, in the long-term has reduced cost as well. The experimental result shows that the accuracy of sending and receiving command control for irrigation system is 96 percent and accuracy of environment collection is 98 percent.

III. PROS

Can monitor from anywhere. Easy to control the motor pump to water the crop as per the need. Easy to sense the humidity, soil moisture and temperature.

IV. CONS

Farmers cannot know if the application does not work properly. If the farmer is far from the crop field, it is difficult for him to monitor and control. Farmers cannot detect if any sensors are damaged.