IoT has enabled smart farming:

IoT technology has created a revolution in our modern world, enhancing every field in every man's life and upgrading everything as smart by making smart decisions and implementing work in a better way.

For the development of agriculture, IoT technology brings day to day devices that are used in agricultural production by making them cost effective and reducing waste.

The aim of this survey is to propose an IoT based project that assists the farmers by extracting the efficient environment monitoring factors in agriculture that is essential part of the overall yield and the quality of the product.

Since the global population has been predicted to exceed 9.6 billion by 2050, which poses a big problem for the agricultural fields. In spite of overcoming the challenges such as extreme weather conditions, rising climate change and the farming environmental impact, the demand for food is very much increased.

1. Soil moisture sensor:

Soil moisture sensors measure the water content level available in the root region from the reflected microwave radiation where the information is collected for the analysis of the condition of the soil in remote for the perfect yield of the crop that are cultivated. The portable probes can be used by farmers or gardeners.

The data available can be used for better irrigation management. The improved irrigation pattern leads to the production of increased crop growth, increased profitability with fewer inputs. The soil moisture sensor helps the farmers with a better understanding of water content in the root area of the plants.

2. Water level sensor:

Water is a necessary factor for farm production and is the key to our quality of life as well. Monitoring the level source such as water tank or borewell. The tracking of the water source can be used to preserve water usage. Thus, monitoring the water level is important in smart farming. Above, resources can be implemented on the Arduino uno with the internet and the cloud resources provided.

3. Ph sensor:

The PH sensor is used to monitor the accurate nutrients present in the soil, which is essential for irrigation. By monitoring the Ph value, the quantity of the nutrients supplied to the soil and the crop for their healthy growth will be in a perfectly controlled manner. Maintaining the soil PH at the optimal rate is essential for getting the crop yield[2].

4. Humidity sensor:

This sensor is utilized to sense the comparative humidity level in the air. It measures the actual air temperature and the moisture ratio of air. Humidity is concerned agriculture directly or indirectly in multiple ways of the plant leaf growth, pollination, photosynthesis, etc. Leaf development does not depend only on the

photosynthesis process, it also depends upon the physical process of the cell growth, which can be monitored via humidity sensors[3].

Challenges faced in IoT smart farming:

Many researchers have worked on the IoT agriculture system and resolved the multiple technological problems and the architectural issues by implementing and designing various solutions. According to the research point of view, there are several challenges that need to be addressed. The challenges are linkage with the IoT smart deployment and the applications[4].

Hardware challenges:

Several challenges arise in IoT's smart farming setup. First of all, the equipment which exists in the perception layer is directly exposed to harsh environments such as rain, high temperatures, extreme humidity, hard winds and many other possible dangers that may damage electronic equipment. End devices work consistently for a long period and will require a continuous power supply. So suitable programming tools and less power potential are necessary[5].

Networking Challenges:

Due to the high cost of wiring, wireless communication is the most important for the implementation of IoT-based smart farming. Physical deployment shows that the accepted transceiver's performance is exaggerated by human presence, temperature, humidity and many other barriers inside the space where wireless devices or node wants to communicate. Since the usage of the most reliable and robust technologies should be used for the transferring of data according to the environmental challenges and the rural conditions.

IoT smart farming platforms:

IoT agricultural architecture is more complicated as it requires real-time monitoring systems with additional optimized and efficient device requirements[6]. Because of that, a service- oriented approach (SOA) can also be used to build a suitable platform; such services can be exploited by using different API’s. In addition to that, the appropriate frameworks and libraries should be developed so that agricultural developers can make use of available documents, classes, code and other useful data[7].

Conclusion:

All over the world, researchers are exploring technological solutions to enhance their agricultural productivity by exploiting services by developing the IoT technology. Hence, we discussed the agricultural platforms, sensor devices employed to monitor various solutions to monitor the factors for improving crop growth and the IoT agricultural challenges for better understanding of the IoT smart farming. Finally, it is expected that this comprehensive survey results in a very useful piece of information for the agriculturalists and the policy makers who are participating and working in the IoT field and agricultural technologies.

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