A Comprehensive Literature Review on Internet of Things In Agriculture

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Abstract- *Water is considered as the most critical resource for the most sustainable agricultural farming. In India the rate of farmers getting reduced continuously because of water scarcity. The number one problem is water for farming.Tamilnadu is in the area where the mean rainfall is 1100 to 1200 mm, while mean annual evaporation is 2190 to 2930 mm in different seasons depending on sunlight. The rate of reduction in water –level made the agricultural farms to be viewed dried. Many water management techniques have been used to save water even though many farms fields are seen to be dried. Software-based solutions for conserving water while enhancing agricultural productivity consists of several interdependent technologies. Water management applications which embrace the internet of things, mobile applications, big data analytics and DSS (Decision Support System) serve to produce eco-friendly and optimized farming outputs for a growing population.*

Keywords- IoT, Mobile applications, big data analytics, DSS.

I. INTRODUCTION

IoT is an extension of internet connectivity within physical devices and external objects. These devices can communicate over the internet and also can be remotely monitored and controlled. The role of IoT in agriculture made many conflicts of agriculture easier for the farmers. Smart agriculture has been evolving in India for the increase in production of crops.

Water management using IoT became the most useful solutions in agriculture. India faces water scarcity in recent days. Many farmers died because of water scarcity. Indian government taking many steps to reduce the water scarcity.

Mobile applications with the collaboration of IoT may produce better results in the productivity of agricultural crops. Technology gives various results for the development of the nation. First, we may know what agriculture is and how water plays a vital role in agriculture.

Agriculture is a process of producing foods like seeds, rice, millet, etc. For the consumption of humans and the domestic animals (livestock).agriculture is the key development in the rise of human civilization. The history of agriculture started 10,000 years ago. After gathering wild grains beginning at least 105,000 years ago, farmers began to plant them around 11,500 years ago. Major agricultural products are grouped into foods, fibers, fuels, and raw materials (as like rubber). Agriculture has been very successfully capturing the major share of the world's exploitable water resources.in crop agriculture; water is the most important climatic factor which helps in the growth of crops. Its availability, or scarcity, can mean a successful harvest, or total failure in yield of crops.

Water has the unique characteristics that determine both its allocation and use it as a resource by agriculture. Water provides goods and services that are utilized by the agriculture, industry, and households. The increasing demand for water in non-agricultural uses is increasing in response to the economic growth, rising population, and increased urbanization. Rising urban demands for water pose a particular threat to agriculture because the urban demands for water take most priority over rural demands. This is because of the urban supplies gets highly polluted which can lead to high health risks.

Increasing demands for non-agricultural usage of water are coinciding with constraints for further development of new water sources.in combinations, these two factors creating increased water scarcity.in terms of future demands in developing countries, non-agricultural demand for water in the forecast to increase by 100 percent between 1995-2025 and agricultural demand to rise by the 12 percent. In a situation of growing water scarcity and rising demands for non-agricultural use of water, reassessment of sectoral allocations of water are inevitable.

II. IoT FOR AGRICULTURE

SENSORS:

IoT sensors are programmed to be used in the way to collect data virtually from any environmental component. Water management sensors could collect data or information

like individual plants water usage, total water usage, soil condition, climatic prediction and more. These data points will be processed to compose are responding with automated actions, which will optimize the entire water system. Sensor is programmed using a language called java or c, with the addition of protocols connecting the sensors to network more enough for the whole farmland.

NETWORKS:

IoT networks consist of four layers such as sensors, gateways communication architecture and central repository for collecting data. Many agricultural platforms rely on to leverage agricultural wireless communications and a repository that is accessible from any devices such as mobile phone, tablets. Common wireless applications for agricultural networks are cellular, satellite and Low Power Wide Area Networks (LPWAN).The communication architecture links together sensors data to the final cloud repository and is facilitated by gateways designed to pre-process data and increase the overall efficiency of the system.

LPWAN architecture has a special mention while discussing water management applications. More processes related to water usage and distribution can be analyzed by sensors, a low power, a low power solution with the larger range provides additional energy-saving benefits. Sensors no need to enlarge the bandwidth that can be provided by cellular or satellite networks, thus LPWAN's low bandwidth a non-issue.LPWAN gives an IoT network programmed to decrease energy cost and increase data usage.

GATEWAYS:

As mentioned before gateways provide several enhancements to the IoT system such as battery life conservation, data pre-processing and enhanced security. Gateways act as intermediate data hubs where the sensors can data can travel with the high speed to be processed by the pre-programmed rules, and the further sent through the remainder of the network to the ultimate central repository. This eliminates the hacking opportunities as a whole, with the stipulation that the gateways themselves must be protected by the security encryption.

III. MOBILE APPLICATION FOR WATER MANAGEMENT

Smartphones and tablets based water management app with synchronization to cloud allow farmers to mention the water needs remotely. Working with hand-held devices helps the rural people to keep all data up-to-date. Remote control feature makes easier when there is a need for water when they away from the field.

Water management apps are programmed with the few main points: wireless connectivity, user interface, and custom controls. Older mobile applications used up with the cellular networks may available to the rural area peoples, which necessitated mobile apps designed to function via cloud connectivity. These apps also rely on GPS, time, and date arguments to give accurate real-time data to the end-users.
UI and custom controls are decided by the user or providers with certain workflow in mind. Standard to all app user interface and features are perfect design and tools that integrate with other which supports the water management software.

IV. BIG DATA ANALYTICS, REPORTING & DECISION SUPPORT SYSTEM (DSS)

Thinking the dimensions of the foremost agricultural systems and corresponding information needs, water management results may be able to method whole a lot, thousands or maybe countless information reckoning on the dimensions of the farmland and the number of data resources Big data software application collects and manages data from the combination of resources, processes quickly, and creates comprehensive, analytical reports to assist in decision making programming water conservation apps to handle big data demand includes developing software that collects and process every type of data utilize data mining techniques, and it will perform predictive or query-based tasks.

DSS(Decision Support System) which can be coded mainly for water management needs.DSS includes a graphical representation of data, integrations with supporting software applications, and comparisons between data sets, as needed for the development.

V. INTEGRATIONS OF ALL TECHNOLOGY

Water management applications should function in synchronization with the agricultural ecosystem. An irrigation system will use the data from IoT sensors combined with the geographical information provided by the satellite imaging central to the precision agriculture.

Crop management application, weather monitors, and necessary objects can even be integrated into water management applications for the read of all mutually beneficial processes required to maximize water potency. With integrations of al technology, water management processes can also be automated to handle the water

conservation methods, thus freeing up framers time to manage the manual tasks.

VI.FUTURE SCENERIO

The sensors placed can be damaged because of any disasters so it should be made strong. Low power consuming sensor devices must be used .Agriculture not includes the irrigation, it includes live hood, transport, and marketing. Nowadays IoT is used in tracking the live hood in that field; the sensors track them if any health issues occur for the live hood. But we can improve it by diagnosing the disease automatically and make an easy way of medication for it. Then IoT can be used to measure the amount (weight) of grains that is collected while threshing. Using the IoT devices we can make able to collect the recent updates of agri products marketing. Already there are sensors to intimate the farmer if the plats are infected, but we can make the sensors able to diagnose the disease and automatically search for the required pesticides and insecticides. Vehicles which are sent for marketing purpose can be tracked by the farmers. Selling of their products can be made known as a database by the farmers by using IoT devices

VII. CONCLUSION

Integration of IoT, mobile applications, big data analytic, and DSS serves the better water management system for the farmers. Water is the important factor of agricultural practices. Now-a-days water scarcity has become a more important issue in India. Mobile application development with the collaboration of IoT will produce better results of water management.it also help farmers to increase the productivity of crops and also to have a sustainable water resource for the cultivation of crops. Many applications have been developed for the water management system. This paper concludes that IoT in agriculture will give a more effective way of agriculture.

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