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Review on Smart Drip Irrigation and Fertigation using IOT & WSN

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Abstract— In agriculture, despite large-scale funding with extension of irrigation services and it is a major concern that many sectors are facing deficits in management of water. Irrigation system is one of the major aspects to be enriched meeting the economic and sustainable challenges of the farmers. Recent trends in the area of Wireless Sensor Networks (WSN) have influenced a wide implementation of various applications in the area of precise agriculture. WSNs for environmental condition monitoring with defined knowledge are used for estimating crop growth and yield properties. The proposed system automates the irrigation and fertigation using WSN to make comparatively high yield than the traditional methods. Irrigation scheduling is estimated by use of WSNs real time monitoring of weather and soil properties. The exigent need for solving the constraints, Evapotranspiration (ET) system is integrated with irrigation module which uses Penman-Monteith FAO-56 model for calculating crop water need. The disadvantages of traditional agricultural systems remove by utilizing water resource efficiently. As a result, the proposed system helps in water conservation to a great extent and also reduces soil erosion as only the required fertilizers are injected via the drip system. The paper also includes the implementation and results of surface drip irrigation and sub-surface drip irrigation are implemented in maize and sugarcane field respectively.

Keywords— *irrigation System, WSN, Crop Selection.*

I. INTRODUCTION

One such part is farming, where the mix of IOT gadgets, Image handling, Cloud processing and Google help gains a superior ground in a productive and powerful manner. The components of this joined innovation make things Possible by whenever anyplace in this world. With the consistent development in innovation today, the correspondences between individuals are decreasing while people are getting progressively associated with their gadgets. The Internet of Things is regularly eluded as Internet of Everything or the Internet of Intelligent Objects. A portion of the application spaces of IOT are in day by day life as advanced cells and control of home equipment's, and so on in transportation and portability, in workplace and furthermore in different areas, for example, social insurance, military, brilliant condition, observing and so forth. The significance of IOT is constantly expanding because of the development in fields like distributed computing, portable innovation and information examination. The couple of fundamental conventions utilized in the field of IOT are HTTP, MQTT, XMPP (Extensible Messaging and Preference Protocol), DDS, and AMQP (Advanced Messaging Queuing HTTP Stands for Hyper Text Transfer Protocol. Information must be moved in a tied down manner from versatile application to the cloud and HTTP will be utilized for this reason. At the point when Web administrations use REST (Representational State Transfer) engineering, they are eluded as RESTful APIs (Application Programming Interfaces). REST helps in decreasing vitality utilization and correspondence idleness. The REST web administration can be changed over to items to make it simple for control of web administration into synthesis. They use HTTP to convey the web server. Illustrative state move (RESTful) frameworks more often than not convey over Hypertext Transfer Protocol (HTTP) utilizing GET, POST, PUT, DELETE strategies which the internet browsers use to recover the website pages and send information to the remote servers. REST frameworks interface with web assets that can be identified by Uniform Resource Identifiers (URIs).

II. RELATED WORK

The results from paper [1] states that The controller exhibits the amount of hours it should work and different events it should water the field and the length between each cycle, ensuing to picking these parameters the status of the motor is to be picked. IOT based astute developing structure can finish up being incredibly useful for agriculturists since over and besides less water system isn't significant for creating. Edge respects for climatic conditions like stickiness, temperature, soaked quality can be settled in light of the organic states of that specific area. This structure makes

water system arrangement in light of the recognized consistent information from field and information from the air store. This structure can prescribe agriculturist whether, is there a need for water system.

[2] The including highlights of this undertaking joins sharp GPS based remote controlled robot to perform tries like weeding, showering, sponginess recognizing, feathered creature and creature startling, keeping caution, and so forth. Moreover it wires marvellous water system with sharp control and insightful major organization in context on accurate nonstop field information. Thirdly, it is an astonishing dispersal center association which joins temperature support, stickiness upkeep and burglary territory in the stockroom. Controlling of these errands will be through any remote stunning gadget or PC related with Internet and the activities will be performed by interfacing sensors, Wi-Fi or ZigBee modules, camera and actuators with more diminutive scale controller and raspberry pi.

[3]This undertaking has attempted to demonstrate a profitable astute property framework. It has joined mechanization into different bits of the living arrangement. Another game plan for creature confine districts is advanced to overhaul the living states of subdued animals, and moreover decay physical work. It combines an automated light, temperature, wetness and sprinkler framework. The sponginess and wetness control parts ensure the creatures are satisfying in the fenced in domains they are kept in, by changing the settings as shown by fundamental. This will accomplish settlement, vitality feasibility, and quality and flourishing advantages

[4]For future upgrades it might be refreshed by structure up this framework for colossal regions of spot where there is land. Besides the structure can be made to check the possibility of the earth and the headway of gather in soil. The sensors and microcontroller are suitably interfaced and remote correspondence is developed between different focuses. All observations and test tests show that this undertaking is an entire reaction for field exercises and water structure issues. Utilization of such a structure in the field can improve the yield of the harvests and general age.

[5] The framework joins a custom sensor plan for control productivity, cost plentifulness, shameful areas, and besides adaptability end settlement. In future there are a few assignments that ought to be done and would build up the framework to a more make state. The framework might be besides associated for outside use.

[6]'Web of Things' is far and wide castoff in relating gadgets and get-together encounters. This development watching structure fills in as a solid and convincing framework and restorative move can be made. The made framework is dynamically ground-breaking and beneficial for agriculturists. It gives the data about the temperature, stickiness of the air in nation field through MMS to the rancher, on the off chance that it aftermath from immaculate range. The utilization of such structure in the field can prompt the accumulate of the harvests and by and large creation.

[7] The computerized water structure framework has been outlined and executed in this paper. The structure made is significant and works in financially savvy way. It diminishes the water utilization to a continuously obvious degree. It needs insignificant upkeep. The power utilization has been diminished explicitly. The framework can be utilized as a bit of green houses. The System is incredibly helpful in locales where water need is a basic issue. The modify capability increments and the wastage of harvests is particularly lessened utilizing this water structure framework. The made structure is progressively useful and gives continuously utilitarian outcomes.

[8]The paper talked about the improvement of a structure that could address these issues. It is like way examined the course of action necessities and the system on the best way to deal with affiliation the structure with quickly accessible contraptions. The awe inspiring water structure controller was appeared to have the point of confinement of remote relationship of programming. This point of confinement will give a steady system to make updates to the structure without annoying the end client. Programming has been made and traded to the controller for manual use. The subsequent stage will be further building up the thing's accommodation and begin handling information putting away moreover, examination for robotization purposes. With the improvement of progression, agrarian field snatched importance in limiting the human power. In that manner IOT and Image managing progression has been utilized to see the plant diseases. The general water system condition is engineered by expanded eagerness for higher plant benefit, poor execution and decreased accessibility of water for agribusiness. Regardless, our course of action will build the execution of plant field and keeping up the field keeping from infirmities.

[9] Irrigation in India to a maximum extent is dependent on the monsoons, which is also a reliable source of water. Depending on the soil type, plants are to be provided with water through a proper irrigation system. This project is about the prototype design of micro-controller based intelligent irrigation system controller which will allow irrigation to take place from remote places where manual inspection is not needed. According to moisture and humidity of value of soil, a list of best suited crop is selected from all crops. Values of different monitoring parameters like temperature, humidity, moisture are shown on mobile

app. Value of monitoring parameters are adjusted according to optimal condition required for particular crop.

[10] John A. Stankovic et.al describes Research directions for the Internet of Things .It uses Internet of Things, Mobile Computing, Pervasive Computing, Wireless Sensor Network, Cyber Physical System, Machine learning technologies. Massive scaling architecture, big data is explained. Architecture and dependencies. Creating knowledge and big data and Security Privacy and humans in the loop.

[11] Haeng-Kon Kim et.al describes Green IOT Agriculture and Healthcare Applications (GAHA). Users can easily access required sensory data from cloud anytime and anywhere if there is network. The sensor Cloud infrastructure is a cost effective approach. They use IoT technology.

[12] Prathibha S R et.al describes IoT based monitoring system in Smart agriculture. It is smart agriculture system that's why less time consuming .No manual intervention. This system is valid only in ideal conditions; practically result is not very good.

[13] Carlos cambra et.al describes An IoT service oriented system for agriculture monitoring. Smart IoT communication system manager used as a low cost system controller. This project is a powerful irrigation system that uses real time data such as index vegetation and irrigation events. Developed system can be controlled by 4G mobile phone.

[14] R. Nageswara Rao et.al describes IOT Based Smart Crop-Field Monitoring and Automation Irrigation System. A Raspberry Pi is basically operated automatic irrigation IOT system, which is specially used is for modernization and improves productivity of the crop. The major advantage the system is implementing of Precision Agriculture (PA) with cloud computing, that will optimize the usage of water fertilizers while maximizing the yield of the crops and also will help in analysing the weather conditions of the field.

III. PROPOSED SYSTEM

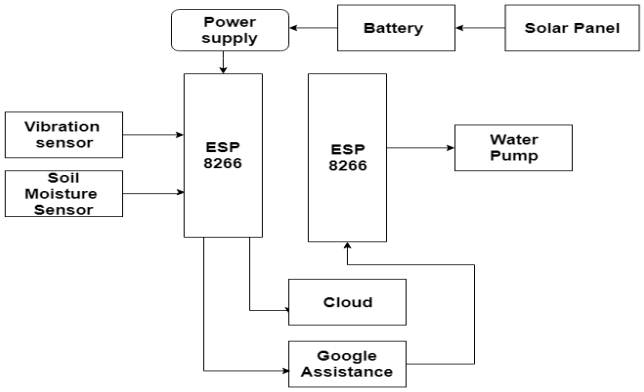

Fig. 1. Proposed System

IV. CONCLUSION AND FUTURE SCOPE

An attractive user interface with the most efficient way of controlling the irrigation system. It gives the idea to monitor the soil moisture content and temperature in a farming area and the user can control watering system using Android device provided with Wi-Fi facility. So, the overall implementation cost is cheap and it is affordable for a common person. Considering the present situation, we have chosen Android platform so that most of the people can get benefits. The design consists of Android App by which user can interact and send a control signal to the output of the valve which will control sensors and also monitor the environment. This system of irrigation is also helpful in the region where there is a scarcity of water and improves their sustainability. It is also adjusted according to the need of varieties of the crop to be irrigated. This work can be extended to develop a complete real-time irrigation monitoring system through Fuzzy and Neural network techniques.

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