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Smart Irrigation System with Monitoring and Controlling using Iot

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Abstract*: Water management systems to be efficient is a major concern in many agricultural field. This paper deals with the control of an irrigation system by designing the variable rate irrigation with the help of a wireless sensor network, and software for real-time in-field sensing are implemented . This irrigation system is made of two various sensors and a micro-controller unit with an embedded cloud communication module. The communication among the sensors, microcontroller, and farmer is established by their respective Login ID using Internet of Things (IoT). In this paper the farmer can communicate to this irrigation system through android mobile application. The farmer can check the status of their land at any time using the app or webpage.

Keywords: IoT, sensing, monitoring, controlling action, reporting, Android Application, water level monitoring.

I. INTRODUCTION

Agriculture plays a important role in all part of the India. Due to sudden change in climate and lower rainfall in all over India, the scope of agriculture become down. Without wasting the water, cultivation should yield maximum. In traditional method, the land get irrigated with excess amount of water than the crop needs. The wastage of excess water can be overcome by modern irrigation system such as drip irrigation, sprinkle irrigation etc. But this smart irrigation system can overcome the wastage of excess water through manual operation ie., offers a flawless operation in irrigating the land. The design and implementation of a clever irrigation gadget were broadly settled in different situations and most reliable price performance on the electric gadget. In reality, the clever irrigation device has extra benefits than the conventional techniques of irrigation. It uses helpful technology and assists the farmers, to irrigate and feed the crops with correct quantity of water and needed fertilizers to the crops. The implementation of a sensible irrigation system in a very land is simple and therefore the value to put in is additionally less. In this system we need of soil sensors, according to the size of the agriculture land. With the various soil sensors reading, the land can be irrigated equally by avoiding the problems like wastage of water and unequal irrigation. Equally irrigated land are monitored and controlled by remote operating system. The various mode of operations can be achieved through the android mobile application. It has microcontroller, and a bi-directional communication link. IoT plays a important role for the communicating the system and farmers. The user interface is provided to them by the utilization of Android Mobile Application. The most contribution of this paper is to develop hardware and software for the farmer's irrigation system. The Proposed system of this paper is to eliminate the manual operation and to implement an entire automatic irrigation system. This system requires additional sensors with respect to the size of the farmer's land. By the implementation of this system, the farmers can able to know about their crops health in all seasons by login with their respective user id into the mobile app to check the status of their irrigation system. In case of power cut, the system can connect to a mini up because the system consumes only less power or once the power reconnects, the system will automatically connects to the Wi-Fi and starts operating automatically. The values from the sensors are sent to the microcontroller. The microcontroller will send this information to the cloud which is connected to the mobile app. After comparing the values with the reference values, the error signal is generated which is sent to the mobile app and the webpage. Through this, the farmers can check the status of the irrigation system remotely by proper checking the volume of water and quantity of fertilizers that are really required by the crops by utilizing this system, the farmers can yield a most quantity of product with low quantity of investment, water and fertilizers.

II. LITERATURE SURVEY

This paper related work has done uniquely by two different ways, for example, one is physically and the alternate one is either mechanically or semi mechanically. The smart way systems embody IoT and the normal system. Name itself says IoT described project[1] has been introduced to irrigate the field by fully automatic by using gsm. The GSM module is used to control the irrigation system by sending text messages and alert messages from the module for a flood control system. Then, it is overcome by [2] consists of a water flow level sensor which is used to measure and monitor the flow level of water in the drip irrigation pipe lines to minimize the excess of water by enhancing the plant growth.

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But for wheat and paddy fields always having excess of water in the field. Nitrogen in percolation water is used in paddy and wheat fields' soil to predict rice and wheat rotation.
And another take a advantage for this one by detect a disease in nutrient growth and how far its growth rate [3] such other things will be same as that of[2].

Someone developed in more way as mobile app by integrated with IoT to monitor and controlling the irrigation [4].The system developed by [5] will not notify the required amount of fertilizer to the farmer. Mobile app is not provided for the framers for ease of use. The developed system [6] requires human power to irrigate the garden and it will not notify the farmer with proper notifications about the crops or plants. [7] has interfaced the sensors with the microcontroller with wireless communication. If the sensor disconnects due to power failure, again it cannot connect to the system automatically. In order to control the usage of water resources for irrigation, this [8] proposes the design of an automated organic irrigation system in controlling and properly allocating the available water resources for the irrigation system and available electricity for the use of the pump. It deals with the overview of the smart irrigation software development[9]. [10] Deals with the smart irrigation system with microcontroller is integrated with raspberry pi to transfer the data. It also deals with the smart irrigation system [11] with water efficiency to reduce wastage of water.[12] Is also same but its disadvantage is fully manually controlled system. [13] Involves a wireless short distance mesh network to collect the sensor parameters to make a decision for the irrigation system development. The mesh network consists of Xbee module which is used to transfer data in the means of radio frequency. The Xbee in module provides only a short distance network transmission since there is no proficiency for satellite network system.The fuzzy logic is complicated than our system and this system requires more manual operations [14].Here the systems are connected with lan network so it requires long cables to transmit the data from the field to the controller. And this system will not notify or indicate any operation to the farmer [15].

III. PROPOSED METHODOLOGY

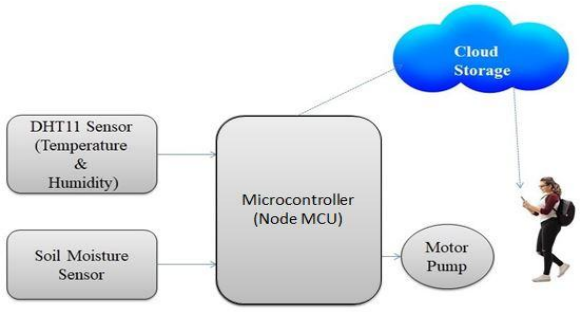

Fig .1.Block diagram

A. *REGISTRATION AND INSTALLATION*

The Smart irrigation system can be coupled with the present irrigation system. An android application will be given to the farmers .The following steps to register and install is given below:

(i) Farmer's name are recorded with their User ID and password along with other mandatory details through sign in page in the android application.

(ii) Then the user are going to be mapped to their login id by employing a distinctive code within the system.

(iii) Now the farmers can sign in with their id and password to verify the status of their field.

(iv) Suppose the famer has more than one agricultural field and irrigation system, they can attach all the system to any one of their login id.

(v) The list of all the system belonging to a person can be displayed in the account page of the person.

(vi) The farmer can nominate any display system to monitor and control.

(vii) However, the farmer will be notified with the help of notification for all activities in the field by this proposed system.

The installation cost might be low and it is simple to layout the design and implement as per the requirement of the agricultural field.

B. *MODES OF OPERATION*

The Smart irrigation system can be used to operate in two different modes of operation ie., semi-computerized and absolutely automatic. Farmers can pick any one mode of operation with the help of their login id in the android application and can also switch the operating mode during the progress. In semi-computerized mode, the farmers need to verify the status of their agricultural field and need to run the irrigation system manually and the system becomes turned off when the water is distributed equally to the field. In completely automated mode, the device might be monitoring the farmer's field for 24*7 and begins irrigating when the water and fertilizer were needed to the crops.

C. *WORKING*

The Smart irrigation system consists of two units - Sensor units and a controller with communication unit. The Sensor unit includes sensors like soil moisture sensor, temperature and humidity sensor, etc. The soil moisture sensor sense the field and measures the analog signals by calculating the electrical resistance in the field. This resistance value decides the soil whether it is wet or dry. If this resistance value is low then the soil is wet and if this resistance value is high then the soil is dry. The electrical resistance from the sensor can be a continuous analog signal. These signals from the sensors should be sent to the microcontroller (Node MCU) in the form of digital signals. Here, the analog to digital converter are used for converting the signals. The temperature and humidity sensor values straightly fed into the microcontroller

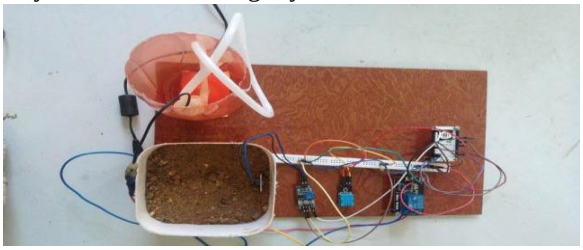

Fig.2. Prototype of Smart Irrigation System with Monitoring And Controlling Using IoT

The microcontroller can send the information to the cloud which is acquired from the moisture sensors for storing and processing. The values sent from the microcontroller are going to be processed with the reference values of a particular crop variety that the farmer cultivating presently. The sensors value will be updated to cloud database continuously for data processing. After processing the signals, an actual signal will be sent to the NODE MCU with the knowledge regarding the crops by artificial intelligence (AI).The microcontroller transfers the data information obtained from the sensor units to both the mobile app and webpage. The farmer will be given with an android mobile application with their login id and password so they can monitor and manage the irrigation system anytime and anyplace.

Fig.3. Water sprinkler attached to the motor of Smart Irrigation System with Monitoring and Controlling Using IoT.

IV. RESULT AND DISCUSSION

The Proposed system is tested in a prototype model with small agricultural land. This system is compared with traditional system and observed that the proposed system is working better. The wastage of excess water in traditional system has been triumph over by using proposed system. It is also demonstrated that the proposed system can work excellent in all modes of operation. The modes are set as per the user's preference. The farmers are get alerted with the condition of the crops, quantity of water and fertilizers required to yield for maximum growth.

V. CONCLUSION

This system has reduced the wastage of water and enlarges the crop growth rate with low quantity of manures. IoT and android application makes the farmers to notify approximately the condition of the crops, required quantity of water for crops and required fertilizers to the field to keep the crop health. The communication between the user and system can be achieved remotely. Farmers can change the mode of operation at any instant of time from everywhere. A single farmer can verify all the field are connected to his login id. This system decreases man strength in the agriculture field. The farmers can easily monitor and manage the irrigation system with the mobile app and webpage provided to them.

REFERENCE

1. Yoshika shekhar; EktaDagur; Sourabh Mishra; Rijo Jackson; Veeramanikandan; Suresh sankaranarayanan, *"Intelligent IoT Based Automated Irrigation System"*, Research India Publication, Volume: 12, Issue: 0973-4562, 2017.
2. Rahul ganpatghodake; a.o.mulani; "Sensor base automatic drip irrigation system",Journal for research, Volume:02, Issue:02, April 2016, ISSN: 2395-7549.
3. Jairamsankar; AmoghJayarajrau; "IoT Based Smart Irrigation System and Nutrient Detection with Disease Analysis": IEEE Region 10 Symposium 2017 Asia- Pacific Conference.
4. S. Vaishali ; S. Suraj ; G. Vignesh ; S. Dhivya ; S. Udhayakumar "Mobile integrated smart irrigation management and monitoring system using IOT.
5. R. Nageswara Rao ; B. Sridhar ; "IoT based smart crop-field monitoring and automation irrigationsystem"2018 2nd International Conference on Inventive Systems and Control (ICISC)Year: 2018.
6. A.Little Judy & R. Divya, " Smart Home Automation and Home Security System Using Arduino", Jour of Adv Research in Dynamical & Control Systems, 13-Special Issue, September 2017.
7. Karthika J & Little Judy A, 2016 'Energy management of a hybrid power system for variable speed wind turbine and varying temperature' ARPN Journal of Engineering and 2017 International Conference on Communication and Signal Processing (ICCSP)Year: 2017, Applied Sciences, vol. 11, no. 2, pp 1359-1364.
8. V.Manimegalai, N. Senthilnathan, " Grid Interfaced Renewable Energy Source to improve power quality using SAPF, International Research Journal of Engineering and Technology(IRJET), Volume:04 Issue:04, April-2017, pg-2395-0072.
9. Design of a fuzzy-based automated organic irrigation system for smart farmJohn R. Dela Cruz ; Jo-Ann V. Magsumbol ; Elmer P. Dadios ; Renann G. Baldovino ; Francisco B. Gan Lim Culibrina ; Laurence A. 2017IEEE 9th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)Year: 2017.
10. V.Manimegalai, N. Senthilnathan, " Grid Interfaced Renewable Energy Source to improve power quality using SAPF, International Research Journal of Engineering and Technology(IRJET), Volume:04 Issue:04, April-2017, pg-2395-0072.
11. "Irrigation management system with micro-controller application Prateek Jain ; Prakash Kumar ; D.K. Palwalia2017 1st International Conference on Electronics, Materials Engineering and Nano-Technology (IEMENTech)Year: 2017.
12. Design and implementation of a smart irrigation system for improved water-energy efficiency Kizito Masaba; AminiNtakirutimana ; TahaSelimUstun4th IET Clean Energy and Technology Conference (CEAT 2016)Year: 2016.
13. Intelligent Command of An Underground Irrigation and Fertilization SystemLaurentiu Mihai Lonescu ; AlinGheorghitaMazare ; Gheorghe Serban ; Daniel Visan ; AdrianloanLita2018 IEEE 24th International Symposium for Design and Technology in Electronic Packaging(SIITME)Year: 2018.
14. Smart Irrigation Decision Support Based on Fuzzy Logic Using Wireless Sensor Network Yousef E. M. Hamouda2017 International Conference on Promising Electronic Technologies (ICPET)Year: 2017.
15. IoT based smart irrigation system and nutrient detection with disease analysis Amogh Jayaraj Rau ; ; Ashok R Mohan ; Deepti Das Krishna ; Jimson Mathew2017 IEEE Region 10 Symposium (TENSYMP)Year: 2017.
16. Soundararajan R., Ramesh A., Mohanraj N., Parthasarathi N, "An investigation of material removal rate and surface roughness of squeeze casted A413 alloy on WEDM by multi response optimization using RSM, Journal of Alloys and Compounds, 2016, 685, pg: 533-545
17. Selvy P.T., Palanisamy V., Purusothaman T," Performance analysis of clustering algorithms in brain tumor detection of MR images, European Journal of Scientific Research, 2011, 3, pg: 321-330
18. Ravindran R., Manonmani K., Narayanasamy R," An analysis of void coalescence in AL 5052 alloy sheets annealed at different temperatures formed under different stress conditions, Materials Science and Engineering A, 507, 2, pg: 252-267
19. Sivaram Kumar V., Thansekhar M.R., Saravanan R., Miruna Joe Amali S," Solving multi-objective vehicle routing problem with time windows by FAGA, Procedia Engineering, 97,pg: 2176-2185, 2014
20. Sreeja N.K., Sankar A," Pattern matching based classification using Ant Colony Optimization based feature selection, Applied Soft Computing Journal, 2015, 31,pg: 91-102, 2015
21. Punithavathani D.S., Sankaranarayanan K, IPv4/IPv6 transition mechanisms, European Journal of Scientific Research, 34, 1,pg: 110-124, 2011

22. Jameer Basha A., Palanisamy V., Purusothaman T, Efficient multimodal biometric authentication using fast fingerprint verification and enhanced iris features, Journal of Computer Science, 7, 5,pg: 698-706, 2009
23. Kumar P.S., Gayathri R., Senthamarai C., Priyadharshini M., Fernando P.S.A., Srinath R., Kumar V.V," Kinetics, mechanism, isotherm and thermodynamic analysis of adsorption of cadmium ions by surface-modified Strychnos potatorum seeds, Korean Journal of Chemical Engineering, 29, 12,pg: 1752- 1760, 2012
24. Vijayakumari V., Suriyanarayanan N," Survey on the detection methods of blood vessel in retinal images", European Journal of Scientific Research, 68, 1,pg: 83-92, 2012
25. Poornaselvan K.J., Gireesh Kumar T., Vijayan V.P," Agent based ground flight control using type-2 fuzzy logic and hybrid ant colony optimization to a dynamic environment", Proceedings - 1st International Conference on Emerging Trends in Engineering and Technology, ICETET 2008, 4579922,pg: 343-348,2008
26. Bhuvaneswari K., Rauf H.A," Edgelet based human detection and tracking by combined segmentation and soft decision, 2009 International Conference on Control Automation, Communication and Energy Conservation, INCACEC 2009, 5204487.

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