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IoT Based Novel System for Drainage and Irrigation Water Management

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Abstract

The most significant and helpful technique for the management of waste water is to efficient reusing of it. This can be implemented by developing a system that reuses maximum of drainage water. For short and long term needs, it is important to stay away from the misuse of water. In some regions, percentage of rain is minimum, in such areas; reuse of sewage water is generally significant and helpful strategy. As per the quality of drainage water, this water can be utilized for the irrigation purpose with necessary water purification process. For salt sensitive crops it is not possible to reuse the drainage water, so it is necessary to purify and reuse this water. If this project is situated close to the wet-land then the drainage water can be reused efficiently for it. This research work presents a system to measure the water level of drainage/canal and pumps it to the necessary irrigation area. This systems consists of water level point contact sensor, solenoid valve, Wi-Fi module, Arudino microcontroller.

KEYWORDS*: Internet of Things, Innovative Irrigation Management, Solenoid valve, Wetland and Salt Sensitive.*

1. INTRODUCTION

The most important issue at the time of reuse of drainage water is that the high concentration of ions. Low concentration of ions is useful for the plant or tree growth. Low concentration ions are required to plants and trees for their growth. However, as salinity will increase, specific ions might become toxicant or interfere with the uptake of alternative nutrients. In soils, the buildup of ions will increase the diffusion potential against that plants extract water. At the time of management of salinity in the agriculture, the most important key factors are Voidance and activity of salts. At the time of management another issue should be occurred i.e. salt tolerance of crop. Salt tolerance is the maximum level of salt that tolerates without losing the productivity of the crop. If salt tolerance is high, productivity level of crops gets decreased. This system is useful for the reuse of drainage water for such agricultural crops which have high economical collection and which are famous to be extremely tolerant to salinity. As salt level of water will increase within the water in the irrigation area, there is a larger have to be compelled to the monitoring and the management of irrigation. For the economical management of crops most important thing to do is to check the characteristics of the water in the crop and also check the soil characteristics of the crop to increase the productivity of the crop by using these characteristics. Poor quality water needs choice of crops with acceptable salt tolerances, enhancements in water management, and maintenance of soil structure and porousness (tilth, hydraulic conductivity). Once sensitive crop growth stages like germination and early growth are excluded, the temporal weighted mean root zone salinity has been found to be a legitimate live for evaluatingFor the estimating response from the crops, the mean root zone salinity at intervals the maturation depth integrated over the time of exposure is a good approximation is done. Plants answer the weighted mean salinity at intervals a particular growth amount. It is necessary to manage voidance, and it's most helpful technique to manage voidance by exploitation Iot. In IoT we have a tendency to use some controllers and sensors like LAN module ESP8266, water level purpose contact device, coil valve, Arudino microcontroller. With the assistance of water level device we will monitor

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voidance or flood water and by exploitation coil valve we will manage water to specific space. We will conjointly collect dataset of rain in last year. It is necessary to manage drainage, and it is most useful method to manage drainage by using Iot. In IoT we use some controllers and sensors such as wifi module ESP8266, water level point contact sensor, solenoid valve, Arudino microcontroller. With the help of water level sensor we can monitor drainage or flood water and by using solenoid valve we can manage water to particular area. We can also collect dataset of rain in last year. On the basis of this dataset we are going to predict areas which have less amount of rain in last year and manage water in that area.

2. LITERATURE SURVEY

K.L.Keyung, C.K.M.Lee, basically IOT is the combination of the hardware system with the software [1]. For gathering the information, some experiments were done. The information is then accustomed train the bogus Neural Network. To assist the storm water and emptying management analysis of projected is done. According to the result, we can predict emptying things. After the cross validation, it is ready to predict most of the testing inputs. The main aim of this paper is at profit to Hong Kong emptying service.

V.S.Velladurai, M.Saravanan, this paper shows the modified work of the model which is used to put safety in industries [2]. This technique may be employed in homes, villages, cities and offices. The forming of toxic gases is most of the emptying and unused wells. The most important objective of this work is planning microcontroller primarily based toxic gas police work, alerting system and gas purification.

RamKumar Narayanan, VM Lekshmy, this paper, new system is introduced by using the sensation of the democratic and flood or water level detection by using the pc vision [3]. In this system with the help of mobile phones user can upload pictures of the part submerged static structures such as buildings, lampposts etc. These pictures should be uploaded on the server with their tags. After this with the help of the algorithms, uploaded image should be matched with the reference image. According to the reference image flood should be calculable.

Antonio Rueda, Jose M. Noguera [4], this proposed system should works on unprocessed DEMs avoiding the issues caused by pits and ats, will generate watercourses with a breadth larger than one cell and detects uvial landforms like lakes, marshes or watercourse islands that aren't directly handled by most previous solutions.

P.S.Chandramohanan Nair, Preetha P.K. [5], this paper proposes a completely unique technique for ill the emptying power that is generally wasted within the delta winding of the distribution electrical device. The experimental studies conducted on a 3 kVA electrical device shows that once the emptying power of delta winding is recovered it helps in rising the electrical device potency and system power issue.

Kizito Masaba, Amini Ntakirutimana [6], In this paper, Author introduce the system which works on sensors, microcontrollers and water pumps along with the choice creating system. According with the collection of atmosphere data, truth table is developed by the Author along with the need of irrigation area. According with the need of irrigation area and the sensor values the decision should be taken to turn on the sprinklers. At the time of this water is sending to the dry area in the irrigation and also it stores the economical use of the water. In this system use of different types of parameters such as temperature, wetness and wet is done, it makes attainable to regulate the system

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in step with the wants of a selected location.

In the paper [7], the proposed system monitors and controls the irrigation based on IoT. It improved a great deal of value and amount of homestead yield by detecting encompassing temperature and moistness esteems with no human intercession. It uses wireless sensor unit nodes. Each node contains the values of humidity, temperature, soil and water level. Each node senses the data and transmits it to the master node through Zigbee. The cloud server maintains the information and performs decision making based on threshold values and sensed values. The decision is to be processed based on crop selection.

Neamet et. al. [8] explains about the keen water system framework utilizing remote sensor organizes on the web of things. The Telosb hub is utilized in sensors and observing applications for ultra-low force remote module. The nodes sense the information and will produce a packet. The middleware program is written in a python language that extracts data where the base stations send the packets to the PC through USB and the data is stored in a spreadsheet in the cloud server. Java application content is used for arranging a site in the cloud server to show the set-aside information presented in a spreadsheet. It can send a request to the electrical valve when the water level is dropped.

Wireless sensor networks with GPRS based for continuously or periodically remote monitoring of temperature and humidity [9]. For collecting information from sensors in the agriculture fields low cost The ZigBee is used [10]. An automated irrigation system is developed based on the internet of things. It uses both hard and software to implement [11]. It depends on the change of sensors. The Blynk application has involved in mobile to automate the process. It investigates the whole process of smart irrigation and identifies the dryness between 400 to 630 by using the soil sensor directly to save the bills and the water. The Arduino automatically water the plants by analyzing the real-time conditions. The data can be seen on the mobile as long as it has an internet connection.

The data has to be saved in the Blynk server and has a validity of one year and the data changes every second [12]. The system implemented the smart irrigation and remote farm monitoring system. In this, they improve the traditional methods of farming. It has been developed many systems to reduce the crop wastes and wastage of water in the fields.in this method compared to the traditional methods it uses less than 50% less water. there are some parameters are having to determining the irrigation of a crop like soil moisture and temperature etc.., in this method they can use the Arduino to convert the along data to digital data and GSM module they can use to communicate the farmers to the motor in the fields .by using this model they said that increase the productivity of the crop and reduce the wastage of the crop. In this model they can use the KNN algorithm would be used to predict the plant in a particular region based on the climatic conditions.

The nitty-gritty review of the robotized water system framework in which they worked without manual intercession or negligible association [13]. It keeps up a reconnaissance office for the activities the computerization of the frameworks like dribble, sprinkles, and surfaces might be utilizing robotized utilizing sensors and electrical things. The frameworks may diminish the inclusion of ranchers. The significant things in these frameworks are its unpredictability and costly, other than it requires the arrangement and its execution. Right now, utilize a huge zone and it tends to be isolated into little zones. It might be flooded independently and water releases might be observed and directed. It can likewise be straightforward. it tends to be actualized in utilizing dirt permeable pots or utilizing

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bottles. Right now, be understanding the attainability of versatile advances and alongside the remote sensors and GSM innovation.

The use of drip irrigation system is an effective method where the water drops at the root in motion [14]. The automated irrigation system using infrared thermometers and remote canopy temperature for the cotton crop irrigation is efficient compared to manual system [15].

Heydari(2014) gives ansummaryover the water productivity and its efficient use for improved planning and effective use.The impact of rainfall and effectiveness of irrigation in agriculrure sector is dicussed by Gurjar and Sanjay Swami in 2018 [16]. Pumps are connected via a relay to automate watering the crops inorder to reduce the farmers work [17]. The e-Agriculture application based on the framework consisting of KM-Knowledge base and Monitoring modules using ICT is used for giving information to the farmers for decision making and effective production [18].

3. SYSTEM ARCHITECTURE

In the diagram, there is flow of our project.

1. The whole architecture is made by Net beans used in java language. Net beans give all the necessary stuff related to GUI design. Net beans provides us display screen, buttons and so on. So, in these way Net beans helps us in design GUI.

2. After designing of GUI, another task is to authenticate valid user for operating application. To deal with this task, we are using MySQL database to store data of username and password and through this, user can authenticate easily.

3. Another task is to collect values from the sensors. Sensor sends value to the server and by using server it is easy to access all values of sensors.

4. The major task of this survey paper is to collect datasets of last year soil moisture and temperature and to achieve this result, we are working on Google for the dataset of rain last year on which, we are providing the irrigation of that area.

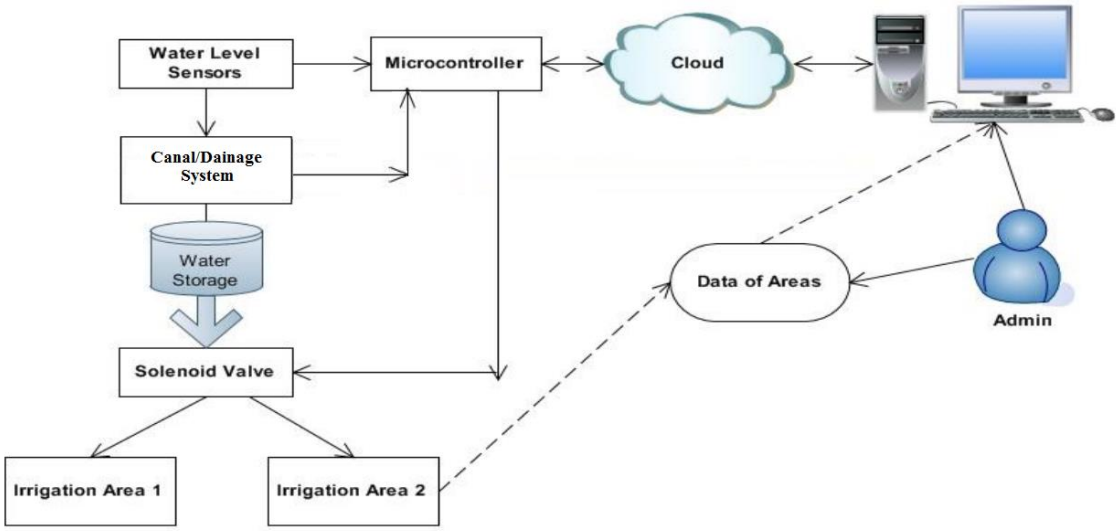

Fig. 3.1. Proposed System Architecture

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4. ALGORITHM

4.1. Naïve Bayes Algorithm in our Approach

Step 1: Collection of data from the sensor and upload collected data to the server
Step 2: Continuously data is send to the server and updating of data is done
Step 3: With the help of threshold values which are predefined, microcontroller controls the sensors
Step 4: Checking of water and reevaluation of the water is done according to the probability showing water level such as full or not.
Step 5: This checking and reevaluation is done continuously until the result should be same.
Step 6: According to the threshold values, sensor data classification is done.
Step 7: Final output is to generate alert or sending notifications to the admin.

4.2. Decision Tree Algorithm in our Approach

Step 1: Collection of data from the sensor and upload collected data to the server
Step 2: Continuously data is send to the server and updating of data is done
Step 3: With the help of threshold values which are predefined, microcontroller controls the sensors.
Step 4: Checking of water and reevaluation of the water is done according to the probability showing water level such as full or not.
Step 5: This checking and reevaluation is done continuously until the result should be same.
Step 6: According to the threshold values, sensor data classification is done.
Step 7: Final output is to generate alert or sending notifications to the admin.
Step 8: On and off operation of solenoid valve should be controlled manually by admin. If water tank is not full but it should be full in some time at that time admin can manually turn solenoid valve on.
Step 9: If the water is full, and generation of alert takes time at that time regeneration of alert message takes place and send message that the water tank is full to the authorized person and with solenoid valve gets started flowing of water to the irrigation area.

5. EXPERIMENT AND RESULT

In this system having different types of components are soil moisture and temperature sensors to measure the humidity and temperature in the field. The soil moisture sensor measures the water content in the soil. If GPIO.input of 26 is equal to 1 then it will give the alert message to farmer mobile number which is registered on twilio as “WATER CONTENT IS ENOUGH SWITCH ON THE MOTOR “.

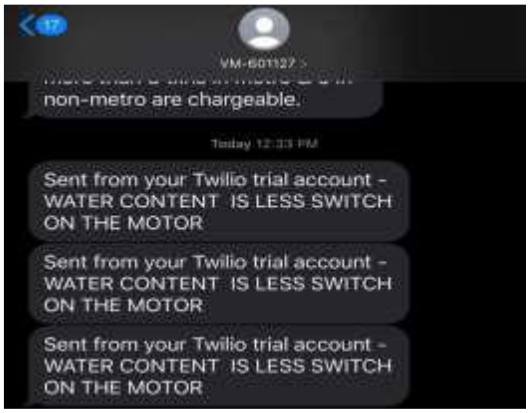

Fig. 4.1. Snapshot of output

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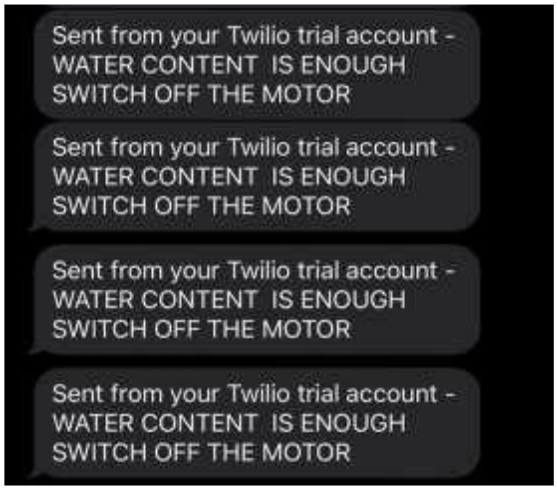

Fig. 4.2. Snapshot of output

The foundation of an automated water framework system is done. It is found that the system works properly and the water is passed to the plants as and when required. On the off chance that the dirt is dry, an alarm message is sent "WATER CONTENT IS LESS SWITCH ON THE MOTOR" to the versatile and through the content water engine turns over which prompts water to the stream. On the off chance that the dirt is wet, an alarm message is sent "WATER CONTENT IS ENOUGH SWITCH OFF THE MOTOR" to the portable and through the content water engine is killed and water stream stop.

This framework utilizes raspberry pi and Twilio cloud. These applications work absolutely on wifi. To interface the application and the ace robot we require a wifi module.

6. CONCLUSION

Drainage & Irrigation Management System, in this type of application, we have first collect datasets of irrigation area and after that make a web application so that user can able to manage drainage and irrigation system. To implement this system we are going to use the different types of sensors according to which we can manage irrigation of particular area. In this way, we are successfully implementing all the tasks of the survey paper.

7. FUTURE SCOPE

In future work, we use different type of sensors to get accurate output for manage drainage. We can use decision tree algorithm or naïve baiyes to predict that the need of water in particular area and for alerting the system administrator.

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