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A Detailed Survey on Technological method of various Irrigation Systems

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ABSTRACT: Irrigation of the farm land with automated system. Different technologies were used to predict the water content of the soil. The technologies used are IOT, ESP8266, and WIFI-Module, wetting front detector, NRF24L01 transmission, cloud & data mining. In all those techniques the water moisture content was stored in the database for the future reference and sends the notification to the PC & ANDRIOD mobiles. In this paper a detailed survey of different existing irrigation technologies and their techniques is presented. The classification is based on the domains and technologies used.

KEYWORDS : irrigation, IOT, automatic, cloud and data mining.

I. INTRODUCTION

Agriculture is the backbone of the Indian economy. 70% of the total population depends on the agriculture for their source of income. It was the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that nurtured the development of civilization. From 1990'S onwards the economic growth of the country depends on the agriculture sector. Indian agriculture sector accounts for 18% of India's gross domestic product (GDP) and provides employment to 50% of the countries workforce

The salient features of agriculture is : subsistence agriculture, pressure of population on agriculture, importance of animals, depending upon monsoon, variety of crops, predominance of food crops, insignificant place to given fodder crops, seasonal pattern. Since it was the backbone to the economic growth but the technology to the irrigation process was not completely developed yet the farmers has faced many issues i.e., scarcity of water, insufficiency of man power, lack of time, etc. so there is an urge to handle the situation with efficient and effective usage of water .To overcome those problems many technologies were exist to find the moisture content of the soil and the information was stored in the database and also send the notification to the farmers about their farm land condition by using different technologies i.e. cloud and data mining[1],wetting front detector[2],ESP8266 WIFI module[3],IOT based field monitoring[4],android system for remote control[5],sprinkler system[6].Watering of the plant is differ according to the type of soil, climate, and plant. If the farmers planned to cultivate the mixed crop means the requirement of water is varying, it not easy to maintain manually. In the proposed paper various technological work are discussed , to avoid the wastages of the crops , to improve the quality and to make the work of farmers in the sophisticated manner. By using those technologies the management of water is become easier with less maintenance also it avoids the water loss. Therefore this paper proposes the irrigation technique using different technologies to make the agriculture more effective between the younger generation.

II.IRRIGATION OF THE FIELD USING DIFFERENT TECHNOLOGIES

In this survey the evaluation of the following techniques for proper irrigation system was studied, which are very useful for doing research in the area of irrigation to the field

- An irrigation system using IOT based wetting front detector
- An irrigation system using cloud, android and data mining
- An irrigation using sensors and ESP8266 Wi-Fi module
- An irrigation system IOT based crop field monitoring
- An irrigation system with android system for remote control
- An irrigation system with sprinkler system

III. AN IRRIGATION SYSTEM USING IOT BASED WETTING FRONT DETECTOR

Pradorn Sureephong et al., proposed the irrigation system using IOT based wetting front detector .it is used to predict the stable value of moisture content of the soil

HARDWARE:

- Frequency Domain Reflectometry sensor (FDR)
- Resistor- based sensor
- Temperature sensor
- Mobile
- Computer
- Router

In this project, WDF [7] and IOT Cloud server service system [8] are the two important systems for monitoring and controlling equipment's.

It is the type of capacitive sensor here the capacitance is used as a dielectric medium between two electrodes. The moisture content of the soil was determined by the dielectric constant of the soil. In this sensors, two oscillators are used .The dielectric constant was detected using the calculation of differential frequencies of the two oscillators; this was done by D-flip-flop and micro controller [9].

In this sensor it uses soil resistance medium and by passing the current between two electrodes, the resistance value represents the moisture content of the resistive content of the moisture soil is less than the dry soil, conductivity of the moisture soil is more

The sensing values are read by a microcontroller and send to the server using MQTT protocol. IOT GUI application is developed to receive data to the system. The farmer can also get the notifications regarding the farm. This system is used for improving precision irrigation and supporting precision agriculture in the future.

IV. AN IRRIGATION SYSTEM USING CLOUD, ANDROID & DATA MINING

Subhashree Ghosh et al., proposed the irrigation system based on cloud, android & data mining

HARDWARE:

- Sensors
- Microcontroller
- MAX 232
- Base station
- Server
- Web application

In this project the water management of the farm was controlled. In this humidity and temperature sensors was used to sense the moisture and temperature of the soil & farm

The whole system was based on the concept cloud & data mining, to provide easy monitoring & control mechanism, the large number of computers were connected in real time using cloud computing technique .The readings were stored in the database which is connected to the pc at the farm. At the same time it was displayed on the mobile using cloud. By this farmer can manage the farm

In this system the drawbacks due to the distance problem and range problem was rectified [10] and the server can be managed by the farmer across the country.



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V.AN IRRIGATION USING SENSORS AND ESP8266 Wi-Fi MODULE

Pushkar Singh et al., proposed the farm management using sensors and ESP8266 Wi-Fi modules

HARWARE:

- Sensors
- Pumps
- Sprinklers
- ESP8266 Wi-Fi module
- Arduino device

In this project the water flow sensor was used to predict the amount of water is passed to the farm, it have the hall effect magnetic sensor on the other side of the plastic tube to measure the number of spins made by the pinwheel on the tube, fluid movement was evaluated by calculating the pulses from the output of the sensor

Soil moisture sensor senses the moisture content of the soil using the dielectric permittivity of the surrounding medium

Temperature sensor (DS18B20) is used to predict the temperature of the farm

The output of the sensor modules were send to the arduino [11] that arduino sends the command to the ESP8266 module which allow the user to send and receive the data, in this the Wi-Fi module was connected with LAN network [12][13] for actual purpose it was connected to the router .The user can get the notification via the Wi-Fi module The main drawback of the system is data sending capacity is restricted to send data of only 64 characters in one string ,to avoid this the data should be send in various small strings instead of single string. This project is completely automatic and reliable used to communicate with sensors from long distance [14][15] by using web communication.

V.I.AN IRRIGATION SYSTEM IOT BASED CROP FIELD MONITORING

Rajalakshmi.P Et al., proposed the irrigation system based on IOT

HARDWARE:

- Sensors
- Light dependent resistor
- solid state relay
- Ethernet
- Arduino
- Zigbee and GSM modem

In this project,sensors are interfacing with arduino.The soil moisture sensor is used to detect the soil moisture by using resistance value.The DHT11 temperature sensor and humidity sensor are used to measure the humidity of the air.After the irrigation, the water droplets in the air is increased and decreases the temperature and increases relative humidity of the surroundings.

Light is the major responsible for photosynthesis, artificial lightening is done using incandescent lamps or fluorescent lamps by using LDR.It is used when resistivity decreases with increase in light intensity and vice –versa.

The readings of the sensors were sent to the Arduino and it is stored in the database [16] using wireless data transmission NRF24L01.

It was displaced on the web server using Ethernet.



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The web applications is designed using HTML and PHP script to display on the android device JSONdata type is used because it is easy way to store & access the database. Processing IDE is used to communicate between arduino & web page. Serial library is used to read and write the data.

The ultrasonic sensor is used to predict the water tank level before starting the water motor to the field .if the level of the water is below the certain range it sends the notification to the user . Further steps to be taken by the farmer.

The separate mobile application is developed to the user in the android for manage the farm based on the PHP script .data fetch and encode will be in JSON format.

VILAN IRRIGATION SYSTEM WITH ANDROID SYSTEM FOR REMOTE CONTROL

A.N.Arvidan et al., proposed the irrigation system with the arduino linked wirelessly via the HC-05 module to an Android smart phone.

HARDWARE:

- Arduino UNO
- soil moisture sensor
- HC-05
- Smart phone
- power controller
- motor
- irrigation pump
- electric power source

In this project, precision agriculture technique is suggested that includes automation in the irrigation system. In this system utilizes the Android smart phone for remote control.

It includes a soil moisture sensor which provides a voltage signal proportional to moisture content in the soil and the comparison are fed to the processor.

For real time applications, it is linked with HC-05 module to an android smart phone and displayed on the user interface (UI) and allows remote control adopted.

Based on the sensing parameter the automated technique called Precision agriculture [17]-[23] requires an irrigation system that regulates water commensurate to operate automatically

While the controlling water parameter by switching the irrigation pump motors the change in the directions of flow can be used for letting in water and draining the farm of flooding.

A proposed android system is included in this paper an arduino-based [24]-[27] irrigation system that operates automatically provided by a soil moisture sensor and subject to remote control

In the moisture content, optimum productivity for various crops by experiments.to water the plants, power controller ON/off the motor.

In the soil moisture sensor, LM393 chip comprises dual independent precision voltage comparators.The output of the sensing unit is given to the comparator.

A drive system with 9V 80 rpm dc motor coupled to a fan, IC L293D which is a quadruple high current half H-driver.

IDE for android applications is used for developing an Android UI interface application with attached S2 Bluetooth module and its terminal which are displayed on the smart phone screen which are interfaced.

It was deployed on an android smart phone to accomplish wireless communication.



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VIII. AN IRRIGATION SYSTEM WITH SPRINKLER SYSTEM

Daniel T et al., proposed the automated sprinkler for irrigation in land to assist production of crops.

HARDWARE:

- Arduino
- Soil moisture sensor
- Temperature sensor
- GSM module interface
- Web camera
- MAX232
- LCD
- Sprinkler irrigation

In this project, the main objective is to introduce an automated sprinkler irrigation system with GSM communication module interface with micro controller.

A web camera is used to monitor the plant growth and insect level in the field condition automatic irrigation system is to reduce wastage of water and also minimize the human interference and this sprinkler irrigation system is controlled and interfaced with solenoid valves.

GSM shield which is SIM 9000 will transmit and monitor the remote station [28] and the exact field condition is monitored by using web camera [29] capture the image if sprinkler is ON and some sensors are used to detect temperature and water content of the soil. With soil moisture sensor, pair of electrodes is used to measure resistance of the soil. With LM35, the ambient temperature are measured. SY-HS-220 sensor is used to convert the humidity into voltage. A drive circuit is used to drive the relay which is an electro mechanical switch to operate 12V. The clock speed is 16MHz and ARM based computer can do many things a desktop PC can do. The sensor chip is to capture image through web camera that also converts the images into streams of digits that are uploaded over internet. Light sensitive part called image sensor that is CCD or CMOS chip and the arduino ATmega328 microcontroller has been programmed.

Embedded technology in the agricultural sector give more scope in the irrigation process and helpful to strengthening their economic condition.

IX. CONCLUSION

In this survey the various technologies related to irrigation system which can detect the moisture content and temperature of the soil in account with the case of implementation, operation, maintenance and cost is presented. All the devices are automatic and reliable and also for website communication. Thus this survey will be helpful for those who are doing research in the area of irrigation system. The irrigation system is to validate the performance experiments which can also interface the control operation of the drive. The final prediction is to supply the right amount of water which we are currently progressing and data analysis method for improving irrigation and supporting agriculture in future.

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