



Review On Smart Irrigation system based on IoT

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ABSTRACT

Precise irrigation plays an essential role in agricultural production and its management. Based on current conditions and historical records, profitability in the farming sector depends on making the right and timely operational decisions. For the last two decades, especially in India, climate change, groundwater depletion, and erratic variation in rainfall have affected crop production significantly. Due to advancements in technologies and reductions in size, sensors are becoming involved in almost every field of life. Agriculture is one such domain where sensors and their networks are successfully used to get numerous benefits from them. In this paper, a review of the scope of smart irrigation using IoT has been discussed. The scarcity of agricultural workers in irrigation can be compensated by the Internet of Things (IoT) platform. The various parameters, such as soil moisture, soil temperature, humidity, and pH, have been collected using the Internet of Things (IoT) platform, equipped with sensors and wireless communication systems (WSN).

Keywords: Arduino Uno, Ultrasonic sensor, Water level Controller, Integrated Circuit, LCD, Buzzer, AC pump, Temperature Sensor, Fan, GSM Module.

INTRODUCTION

Pawar SB, Rajput P and Singh AD, Vishwakarma S, SS. [1] [2] Agriculture is an imperative sector that contributes a sufficient diet to the growing population. The projected world's population will be more than 10 billion inhabitants by 2050 (United Nations, 2017). According to the UN Food and Agriculture Organization, with the increasing population mouths, global food production must be increased substantially by 2050. To meet the demand, farmers and agricultural companies will have to push innovations by suppressing their current practices. There is evidence from many researchers that agricultural areas and productivity decrease day by day.

Irrigation is one of the essential factors which regulate the level of crop production. The agricultural sector uses a maximum of 80% of global water. Irrigation helps to maintain moisture in the soil and regulate soil temperature. It is vital for the proper crop nourishment and development of crop growth. Traditional irrigation methods include surface irrigation, sprinkler, Centre pivot, and drip irrigation, which are Labour intensive and cause waterlogging due to excessive seepage into the ground. Over 70 percent of the farmers still use traditional methods and apply irrigation on an equal interval basis. Water is a depleting resource; hence providing the right amount of water and at the right time to the crops depending on their water requirement is the need of the hour. Precise irrigation is the only feasible solution for the current water shortage issues.

According to data from the U.S. Department of Agriculture Irrigation and Water Management Survey, the adoption rates of advanced irrigation scheduling technologies are less than 21 percent. Advanced irrigation scheduling refers to irrigation scheduling based on soil moisture sensors, evapotranspiration programs, plant-based sensors, and crop simulation models.

This project is based on developing the idea of measurement of water level and self-cut-off pump when attained threshold level of water. Temperature monitoring of motor, if the motor overheated then it shut down or we put a fan near the motor to maintain the temperature of the motor Monitoring of field from animals (cow, buffalo, etc.) This idea was conceived with regard to Indian farmers who are still using traditional ways of of farming, the aim is to modernize farming way in order to optimize and to get better productivity so that the farming as well as the problem of water scarcity can be solved up to some extent. This project utilizes the application and optimum data collection through internet of things (IOT) which acts as a Bridge to the solution, it is based on the application of specific sensors for data collection and transmission All the data is accessed by owner of the field on the mobile phone, he is continuously gating the activity takes place in the field like amount of water level attained in field, temperature of motor, motion across the boundary of the field.

DIFFERENT TYPES OF IRRIGATION METHODS

Khan IA, Sunyani [3,4], Artificial water application as an input to the agriculture field for crop growth and development is called irrigation. It is considered a crucial component and helps plants in absorbing micronutrients from the soil. Traditional irrigation practices such as border, furrow, and flood irrigation require plenty of water for crop production. The freshwater shortage issues made a motivational factor for developing pressurized irrigation techniques for precise irrigation management.

Surface Irrigation Methods

Traditional irrigation methods (border, basin, and furrow) apply water equal to the upper edges of banks/bunds considering the traditional plant-based indicators; that create ponds rather than. irrigate them. Reported by, that irrigation water's imprudent application through traditional irrigation methods reduced crop intensities and yields. It was also found, that conventional water application practices had created water stagnation and soil salinity problem that substantially reduced the overall irrigation efficiency.

Modern or Micro-Irrigation and Pressurized Irrigation

Pressurized irrigation or micro-irrigation eliminates seepage and evaporation, water conveying losses by adopting pipes as a water transport medium. Due to these irrigation techniques, the entire area wetting problem is eliminated, and weed growth is diminished.

Application of ultrasonic sensors

In this Research paper Shaguftha and Supradeepti [5] has proposed an idea of using the ultrasonic sensor by displaying a usage by displaying a usage of ultrasonic sensor in water tank of an IOT based water level monitoring system (WLMS) that will monitor the level of water in water tank by transmitting a pulse of sound, much like sonar detectors outside the range of human hearing. FARES.[6] This pulse travels away from the range finder in a conical shape at the speed of sound (340 m/s). The sound reflects off an object and back to the range finder. and this is how in this research paper the object is water and it detect the water and transmit its pulse to the water and find the water level and the buzzer will beep at a threshold value which is set(0.1m) from the top of the tank and that tank measures 5m so it start beeping at 4.9m so here we get the idea of using ultrasonic sensor for detection of motion then we have used that idea for protect our land from unwanted animals likes cow, buffalo and other wild animals by adjusting the ultrasonic sensor at the peripheries of field which will detect the motion of any animals and regulates the message on the farmers smartphone.

APPLICATION OF WATER LEVEL SENSOR

Bhandari, Prachi Rai, Dr. Rathi [7] used water level sensor in their project. Their main motive is to save the wastage of water by providing appropriate water to the plants as much required direct to the roots of plant. They use water level sensor to measure the water level in field, a threshold level of water is set when that threshold level of water is achieved in field the pump will automatically cut-off. Which results in save of water.

Rawal [8] worked on smart irrigation based on IOT. She uses water level sensor, ultrasonic sensor, GSM module and buzzer in his project. A water level sensor is set in field which continuously measure the level of water in the field and continuously send the data to host server with the help of GSM module in the form of SMS. Owner of the field is continuously in contact with the data received from the field, when threshold level of water is achieved farmer will shut down the motor.

APPLICATION OF PUMP

Bhandari, Prachi Rai, Dr. Rathi [9] worked on project Smart Irrigation System using IOT. The project is all about how to providing controlled amounts of water to plants at needed intervals. They mainly focused how to save wastage of water. they use pipe line system in such a manner that individual plant get water to the root of pant directly at different period of time when required. They use pump to transfer water from small tank to plant at different interval.

APPLICATION OF BUZZER

Baskar and Patil.[10] have worked on smart irrigation based on IOT, using soil moisture sensor, temperature sensor and buzzer in his project They use buzzer as alarming device. Purpose of using buzzer is it produce a sound when certain task is completed. When water in field achieved a threshold water level it produces a sound as indicator that the threshold level is achieved so farmer can turn off the motor. Rawal [11] used buzzer in her project as warning device as she uses ultrasonic sensor to protect the boundaries of field from animals. any animal cross the boundary ultrasonic sensor will detect the motion across the boundary of field and send signal to buzzer and it produce a sound.

APPLICATION OF GSM MODULE

Rehman [12] worked on project GSM based solar automatic irrigation system. They use GSM (Global System for Mobile communication) technology to connect farmers with new technology in their project for wireless radiation monitoring through Short Messaging Service (SMS). This GSM module is able to receive data from radiation monitoring devices and transmit the data in SMS as a signal to a host server device (phone or laptop). They mainly worked on drip irrigation method of farming in which they directly supply water to the roots of the plants. They use GSM as communication device in between centralized unit and host server device through SMS service [13]. GSM module receives data from radiation monitoring devices and transmits the data in SMS to a host server device. Advantage of using GSM is that farmer can control and regulate the activities of the irrigation system and receive information of the field.

Application of temperature sensor

Md. Islam and Md Al [14,15] have worked on the project IOT based smart irrigation monitoring and controlling system in agriculture they use Ph sensor, Water level sensor and humidity sensor and temperature sensor pump the main motive of this project to monitor the crop in the field they used temperature sensor which measure the temperature of soil and continuously send the data host server with the help of GSM module in the form of SMS. In our project we use temperature sensor on the motor which continuously monitoring the temperature of motor a threshold value of temperature set when motor attain this temperature a fan put over motor will start automatically.

Application of arduino

Prathyuksha [16] worked on the project smart irrigation using Arduino , in there project they use servo motor soil moisture sensor mini pump relay module .the main motive of their project is to measure the water level in the field .The use of Arduino in there project is it implement all the task that were given by the host server the instruction is given in the form of code and Arduino execute it and give desired output in the form of action of different-different device the main advantage of Arduino is that we can make change according to our desire so it provide a flexibility to the farmers .

An organized summary of the current state of an area of research is that we have gone through different research paper and review it and come to know about the functioning of different component which are used in different areas to reduce the human power and adds the human safety features. From these ideas we come to know that generally, water level sensor is used to measure water level in the field which lead to automatically shutdown of motor. Temperature is generally used for measuring the temperature of the field. Pump is used to transfer fluid from reservoir to desired area. Mainly focus is how to make irrigation more advanced. Buzzer is used as warning devise which indicates a sound signal when task is completed. Global system mobile communication is used to transfer data from field to host server in the form of SMS.

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