

Water Optimization and Crop Protection System Using IoT

Navyashree H R
Dept of ECE, MIT Mysore,
Karnataka, India

Abilash M
Dept of ECE, MIT Mysore,
Karnataka, India

Dr. Balakrishna K
Asst Professor, Dept of ECE, MIT Mysore,
Karnataka, India

Abstract: Agriculture is an art of cultivating the plants. Development of agriculture is crucial to feed the rising human population. Hence it is necessary to improve the productivity of the crop by using limited water resource. The proposed system is an automated irrigation with field protection unit. The system keeps notifying all the background activities to the farmer by sending SMS to the registered number (farmer) and it displays the sensor reading on the LCD display embedded with the system. In agriculture, major yield reduction is by animal attack to the farm field to overcome this problem, the system uses protection including buzzer and PIR sensor. This system is affordable by all farmers and it reduces the human labours and cost of usage. Then take the agriculture to the next level of standard.

Keywords: GSM module, SMS, automatic irrigation, temperature sensor, humidity sensor,

I. INTRODUCTION

India is an agricultural country. Agriculture plays a major role in the life of economy. It is the backbone of the economic system. Most of the Indian irrigation system is manually operated; hence it requires a large amount of water for the irrigation. The farmer used different techniques to overcome the wastage of water during irrigation but it does not meet the expectation. In order to monitor the irrigation, a mobile integrated smart irrigation system is developed which automates the irrigation by analysing the moisture level of the ground and this system will operate without manual intervention. The motor will turn ON when the moisture level is below the threshold value and turns OFF when the moisture level is above the threshold value. Surveillance plays the main role in all the field. It also helps to protect the farm field from unauthorized people as well as from the animals. Various methods are used to prevent human intruders. But the main enemies of the farmers are animals which destroy the crop and this leads to poor yield production and there is financial loss to the farm owner.

Various methods are used to overcome this problem; they are

- [1]. By putting an electrical fence around the field.
- [2]. By putting a bucket or bowl with water near the planting place.
- [3]. By using crackers. But this method causes physical and biological harm to the animals.

To overcome this problem, we can use the mobile communication technology which includes GSM module

and provide short message service (SMS) to the farm owner.

This system helps the farmer by keeping the animals away from the farm field and the system uses multiple PIR sensors to detect motion. If more than half a PIR sensor turns ON, it treats as a big animal and turns on the buzzer and if less than half a sensor turns on, the system treats it as a smaller animal and starts spraying the rotten eggs and the system is embedded with the camera which turns on when the PIR sensor goes high and captures the image. That image is stored in the cloud by using the Raspberry Pi and the land owner views the image on any smart device.

The proposed system performs both water optimization and field protection functions. An automated irrigation system generally consists of soil moisture sensor, humidity sensor, temperature sensor and water level sensor. This sensor helps to get the accurate value which is needed to water the field in time. The system is embedded with the GSM module which helps to send the SMS to the farmer.

In the farm field, it seems that unequal distribution of water in different places of the land during irrigation and there are some places where the irrigation is difficult to carry out everyday. In this place, we can place the sensor to get the moisture level of the ground.

II. LITERATURE SURVEY

Vaishali et al., [1] worked on an automatic irrigation system and monitoring system. The system supports water management decision used for monitoring the whole system using GSM module. The system continuously monitors the water level in the tank and provides accurate amount of water required for the plant or crop. The system checks the temperature and humidity of soil to retain the nutrient composition of the soil managed for growth of plant. Smart phones are used for communication.

In the proposed work, the crops or plants are considered along with their water requirements at different stages. The crops or plants are watered with respect to the water requirements at different stages. The water is passed to the plants as and when required. If the soil is dry, an alert SMS is sent "motor on" to the mobile and through the voice or text, a water pump is turned off and water flow stops. Here an application that is Blue term

is used. These apps totally worked on Bluetooth. To interface the Android application and the master robot, we require a Bluetooth module. These applications are used to

writing and coding programming then these program is send to the raspberry Pi. These Sets of code is then given input of motor which is responsible for the movement of water.

Vikas Bavane et al., [2] worked on intelligent Surveillance System. Animal attack in India are very common scenario nowadays. And which leads to great loss to the because of damage of crops from animals. Due to the unavailability of any detection System these attacks kill villagers and also destroy their crops. Due to lack of proper safety measures these villagers are left helpless. Therefore the proper detection and monitoring system may help to save their lives and also to preserve the crops safely. In the system sensors and camera are interfaced to the raspberry pi model. As soon as the pir sensor go high on detection motion within a range of 10 metres, the camera will be on then it will start to capture the video for six minutes it will stored on cloud then the message will generated and send the registered mobile number. If the motion detection is due to an authorized person with a valid RFID like the farmer or some worker it gets recorded automatically if it is not so then the system further processes the image by using matlab for object detection and decides if the entity is an animal intruder. Hence the system is capable of turning on/off automatically and warding off the animals from the field thus protecting the fields from any damage also we can setup a timer as per farmers requirement.

Gobhinath S et al., [3] worked on a system with field protection and crop health management System using an autonomous robot. This model is for improve irrigation, an autonomous rover for monitoring the fields, a system for identification and classification of affected plants. A technique has been designed with the help of machine learning mechanism and image processing tools. They have used support vector machine algorithm for the task of classification of diseases. To capture the current status of the plants a rover with fixed camera have used which moves around the field and collects a data. The images are further processed for disease identification identification using SVM classifiers based on which suitable cations can be taken. A smart autonomous gardening rover, which can be controlled remotely has been fabricated which automatically identifies, classifies the plant species and measures the key parameters for farming such as temperature, humidity, heat level, windspeed, wind direction and soil moisture. Based on the acquired data and history, actions are taken to maintain the farm more effectively.

S. Vithyalakshmi [4] worked on automatic irrigation System which facilitates the effective irrigation. Agriculture uses most of the available fresh water. Since the atmospheric parameters vary from place to place in large farm field. It makes difficult to maintain uniformity in all the places of farmfield manually. So a combined function of wireless sensor networks are incorporated in root zones of the plants. ZIGBEE radio modem transmits the information to master microcontroller for processing. The microcontroller is programmed with threshold values of soil moisture and temperature sensors. Automatic irrigation starts when the processed data of the

microcontroller drops below the threshold value. The strain sensor is used to indicate the motor theft. A GSM module is embedded to provide the remote control of data inspection and irrigation scheduling. It has a two main functional units they are wireless sensor field unit (WSFU) and wireless control unit (WCU). The proposed system allows cultivation of crops in places with water scarcity thereby improving sustainability. This irrigation system can be adjusted to variety of specific crop needs.

Lala Bhaskar et al., [5] develop an automatic crop irrigation system which aids farmers in irrigation process. It keeps notifying the farmers through onboard lcd display and message that is sent on the farmers cellular number. The proposed system is also helpful for the farmers who are facing power failure issues to maintain a uniform water supply due to power failure issues to maintain a uniform water supply. The automatic irrigation system also keeps the farmer updated with all the background activities through the SIM900 module that sends messages on the registered number. This device can be a turning point for our society. The device is easily affordable by the farmers of the country. This proposed design is helpful for reducing the human labour. This is a low budget system with an essential social application. this model visions eliminates the human labour completely. Farm automation includes monitoring humidity temperature, water levels of the wells and uniform supply od water using sprinkler and drip water irrigation. This is an low budget system with an essential social application which can be further improved by using latest technology.

Vensa Maras and others [6] worked on optimal irrigation method which will be a tool for precision agriculture. Here they have developed this optimal irrigation method particularly for a vineyard. The precision viticulture is unique in its emphasis on to accomplish this aim. To achieve a particular goal of improved yield and quality in vineyard management system, it is essential to understand the impact of plant soil water dynamics of pheonological growth stages of the plants physiology. Irrigation is the one of the most important factors for the crops and for successful agricultural production. contemporary plant production is based on the better utilization of water per unit area. That is to achieve as much yield as possible. While reducing the amount of invested resources. The paper presents the results if research carried out within company. At several micro localities with different vine Varieties, 28 sensor devices have been installed on the cemovsko field for each micro locality the values of the field moisture capacity were determined all for the purpose of more precise scheduling of the irrigation and irrigation norm. Vineyard management according to the local variation of agro based biological conditions, and in its use of science and technology

III. PROPOSED SYSTEM

To facilitate effective irrigation of crops and to avoid wastage of water, a soil moisture detection module, a DTH11 module and a water level sensor module has been combined and their values are used to draw the conclusion

whether the crop can be watered or not [7]. At first, the soil moisture is taken into account. If the water level in the soil is below the required water level essential for the plant, then temperature and humidity is checked. Temperature and humidity are checked in the view that watering the crops when it is about to rain then the plants will not be watered. When all the aspects do not meet the preconditioned value sufficient for the plant, then the plant has to be irrigated, the water level in the tank or well is to be checked. This is done by considering the necessity of water during inevitable plight. If the water level is low, it is indicated to the farmer and they can take the suitable actions.

Passive Infrared Sensor (PIR) is used to detect animal invasion in the field to protect the crops from the wild animals. If any animal is found then PIR Sensor goes high it will generate ultrasonic sound from the buzzer/speaker because of the buzzer/speaker sound the animal go away from the field. The GSM module is used to send the message to the farmer in aremote area about the field regarding motor on/off, animal intrusion and water level in the tank or well [8]. The lcd display will display the moisture of the soil and temperature and humidity of the farm field to convey the farmer [9][10].

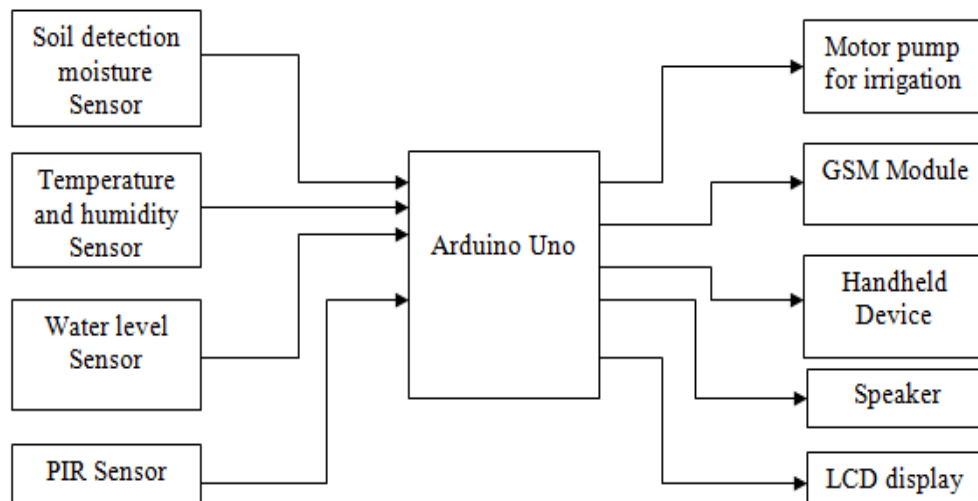


Figure 1: Block diagram for the proposed model.

RESULTS

If the soil moisture value is less than 1000, an alert message is sent "MOTOR ON" to the mobile then water will be supplied till the plants reach the moisture level. If the soil moisture value is less than 250, an alert message is sent "MOTOR OFF" to the mobile then water supply will be stopped. The GSM module is used for message transform. The result of LCD display that has been interfaced with Arduino Uno. The LCD display acts as an output system that displays the status of system. The LCD display provides the message about both irrigation need and field protection.

IV. CONCLUSION

The research designs an automatic irrigation system and field monitoring system. The outcome of this project would take the agriculture to the next level of advancement. The proposed system allows the cultivation of crops in places with scarcity of water. This irrigation system can be adjusted to variety of crop needs. The system will reduce the man labour and protection system to the farm field eliminates the loss of yield to the farmer due to animal attach. By using the method of irrigation as specified in the paper crops receive optimum amount level of water and wastage of water can be prevented. Protection of farmland prevents the physical damages to the crops. The system allows the farmer to remotely know about their farm field condition like motor on and off availability of the water in the tank and when any

movement of animal find in the field by using GSM. LCD display the information about the sensor reading and motor on and off for the convenient of the farmer.

Acknowledgement:

We are grateful to Maharaja Institute of Technology, Mysore for continuous encouragement to continue this research work. We would like to thank our family members, Staffs of department ECE and friends for their continuous support to present the paper.

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