

Smart Irrigation System using Arduino Uno and Control of Paddy Plant Diseases



B. Pavan Kumar Reddy, M. Sujatha

Abstract: These days, the increase in population has led to water scarcity in India. A large amount of water is wasted in Horticulture. Horticulture is the backbone of India. Most of the population in India depends on agriculture mainly in villages. This paper proposes an automatic irrigation system and control of paddy plant diseases by using pesticides. It monitors environmental parameters such as temperature, soil moisture, and humidity and also monitors paddy plant diseases. The functioning of motors is mainly based on the soil moisture. The digital image processing technique is used to find plant diseases. Crop production can be increased by detecting the disease as early as possible and providing proper pesticides. It also detects the intruder in the field by using the ultrasonic sensor. By using the GSM module the message will send to the farmer.

Keywords: Soil moisture, GSM module, temperature, paddy, humidity.

I. INTRODUCTION

In India, around 70% of the population depends upon agriculture. Agriculture is the primary occupation in India. It is the strength of the Indian economy. To avoid food scarcity, it is very important to support the agriculture sector. Improving agriculture is essential to meet the rapidly growing demand for food in population growth across the world. Farm productivity can be increased by considering and predicting ecological circumstances. Paddy is the most cultivated crop in India. The executives of the paddy plant from beginning time to develop collect state build the yield This work revolves around seeing paddy plant illnesses to be a particular rice sway disease. The correct discovery and acknowledgment of the disease is significant for applying manure. There will be a decrease in crop growth if the diseases are not perceived at the beginning time. The fundamental objective of this work is to develop a picture acknowledgment framework, which distinguishes the paddy plant infections influencing the development of paddy. The framework additionally screens natural parameters.

A high augmentation pace of the human population realizes the need for productive use of world assets. In this paper [1], a cloud-based trickle water system framework, which decides the measure of water and plays out the water system process naturally, is exhibited. To gauge the ecological substances, such as temperature, moisture, and humidity, an additional sensor is remembered for the framework.[2]

A Global Packet Radio Service module empowers web association of the framework and all the sensor information just as framework status information is recorded in a cloud server. A computerized water system framework was created to enhance water use for horticulture crops.[3] The framework comprising of a remote sensor unit that is a temperature sensor and soil dampness is set in the plant root zone by utilizing Zig Bee technology. In this to send information to the client GPRS is used.[4]

In this paper [5], the large field area is separated into small divisions. Each division of the field has its own automatic irrigation system. There will be communication between all separated divisions. These areas are internally linked and communicated by using technology wireless sensor networks. The radiofrequency is used for communication. Each division has its own motors and works based on the input obtained. The proposed technique utilizes Arduino for dampness detection and the controlling of water supply and Node Microcontroller Unit (MCU) for informing the status of the structured water system framework to the farmers through portable correspondence. The possibility of the Internet of Things (IoT) has been coordinated with computerization to plan the proposed Automated Irrigation System.[6]

II. PROPOSED METHOD

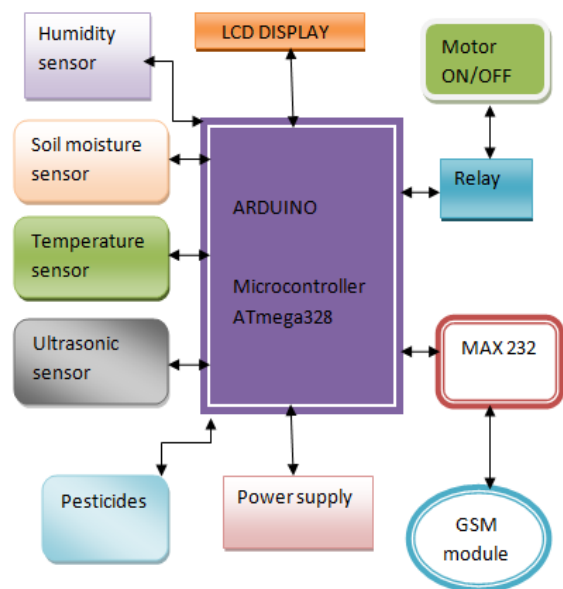


Fig. 1 Proposed System Overview

The development of the smart irrigation system increases the quality of farming. The motor on and off mainly depends on the soil moisture sensor. The dielectric permittivity principle is used in soil moisture sensors.

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There are two threshold values, one value is when the soil is in dry condition and another value is in wet condition. According to the threshold values, the motor ON and OFF takes place. A relay acts as a switch to the motor.

The status of the motor and value is displayed in LCD. By using moisture sensor wetness in the atmosphere is measured. By using temperature sensor temperature in the atmosphere is measured and displays on LCD.

An ultrasonic sensor is used to detect the intruders entering the field and makes sound by using a buzzer. This system also detects plant diseases, mainly four types of paddy diseases such as

- Leaf Blast,
- Bacterial leaf Blight,
- Brown spot,
- Narrow brown spot

LEAF BLAST:- The leaf blast disease occurs due to the presence of low soil moisture and when the temperature is cool in the daytime. In this case, the leaves will turn white to grey-green spots and dark green at the corners of the leaf. This disease can be managed by applying silicon fertilizers to the soil.

BACTERIAL LEAF BLIGHT:-

Bacterial leaf blight occurs due to the heavy winds and humidity above 70%. In this case, infected leaves turn into grayish color and roll-up. This disease can be managed by providing a balanced amount of plant nutrients and especially nitrogen.

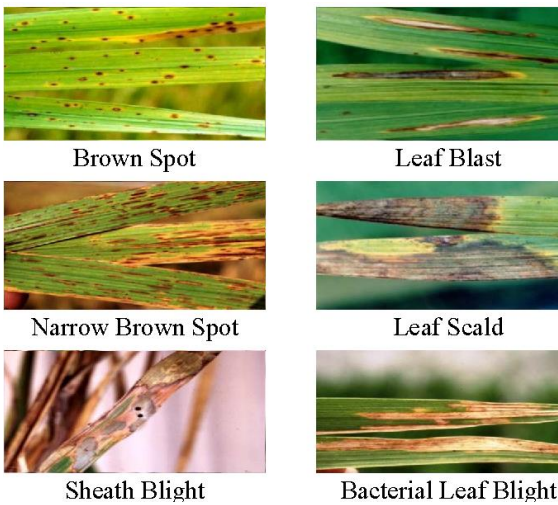


Fig. 2 Types of paddy plant diseases.

BROWN SPOT:- Brown spot disease occurs due to the presence of toxic substances in the soil. In this case, we see the circular brown spots on the leaf and it can be managed by providing of required fertilizers to the soil and also calcium silicate slag has to be applied to the soil before planting.

SHEATH BLIGHT:- Sheath blight occurs due to the presence of more nitrogen in the soil. In this case, leaves will turn into yellow or orange-yellow, and this can be managed by applying Neem cake at 150 kg/ha.

The motors have a connection with the microcontroller ATmega328 and they will provide pesticides to the plants according to diseases. Initially, a healthy leaf image is stored as input and the image which is obtained is compared with

the original leaf and then type of disease is detected and the particular motor will turn on and off.

III. IMAGE PROCESSING

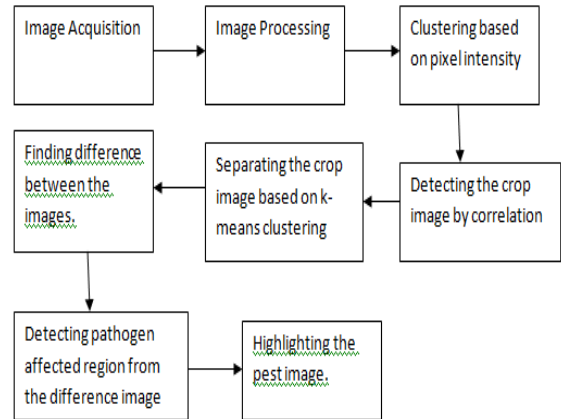


Fig. 3 Block diagram of image processing.

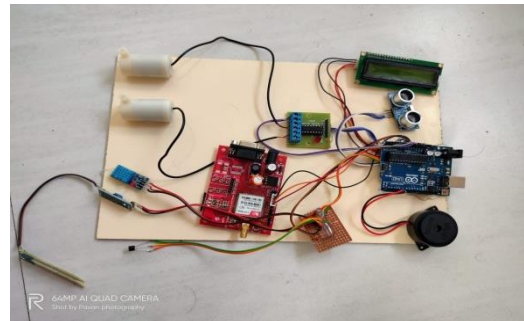


Fig. 4 System Model

IV. RESULTS

Using Arduino IDE software the values are evaluated and displayed on a monitor. These are the values of temperature, humidity, moisture, and status of the motor.



Fig.5 Sensor Values when motor is OFF.

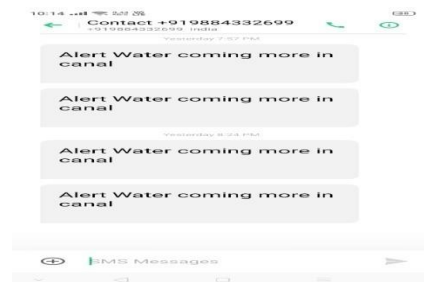


Fig.6 Message alert to farmer.

The four pesticides motors on and off based on the image obtained. The soil moisture sensor is responsible for motor ON and OFF.

V. CONCLUSION

The proposed method of smart irrigation system and control of paddy plant diseases is a valuable tool for the farmers. Based on environmental conditions the threshold values are fixed for the moisture, temperature, humidity and also to the motors which are connected to the pesticide bottles. This process eliminates manual power in the field. Intruders can be avoided by using the ultrasonic sensor and sound will be made by using a buzzer. A message is sent to the farmer by using the GSM module whenever the flow of water is heavy in a dam near the village. The motors which consist of pesticides turn ON and OFF based on the threshold values obtained from the controller. The future work of this project uses solar power and should pesticides should provide to all other plant diseases. Digital image processing plays a major role in the comparing of two images.

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