JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

IOT BASED MONITORING SYSTEM FOR SMART FARMING

Dr S K B Pradeep Kumar CH[1], G Jahnavi[2], Ch Sai Jayanth[3], S Sai Bhanu Prakash[4],
M. Pavan[5]
[1]Associate Professor, [2345]UG Scholar
Department of EEE
Ramachandra College of Engineering (Autonomous), Eluru, Andhra Pradesh, India

Abstract: India is a nation that specializes in farming crops. Farmers were the only source of income for our historical publics. For the majority of Indians, agriculture is a major source of income and influences the nation's economy greatly. Irrigation becomes problematic in arid regions or when there is insufficient precipitation. To safeguard farmers, it wishes to be measured in any way and involuntary for the right production. One area of agriculture that is subdivided into horticulture is important for employment, gender mainstreaming, human nutrition, and the economy. While the goal of an autonomous irrigation control system is to reduce the amount of work that a human operator, or gardener, must do to maintain food security, the goal of a horticulture system is to quantify food security. The Arduino platform, which is used in this control system, is coded in embedded C. Messages on the state of the pump are also sent to the operator's mobile device using GSM technology. One may quickly and efficiently obtain the data by employing this strategy, saving both time and effort.

Keywords: EvapoTranspiration (ET), Irrigation water use efficiency (iWUE), proportional–integral–derivative (PID), water fraction by volume(WFV).

I. Introduction

India, a nation with strong roots in its agricultural heritage, has always relied on crop production to survive [1]. The country's economy has been profoundly impacted by agriculture, which has long been the lifeblood of the populace [2]. Nonetheless, the problem occurs in areas with little rainfall, necessitating irrigation in order to guarantee good agricultural yields and protect farmers' livelihoods [3]. Automatic irrigation control systems have arisen as a crucial instrument for accurate and effective agricultural output in response to this necessity. Fruits, vegetables, flowers, spices, and sauces are just a few of the many crops that fall under the umbrella of horticulture and have been increasingly popular in the agricultural sector [4].Horticulture's main objective is to provide food security for the people of the country by addressing both financial and dietary issues [5].

II. LITERATURESURVEY

Precision irrigation is a modern irrigation management strategy which applies only the necessary amount of water to the crop, with varying rate and duration as needed based on site- specific conditions. Precision irrigation has been proven to increase the water use efficiency compared to conventional irrigation management approaches based primarily on operator's experience or preset irrigation scheduling (Zhang et al., 2002). Irrigation water use efficiency (iWUE) is defined as the dry mass of plant tissue or yield produced per unit of water volume used for irrigation. Water can be applied precisely based on the sensor data and scheduling strategies in the precision irrigation system. In precision irrigation, parameters can be related to soil, plant, or weather. Common irrigation scheduling strategies include soil moisture-based, plant-based, and EvapoTranspiration (ET)-based irrigation. Various control strategies have been used for automatic irrigation systems. The simplest automatic irrigation system is based on timer with a programmed setting. Another widely used method is on-off control of solenoid valves based on sensor data. There are also some advanced control theories, which may have better accuracy in irrigation, including proportional–integral–derivative (PID) control, fuzzy control, neural network, and model predictive control (MPC) (Romero et al., 2012).

IoT-based irrigation is a new irrigation solution and has been attracting attention in recent years. A wireless sensor network (WSN) is usually a core component in an IoT-based irrigation system, which connects sensors and server wirelessly. Users can access the field data through the Internet in real-time, and the data can be analyzed and processed on the server. Several types of IoT wireless technologies can be used for agricultural application, including ZigBee®, ONE-NET, 7 Sigfox, WirelessHART, ISA100.11a, 6LoSWPan, Bluetooth Low Energy (BLE), LoRa/LoRaWAN, DASH7, and low-power Wi-Fi (Tzounis et al., 2017). Typically, the energy efficiency, network features, scalability, and robustness should be taken into consideration in selecting the IoT system technology

III. PROPOSEDMETHODOLOGY

We suggest this project as a way to address every flaw in the current setup. We are able to communicate over large distances with this initiative. It lessens the workload for farmers, as farming requires automation. Automation of farming procedures reduces the time and energy needed to complete time-consuming chores and boosts produce output. The goal of this project is to create a system that uses sensors based on an Arduino board to monitor temperature, humidity, wetness, and even the movement of animals that might damage crops in an agricultural field. If there is a discrepancy, the system will send out an SMS notice. Depends on whether the water level pump is turned on or off, by utilizing the ultrasonic sensor to measure the water level. Based on the on/off LEDs of the LDR sensor.

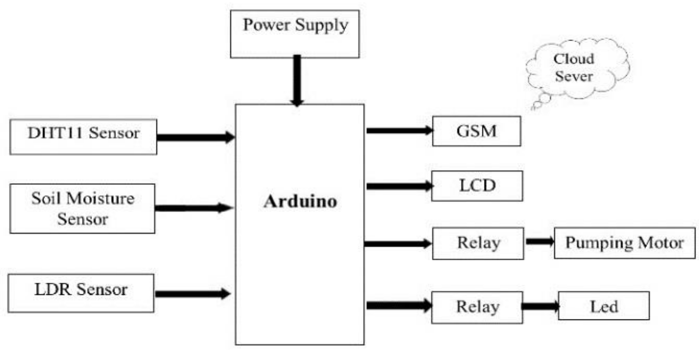

Figure 1: Proposed Block Diagram

IV. HARDWARECOMPONENTS

To achieve the intended results, the following elements are being used in this project in Figure 2:

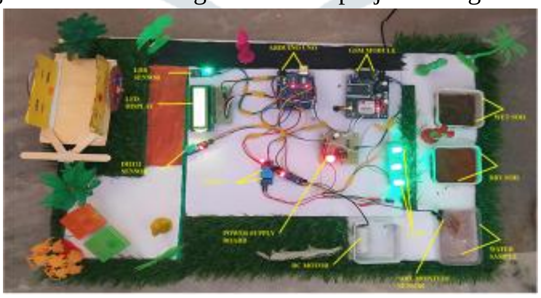

Figure 2: Hardware setup

V. RESULTS AND DISCUSSIONS

The proposed smart agriculture monitoring is very helpful for the farmers, who are actually in need. Where GSM modem takes the information from the Arduino IDE and forwards the messages to the respective contact numbers. And Wi-Fi model sends the parameters to the IOT server by graphical method. Then farmer performs the necessary precautions to the field. In this paper we have test on different soil conditions by using soil moisture sensor, based on that condition the motor will turn on and off position automatically, and also Temperature and Humidity sensor in atmosphere by using DHT11 sensor. In that output reading shows on the LED Display. The study was conducted for testing soil moisture in the following four modes and the readings of the sensors show on the table 1.

Mode 1:

Figure 3: Testing On Dry Soil

Mode 2:

Figure 4: Testing on Dry Soil with Adding Some Water

Mode 3:

Figure 5: Testing on Wet Soil with Full Of Water

Mode 4:

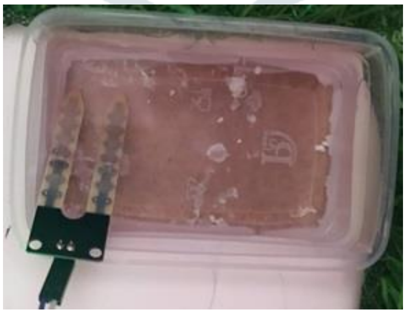

Figure 6: Testing on Pure Water

The Study results are shown in Table 1. As from the conducted study, it is observed that the moisture content varied in the range between 31 WFV to 99 WFV. Also, the position of the motor for the listed operating modes is also given in Table 1.

Table 1 Test Results

Type of Soil	Soil Moisture	Motor Position
Dry Soil	99	**ON**
Water is added to dry soil	65	**OFF**
Wet soil	31	**OFF**
water	**38**	**OFF**

The Bar chart of the test results are shown in Figure 7

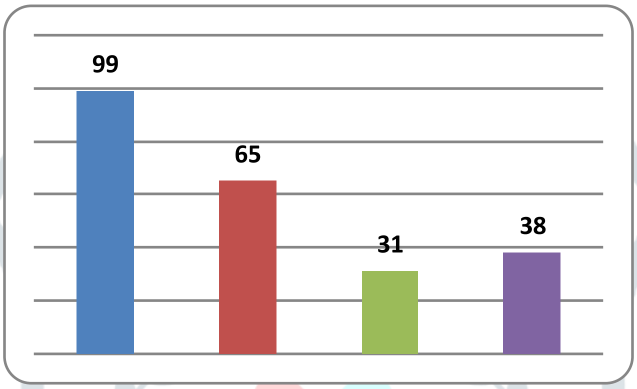

Figure 7: Barchart showing Moisure content of Different soils

VI. ACKNOWLEDGEMENT

As from the conducted study, it is observed that the moisture content varied in the range between 31 WFV to 99 WFV. And the IOT based monitoring system for smart forming is superior to the traditional farming system.

VII. REFERENCES

1. Mini, Ajit Divakaran, et al. "IoT based smart agriculture monitoring system." *InternationalResearchJournal of engineering andTechnology*10.4 (2023): 1442-1448.
2. Rehman, Amjad, et al. "A revisit of internet of things technologies for monitoring andcontrolstrategies in smart agriculture."*Agronomy* 12.1 (2022): 127.
3. "Automated Systems for Smart Agriculture", IEEE Pune Section International Conference, 2019, Anjali Chandavale, Abhijeet Dixit, Aditya Khedkar, and Rucha B. Kolekar.
4. "heart rate monitoring system," by P. D. Kandait, Abhishek Madankar, and Mineral Patil, presented at the 5th International Conference on Advanced Computing & Communication Systems in 2019.
5. The article "A Survey on IOT based Digital Agriculture Monitoring System and Their impact on optimal utilization of Resources" was published in the IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) in 2016. It was authored by Prosanjeet J. Sarkar and Chanagala Satyanarayana.
6. "Inventive GSM based Remote Controlled Embedded System for Irrigation," Indu Gautam and S.R.N. Reddy, International Journal of Computer Applications, vol. 47, no. 13, June 2012.
7. "A Novel Soil Measuring Wireless Sensor Network," by Q. Wang, A. Terzis, and A. Szalay, IEEE Transactions on Instrumentation and Measurement, pp. 412-415,