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Greenhouse Automation using IoT and Cloud Computing

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ABSTRACT: Irrigation is an important task when comes to farming. India is also known for its farming outputs, so based on several methods used while irrigating a farm field involves manpower, water resource and most importantly availability of water. So to save these efforts also the water, we are proposing a system where the manual work will be exchanged with automated system which is capable enough to irrigate field automatically without human interventions. Automated system here is designed for poly-house which consist of Soil moisture sensor which will sense the soil-moisture content of the soil and based on that the system will operate the pumps and irrigation process is carried out. Another parameter is temperature within polyhouse so using temperature sensor we will sense the temperature in poly-house and the temperature cooling mechanism will get operated. Android will act as a user inter-face where the user can manipulate system using the device also gets the information related to its farm field. Index Terms—IoT (Internet of Things), Android, WSU (wireless sensor unit), WIU (wireless information unit), Temperature sensor, Soil-Moisture sensor, Fan..sector, as its requirement in agriculture starts from initial stage like at the time of cultivating crops until the crops are ready for harvesting. So while manually irrigating the fields, sometimes water is irrigated more than required amount or less water can also be irrigated, which is a concern while irrigation which leads to poor quality and quantity of farm output. The system is developed as a automated Greenhouse using IOT and cloud computing to irrigation and maintenance of temperature needed for crops

KEYWORDS:IoT (Internet of Things), Android, WSU (wireless sensor unit), WIU (wireless information unit), Temperature sensor, Soil-Moisture sensor, Fan.

I. INTRODUCTION

Agriculture field is the backbone of any country. Agriculture supplies the food and raw materials to the people in country. It is the only income source of many peoples. Peoples who belong with agriculture field faces many problems such as decreasing production due to unsuitable climatic changes, flood, dearth and many other natural reasons and rarely factors. They are unable to do agriculture due to this reason. Farmers are facing lots of problems and loss due to lack of knowledge. Most of the farmers are either committing suicide or migrating from the agriculture. Motive behind this project is to provide a system to the farmers that will provide them the suitable information while choosing. Irrigation is an important task when comes to farming. While irrigating a farm field involves manpower, water resource and most importantly is availability of water. Due to climatic conditions sometimes it becomes difficult manage irrigation. We propose a smart irrigation method with smart Greenhouse to make irrigation easier. Water is one of the important factor which is required in agriculture

II. RELATED WORK

In this paper, soil moisture sensor, temperature and humidity sensors placed in root zone of plant and transmit data to android application. Threshold value of soil moisture sensor that was programmed into a microcontroller to control water quantity. Temperature, humidity and soil moisture values are displayed on the android application [1]. In this analysis done without manpower by automatically buzzer will on and it will improve the efficient use of energy saving [2] This system promises about increase in systems life by reducing the power consumption resulting in lower power consumption. It is considered to be used at Cricket stadiums or Golf stadiums and also in public garden area for proper irrigation [3]. This smart drip irrigation system proves to be a useful system as it automates and regulates the watering without any manual intervention. Sending the emails to the system can be automated but manual sending of the emails has control over the system regarding whether or not to run the system depending upon the weather conditions [4]. In this combination of hardware and software provides a irrigation controller that can be implemented at relatively low cost and which is extremely user friendly [5]. In this paper they are proposing use of IoT in a poly house and poly house is a fully covered structure so there is almost no effect of outside factors like insects do not enter and cannot harm the crop so there will be less need of insecticides. By using sensors the crop field that is connected to internet, an

appropriate decision can be taken [6]. In this irrigation system the drip is ON/OFF using a Bluetooth module. In this system the data storage device is reduced to control a drip and reduced a manpower [7]. This paper designs an automated irrigation system to water the crop and it will optimize the usage of water by reducing wastage. By providing Android application the user can monitor and control the water require-ment in the farm, the system will reduce the human intervention [8]. It gives the idea to monitor the soil moisture content and temperature in a farming area and the user can control watering system using Android device provided with Wi-Fi facility [9]. Agriculture is base for all the industries for raw material and cultivation requires different water levels at different periods, so for minimizing and maintaining water level [10]

III. PROPOSED ALGORITHM

A. Block Diagram Description 1) Arduino: Arduino is the center hardware where the other component are connected. 2) Router: It is used to collect the data through Arduino kit and sends to the remote devices e.g: Smart phone, Tablet, PC etc. 3) Smart phone: It is used to access the details and get the feedback through system and also can give permission to the system to work. 4) Relay switch: Through Relay switch the Water pump is connected to Arduino kit and it switches the pump on and off while irrigating farm land. 5) Temperature sensor: Senses Farm temperature and regulate the temperature adjusting mechanism 6) Soil-Moisture sensor: Senses the Moisture content of soil bases on threshold values and regulates the water pumps for irrigation.7) Fan : The fan is used to control the temperature in greenhouse. If temperature goes high the fan starts to bring down the temperature.

B. Block Diagram

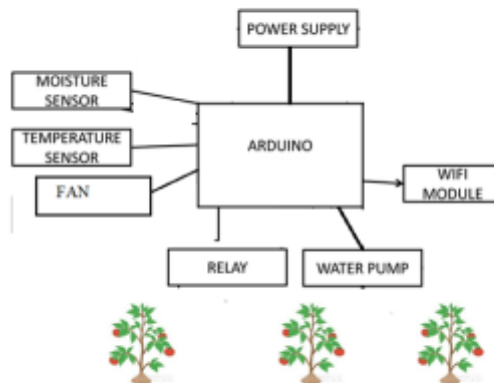


Fig. 1. Block Diagram

C. Hardware Used

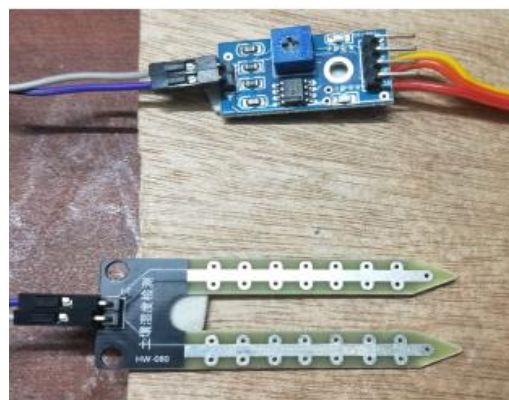


Fig. 2. Soil Moisture Sensor



Fig. 3. Water Supply

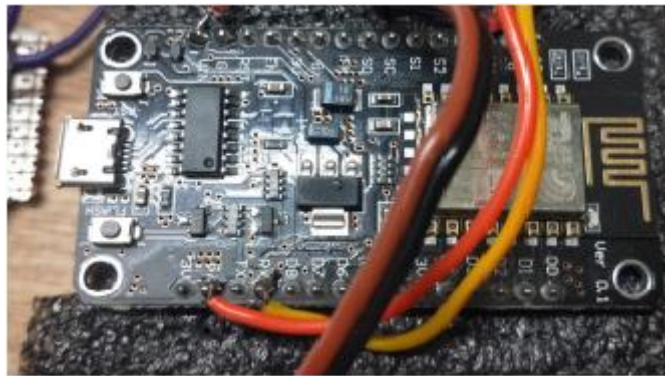


Fig. 4

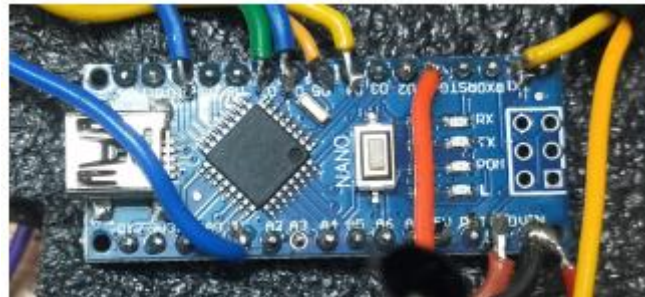


FIG. 5. ARDUINO NANO



Fig. Relay



Fig. 7. Power Supply

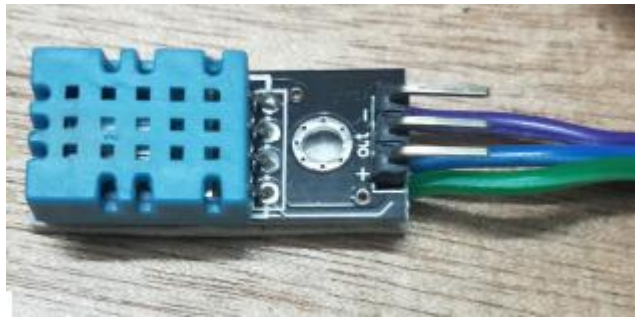


Fig. 8. DHT11



Fig. 9. Fan

OUTEPUT

IV. SIMULATION RESULTS



Fig. 11. Experimental Setup

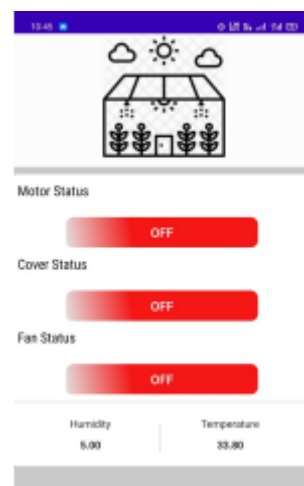


Fig. . Application Status : OFF

V. CONCLUSION AND FUTURE WORK

The system can provide the better and convenient way of farming so that farmers can work with proper knowledge and can cultivate crops also keeping the quality and quantity of crops, with that they can save adequate amount of water and can reduce the human efforts. The observations and results tell us that this solution can be implemented for reduction of water loss and reduce the man power required for a field. In future we can make use of cameras which can capture images of crops also we can move the cameras remotely through the app in front and backward direction just to see each and every crops condition. Use of solar panels for energy conservation can be done.

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