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SMART IRRIGATION SYSTEM IN POLY HOUSES BASED ON IOT

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ABSTRACT:

The main goal is to improve farming practices by using new technologies to improve yields. It was fully automated, consuming less power from the man. Poly house is closed system for irrigation practices to protect plants from extreme weather and harmful diseases, namely: virus, high temperature and ultraviolet radiation. To control climate factors and changes in the environment, a software equipment may be required. We can also add different types of sensors to test plant condition and soil composition. If there is insufficient moisture in crops, the threshold value specifies whether the pump will be turned on or off .The controller used in this system was ARDUINO. It was inexpensive and well suited for applications of all kinds. And the IC is ATMEGA328. It includes flash memory,1 Kb EEPROM,2 KB SRAM and it handles with 23 General purpose input output lines,32GP Working registers, ARDUINO operates at the voltage in the range of1.8-5.5volts.This system results better yield and handles automatically without any human interference.

Keywords:

Poly-house,IOT, Agriculture, Temperature sensor ,Humidity sensor, Soil moisture sensor, Relays ,Solar panel.

I. INTRODUCTION:

In India ,agriculture is performs in a traditional way and it falls at backward stage when there is no invention of new technologies.

Approximately near 50 percent of people in India has been engaged with farming .So for that the agriculture becomes a lively hood for Indians .Now at present days we are inventing a new farming equipment by using our modern technologies .With that the agriculture becomes easy to handle in smart way .By using smart method we can done the work easily when the person is at any place. This system needs to improve the performance of yield and also gives healthy food.

- With the advantage of ARDUINO board with the use of soil moisture sensor it can detect the moisture in the soil and helps to the farmer to irrigate itself. The given system uses ATMEGA328P micro controller on the ARDUINO board .And it helps the farmers to monitor the Working of the water sprinklers. It helps the farmer to work more with the less human work as the irrigation is fully automated.

- In the underground well digged in the farm it collects the water from various sources like rivers, canals ,rain water, and from the bore wells in the fields. With the use of ultrasonic sensor in the well its sends the message to the farmer when it becomes empty or it may be full.

- The water is pumped into a tank up to a threshold value with the use of a motor. The tank is connected to a pipe line which is given to the field n the irrigation network. The valve of the tank is opens when the moisture in the field is fallen or it may becomes dry.

- The temperature and the humidity in the poly house are measured with the use of temperature sensor and humidity sensors. When the temperature is high above a threshold value the fan is automatically turned on to decrease the temperature. As the structure of the poly house is closed the

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temperature in the poly house is high, the insects and the pesticides cannot enter into the house .Because of the closed structure ,the light intensity is low. For the photosynthesis in the plants we uses a LED light for the growth of the plants.

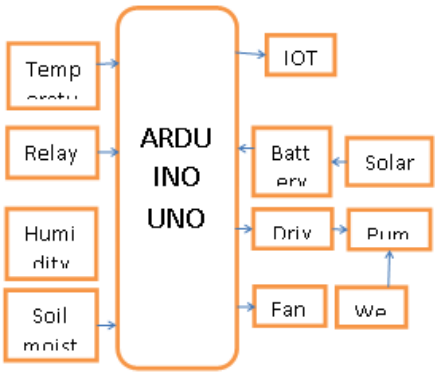

Fig: Block Diagram of Smart irrigation system in ploy houses based on IOT

ARDUINO:

ARDUINO is a micro controller and in that we are using the IC as ATMEGA328,it consists of 28 pins. In that it have 14 digital pins (D0-D13) and 6 analog pins(A0-A5) used for analog input in the range of 0-5v,It have a crystal oscillator for providing the frequency range for a micro controller, It is having a voltage regulator ,capacitor, reset pin is used to reset the controller, ARET, IO references are used for input/ output ,power barrel jack, serial pin is used to receive /transmit TTL serial data, external interrupts pins are 2,3 which are used to trigger the interrupt, SPI for serial communication, AREF is used to provide reference voltage for input voltage.

→input voltage is 9-12 v

→output voltage is 3.3 -5v

→operating voltage is 5v

→recommended input voltage is 7-12 v

TEMPERATURE SENSOR-LM35

LM35 sensor has three terminals .They are

1.VCC

2.VOUT

3.GROUND

LM35 is a Integrated circuit Temperature sensor, whose output voltage changes based on the atmosphere. It is a small integrated circuit which gives better results with less cost.Its range is from -55°C to 150°C.It can be easily interfaced with any micro controller.

LM35 has an input power supply of +5v given to the input pin and the ground pin is connected to the ground.

HUMIDITY SENSOR:

Humidity is the amount of moisture present in the air. The water vapour present in the air is sensed by the humidity sensor .With the use of this sensor in the poly house it can detect the humidity in the air and it helps to turn on the fan when the humidity is greater than a threshold value.

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SOIL MOISTURE SENSOR:

Soil moisture sensor is used to measure the state of the soil condition whether it may be dry or wet condition. It detects the water content in the soil and how much of water is required for the plant. When the soil is in dry condition it automatically senses and helps the motor will be turned on automatically.

RELAYS:

Relays are the primary protective and the switching device which can take the decisions automatically whether it may be turned ON or OFF. Relays allow one circuit to switch over to a second circuit that can be completely separated from the first. There is no electrical connection inside the relay between the two circuits – the link is magnetic and mechanical only.

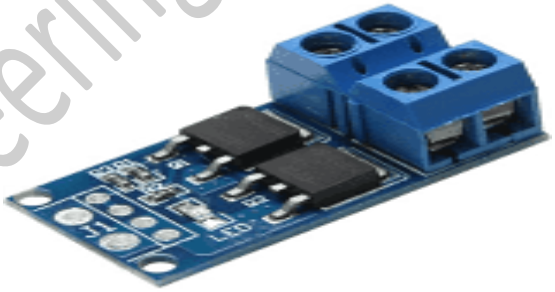
FAN:

It was having a 12v dc power supply which will be operated with the help of relays.Fan controls the temperature in the poly-house when the temperature range is high.The switching operation of the fan is based on the threshold value which is assigned to the ARDUINO based on the temperature resisting capacity of the crop.When the temperature is more than a threshold value it automatically turned ON.

PUMP:

A submersible pump is a centrifugal pump which is attached to an electric motor and operates while submerged in water. It is an ac supplied motor which is used to pump water to the fields from the well. It pumps the water when the soil becomes wet. It is automatically controlled by the relay which is given to the ARDUINO.

DRIVER:



A driver circuit is an circuit of electrical or electronic component used to control another circuit or component,such as a HPT(High _power transistor),liquid crystal display(LCD),and so on to regulate the current flow through the circuit.It is a hardware component worked by the inbuilt software.

LITERATURE REVIEW:

In A Mobile Measurement and Control System for Greenhouse[4], the proposed system introduced a GSM SMS mobile greenhouse measurement and control system based on a PC-based database system linked to the base station. The base station is designed using a micro controller, GSM module, sensors and actuators. The central station in realistic service receives and sends messages via the GSM module. The central station and then the air humidity at the base stations set the criterion value of the parameters to be determined at each base station. The surface water also blocks pores in

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the soil and destroys beneficial microorganisms. Instead, areas with limited water supply cannot irrigate throughout the growing season because the water demand frequently exceeds the supply due to traditional irrigation forms such as sprinklers or where water is allowed.

The paper proposes a GSM / Bluetooth-based revolutionary remote-controlled irrigation system. The device sets the irrigation time and can automatically irrigate the field unattended, depending on the temperature and humidity reading from the sensors and plant size. Information will be exchanged between the far end and the built process via SMS on the GSM network. A Bluetooth module is also interfaced with the main micro controller chip, reducing SMS charges if the user is within the specified range of a few meters. Effects of excessive and irregular irrigation:

.*Increase salinity

*Water logging

* Reduction in temperature to soil

* More nitration in soil

* Land becomes marshy

* Acidity of soil

PROPOSED METHOD:

The proposed method addresses the idea of developing a Smart Irrigation (SIR) using wireless sensors. The program also focuses on reducing costs and energy consumption during the process. The entire field is filled with sensor nodes including soil moisture sensors, soil PH sensors, controller nodes, solar panels, irrigation sprinklers and control valves.

The machine can decide to open the valves if the amount of moisture and humidity is less than the specified limit. The valves in the tube will open in just 3 seconds and then close immediately. As the whole process is activated every 1 hour, a plant is more sufficient to retain the necessary moisture.

If the amount of moisture and humidity is low ,it senses and decides to open the valves. Upto sufficient water observed by the plant the valve is automatically closes.

The water level sensor in the tank also controls the water level inside the tank and if it is lower than the appropriate parameter, the device will start the motor to pump the water from the well. The customer is aware of the water level status, motor on / off, moisture level and temperature level via SMS in all cases. Because all nodes are powered by solar energy from the solar panel, the SIR system also reduces the energy supply issue.

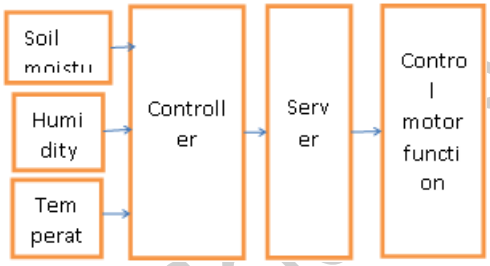

Fig: Overview of Smart irrigation system

SOFTWARE REQUIREMENTS:

It is an integrated development environment (IDE) tool for ARDUINO UNO and for all types of ARDUINO controllers. The IDE tool provides all software equipment for our project and we can design our project in PROTEOUS design software.

EXPERIMENTAL RESULTS:

The below figure shows the experimental setup for the Smart irrigation system in the poly house based on IOT. The Wi-Fi module, humidity sensor, soil moisture sensor , and LCD is connected to the ARDUINO board . Fan and pump are connected with the help of Relays.

Power supply is given to the board with the help of an adaptor or a battery. Open the

Mobile telnet tool and connect to the Wi-Fi module with an IP address of 192.168.4.1

The sensors will activated and senses the states of the soil and humidity and displays the

state in the LCD and the Telnet tool. The fan and pump will be activated when the soil

becomes dry and the humidity is more than 50^{0}C.

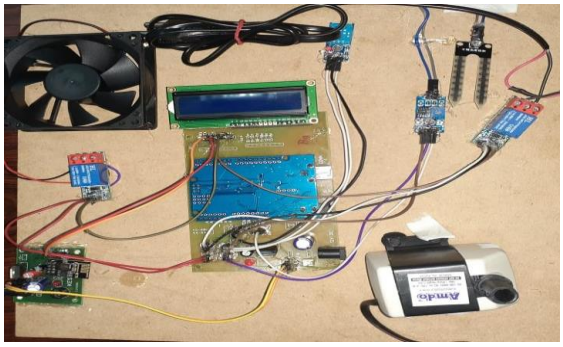

Fig : Experimental set up

Fig : Experimental Output

CONCLUSION:

The system was designed to monitor soil moisture levels and the project provided an opportunity to explore existing systems with their features and disadvantages. Depending on soil moisture levels, the proposed system can be used to turn on / off the water sprinkler, automating the irrigation process, which is one of the most time-consuming farming practices. Agriculture is one of the most water-consuming activities. Soil moisture sensor data are used by the system to irrigate soil, which helps prevent crop damage from over irrigation or under soil irrigation. A website allows the owner of the farm to track the online activity.

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