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Automatic Monitoring of Green House and Controlling System using IoT

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Abstract: This project is required to get ensure that plants could develop as much as possible inside a greenhouse, all of the factors, including temperature, soil moisture, and air humidity, had to be checked often and automatically managed. This method aids in monitoring and controlling the weather conditions most conducive to growing a particular plant. The farmer is the primary focus of this project because, in order to grow the correct crops at the right time in the right soil, he or she must frequently visit the agricultural area to monitor a range of environmental parameters, including temperature, humidity, light intensity, and soil moisture. Greenhouse farming is the practise of growing crops in ecological habitats where all environmental conditions are altered according to the crop being grown. Automation in greenhouses enables a grower to remotely monitor and control the environment at anytime from anywhere in the world. In order to gather potential greenhouse environmental parameters (and ensure continuous power supply to the greenhouse system), a greenhouse monitoring and control system with an integrated Arduino Uno R3, a solar power system with a rechargeable battery, and a variety of sensors, including temperature, humidity, light, and soil moisture sensors, is used. The Internet of Things (IoT) is also used to process the information collected, store it in a database, and give users access to greenhouse monitoring and control.

Keywords: Arduino, solar power system, sensors.

I. INTRODUCTION

In today’s greenhouses, Numerous parameter measures are needed in greenhouses today to monitor and regulate plant quality and productivity. However, there are several very important factors that come into play in order to achieve the desired results, such as temperature, humidity, light, and water, all of which are necessary for better plant growth. This project's primary objective is to develop an automatic greenhouse monitoring system in which a Bluetooth module transmits information about soil moisture, temperature, humidity, light intensity, and the status of devices (such as fans, sprays, artificial lights, and water pumps) connected to a circuit for controlling greenhouse effects or greenhouse parameters (such as light intensity, temperature, and humidity) for the purpose of providing water to plants.. The include a variety of sensors, including temperature, humidity, light and soil moisture sensor to collect possible environmental parameters of greenhouse.As well as integrating an Arduino (to store and process data), a GSM module (to send the measured value of the various parameters to the user's cell phone via SMS in order to ensure efficient plant growth), and a solar power system with rechargeable batteries (to ensure continuous power supply to the greenhouse system), a soil moisture sensor collects potential environmental parameters of a greenhouse.

Everything can now be automatically monitored and managed. Unfortunately, the manual method is still highly prevalent in an essential industry like agriculture. This is especially true for small-scale farming, where automatic monitoring and administration of a greenhouse system hasn't yet made a significant impact.The automation of a greenhouse system hasn't been completely employed for a variety of reasons, including a lack of technological know-how, high expenses, and a high maintenance requirement. Sadly, even though farming has historically been one of the most significant human vocations, manual effort is still required in the bulk of farming operations today. A greenhouse monitoring and control system is an essential part of farming because it can be used to grow plants in climate-controlled environments for the best plant output. It's also important because it extends the growing season, enables earlier planting and later harvesting, and shields plants from weather extremes by maintaining a controlled temperate environment.

II. OBJECTIVE

- To measure and regulate the temperature and humidity levels.
- To manage the water pump and determine the soil's moisture content.
- To detect fire in the event of a fire accidents and to turn on the water sprinklers automatically.
- Calculating the PH of the soil to evaluate its quality.

III METHODOLOGY

- DHT11 sensor is used for measuring of temperature and humidity of the greenhouse and with this information, desired temperature can be maintained with the help of heater and DC fan.
- LDR sensor estimate the intensity of light and automatically switch on/off of LED lights by Arduino.
- Soil moisture sensor is used to identify the moisture level in soil and water will be pumped to maintain soil moisture.
- Ph sensor will determine the Ph of soil to find whether it is acidic or alkaline. The imbalance of nutrients in soil will affects plant, so it will help to monitor and understand soil quality and apply the fertilizer and improve fertility.
- Fire sensor detect fire during any fire accidents and automatically switch on the water sprinklers.
- All the information from sensors will be displayed on LCD display and automatically controls the system.

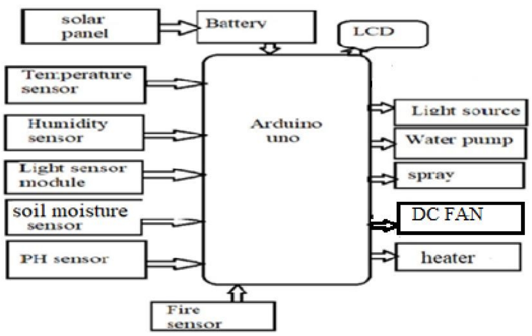

Fig 1: Block Diagram of Green House Monitoring and Control System

In fig 1 shows that to measure and control the environmental parameters in the greenhouse the system is required. The system measures parameters like temperature, humidity, sun light, soil moisture, Ph of soil and the system iscontrolled the Arduino by dumping code to it through Arduino IDE software.

The system identifies any variations in parameters it displayed on LCD displays and automatically controls the system.

IV. HARDWARE AND SOFTWARE REQUIREMENTS

Software requirements:

Arduino IDE

A text editor for writing code, a message area, a text console, a toolbar with buttons for basic functions, and a number of menus are all included in the Arduino Integrated Development Environment (IDE), sometimes known as the Arduino software. In order to upload programs and communicate with them, it connects to the Arduino hardware.

Hardware requirements:

In fig 2 shows that The ATmega328P (datasheet) serves as the foundation for the Arduino Uno microcontroller board. In addition to a 16 MHz ceramic resonator (CSTCE16M0V53-R0), it contains a USB connector, a power jack, an ICSP header, six analogue inputs, fourteen digital input/output pins, six of which may be used as PWM outputs, and a reset button. It includes all the hardware required to support the microprocessor; to get started, just plug in a USB cable, an

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AC-to-DC adapter, or a battery.

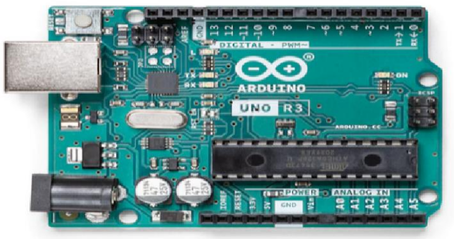

Fig 2: Arduino uno

In fig 3 shows that A flat-panel display or other electronically controlled optical device that makes use of polarizers and the light-modulating capabilities of liquid crystals is known as a liquid-crystal display (LCD). LEDs have a large and varying set of use cases for consumers and businesses, as they can be commonly found in smartphones, televisions, computer monitors and instrument panels.

Fig 3: LCD DISPLAY

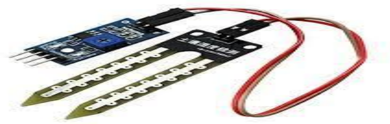

Fig 4: soil moisture sensor

In fig 4 shows that One type of sensor used to determine the volumetric content of water in the soil is a soil moisture sensor. As the soil moisturestraightgravimetric dimension needs to be removed, dried, as well as sample weighting. These sensors measure the volumetric water content indirectly using the electrical resistance, neutron interaction, dielectric constant, and other soil laws as well as replacement of the moisture content.

The relationship between the computed property and soil moisture needs to be changed and could alter depending on environmental conditions like temperature, soil type, or electric conductivity. The moisture of the soil can have an impact on the reflected microwave emission, which is mostly used in hydrology and agriculture remote sensing.

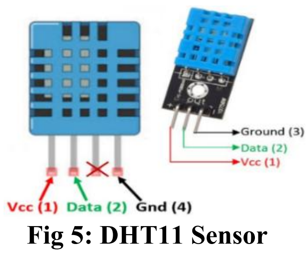

Fig 5: DHT11 Sensor

In fig 5 shows that typical temperature and humidity sensor is the DHT11. The sensor includes a dedicated NTC for temperature measurement and an 8-bit microprocessor for serial data output of temperature and humidity information.Additional factor calibrated the sensor makes it simple to integrate with other microcontrollers. The sensor and module are identical except that the module has an integrated pull-up resistor and filtering capacitor while the sensor does not.

DHT11 Specifications

- Operating Voltage: 3.5V to 5.5V
- Operating current: 0.3mA (measuring) 60uA (standby)
- Output: Serial data

- Temperature Range: 0°C to 50°C
- Humidity Range: 20% to 90%
- Resolution: Temperature and Humidity both are 16-bit
- Accuracy: ±1°C and ±1%

Fig 6: Flame sensor

In fig 6 shows that A flame-sensor is one sort of detector that is primarily designed for both detecting and reacting to the occurrence of a fire or flame. The flame detection response may be impacted by its fitting. It has a propane connection, a natural gas line, an alarm system and a fire suppression system.

Fig 7: Ph sensor

This pH sensor is a piece of equipment used in science to determine whether a solution is naturally acidic or alkaline.

- pH Range: 0 – 14.
- Temperature Range: 1-80 ºC; 33-176 °F
- Resolution: 0.1 pH;
- Temperature resolution is 0.1 ºC/°F
- Accuracy: +/- 0.2 pH;
- Temperature accuracy is+/-2%.

Fig 8: solar panel

In fig 9 shows that photovoltaic solar cells installed on a frame is known as a solar cell panel, solar electric panel, photo-voltaic (PV) module, PV panel, or solar panel. A neatly arranged collection of PV panels is known as a photovoltaic system or solar array. Sunlight is used by solar panels to collect radiant energy, which is then transformed into direct current (DC) power. A photovoltaic system's arrays can be used to produce solar power that either directly powers electrical equipment or, through the use of an inverter system, is sent back into the alternating current (AC) grid.

V. RESULTS

The result that system is expected to determine the parameters accurately, also provide a good study on the greenhouse system, with help of this data greenhouse parameters can be measuredaccurately and get greenhouse status by LCD display and automatically controls the greenhouse

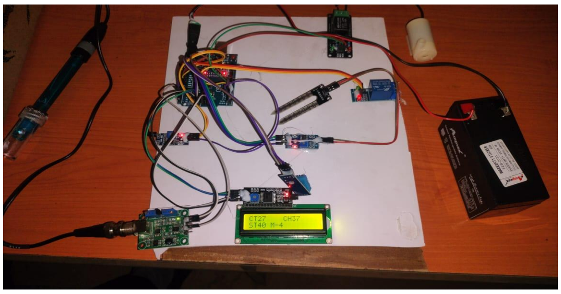

Fig 10: model of automatic greenhouse monitoring and controlling system

In the fig 10 CT is current temperature. here temperature is measured and displayed in the LCD that is 27.CH is current humidity. here the humidity is measured and displayed in LCD that is 37.

ST is denoted as change in temperature from normal condition to green house.The moisture of soil is measured and displayed in LCD.The fire sensor senses fire and automatically water pump gets turned on.

pH sensor detects pH ofwater.

VI. ACKNOWLEDGMENT

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