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AUTOMATION IN POLYHOUSE USING IoT

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ABSTRACT
Poly house is the latest method in farming technology. Poly house is a growing Organic business in developed countries. Poly house is creating a fake and comfortable environment to the crop. This method Yields more crop than the normal method and it is more organic. Automation in poly house avoids the manual error by the farmer. We are monitoring the temperature, humidity, soil moisture, intensity of light in the poly house farm using various sensors. The whole farm is controlled using arduino. The whole farm is monitored through the mobile app which is connected to internet. The arduino is connected to the IoT wifi module which sends the reading from the sensors to the cloud. DC fan and light is used to increase or decrease the temperature of the poly house farm. Motor pump is used for irrigation. It is easily monitored by the customer through the mobile app from anywhere around the globe.

Keywords- Arduino, IoT, Humidity sensor, Organic foods, Polyhouse, Temperature Sensor.

I.INTRODUCTION

The polyhouse is a part of greenhouse where the main difference is that in green house many type of product can be yield but in poly house only single variety of crop are yield. The poly house is most famous Netherlands because in that country there will be only presence of cold temperature hence the vegetation are difficult for them without the temperature, as well as they cannot to grow the crop which can be grow in the other temperature crop region. Generally polyhouse is covered with the polythene. The polyhouse can be in any shape it may be in tunnel and it is termed as poly tunnel. It may be also in square, semi-circular, elongated in shape. The polyhouse is covered with the polyethylene sheets. These sheets are used to stabilize the ultra violet rays and helps in proper photosynthesis in crops. The manual process for polyhouse is that the sunrays falls on it will preheats the air inside it. The major parameters to be considered for the polyhouse are temperature, humidity and the intensity of the light. The many polyhouse will be failed to show the result due to the manual error such as not maintain it properly. Three parameter are set only by the specification of the plant. Scientist proves that the polyhouse techniques can held 4 to 10 times more yielding than the normal method of farming techniques.

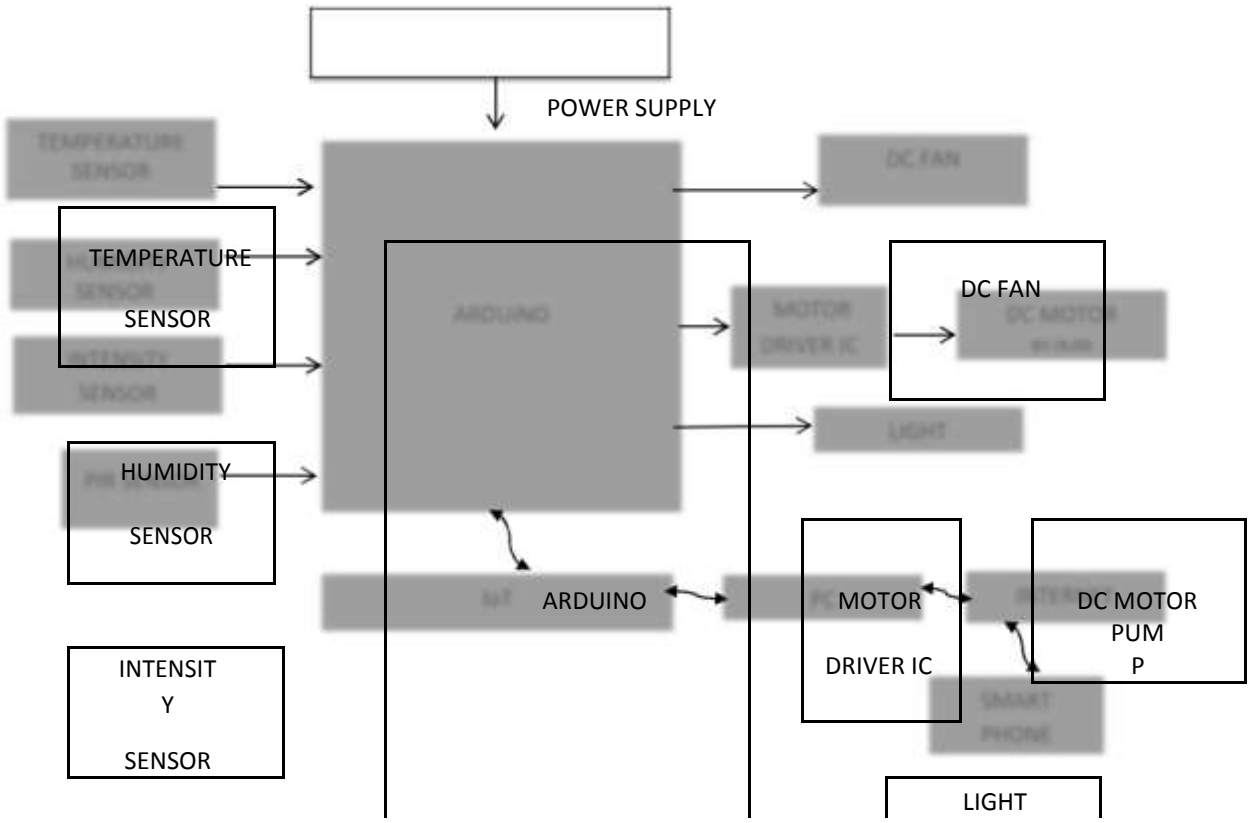
Mostly the polyhouse is constructed in east to west direction in order to allow proper entry of sun light in polyhouse farming, we can protect our crops from any adverse environment such as high humidity or high temperature. There is a facility in polyhouse to control temperature or humidity. There will be an increase in the production of vegetables, fruits and flowers etc., polyhouse can protect the crops by preventing the entry of animals and birds into the farm. When we cultivate in normal farm, nearly 45% of crops may be lost due to lack of insects and worm attacks, whereas in polyhouse farming, we can harvest the crop about 3-5 times more

without much damage or loss. We can farm any crop in polyhouse regardless of season or place which grows like tulips, strawberries etc., it also has a advantage that it requires less space for more yielding. One of the main reasons for decrease in agriculture in India now-a-days is non-availability of enough agricultural lands. In automated polyhouse the arduino is used which consist of in-built microprocessor. The power supply is given to the arduino. The input devices are used as the sensor for measuring the parameter such as temperature, humidity and light intensity. The LM35 is used as the sensor for measuring the temperature. If the temperature is below the set point the light will be on for heating purpose. If the temperature is above the set point the DC fan will turn on which only work on the DC supply. The DTH11 is used as the humidity sensor which measures the humidity of the polyhouse. When the humidity is less than the set point the motor will be turned on. This will feed the water to the polyhouse through the pump. The timer is connected to it to run the motor for the specific time. The timer circuit is coupled with the motor driver circuit. The LDR is used for the measurement of the light which is connected to the light. The readings of the sensors are stored in the IoT cloud through the wifi module which is connected to the arduino. The readings and the other things in the farm are monitored using the mobile app which is connected to the internet.

II. AUTOMATION

inPolyhouse:

2.1. Block iagram



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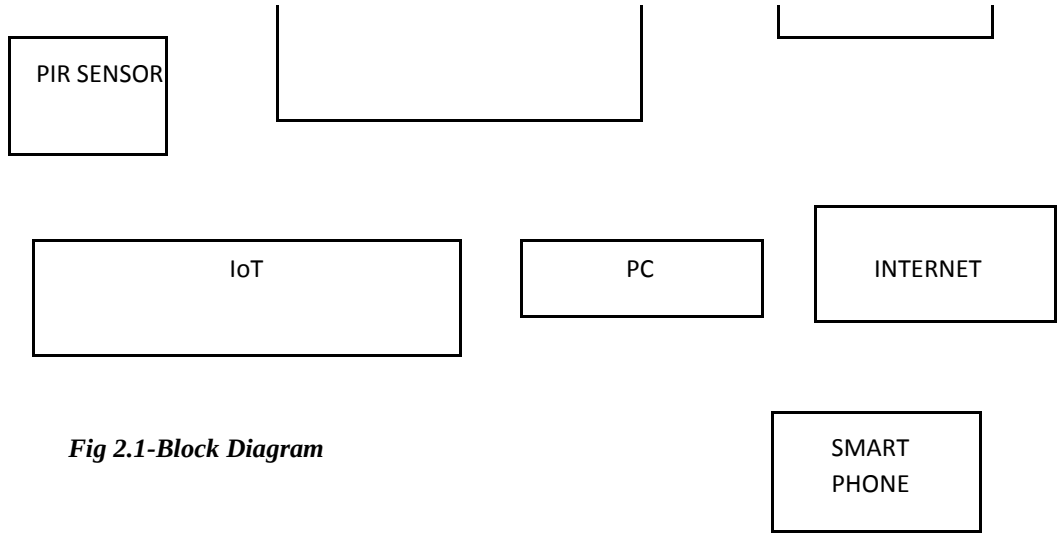

Fig 2.1-Block Diagram

2.2. Temperature sensor

The LM35-series devices are precision integrated-circuit temperature sensors, with an output voltage linearly proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling.

The LM35 device does not require any external calibration or trimming to provide typical accuracies of ± ¼ °C at room temperature and ± ¾ °C over a full −55°C to 150°C temperature range. Lower cost is assured by trimming and calibration at the wafer level. The low output impedance, linear output, and precise inherent calibration of the LM35 device makes interfacing to readout or control circuitry especially easy. The device is used with single power supplies, or with plus and minus supplies. As the LM35 device draws only 60 μA from the supply, it has very low self-heating of less than 0.1°C in still air. The LM35 device is rated to operate over a −55°C to 150°C temperature range, while the LM35C device is rated for a −40°C to 110°C range

The temperature-sensing element is comprised of a delta-V BE architecture. The temperature-sensing element is then buffered by an amplifier and provided to the VOUT pin. The amplifier has a simple class A output stage with typical 0.5-Ω output impedance as shown in the Functional Block Diagram. Therefore the LM35 can only source current and it's sinking capability is limited to 1 μA.

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Fig 2.2.1-Temperature Sensor

Functional Block Diagram (LM35)

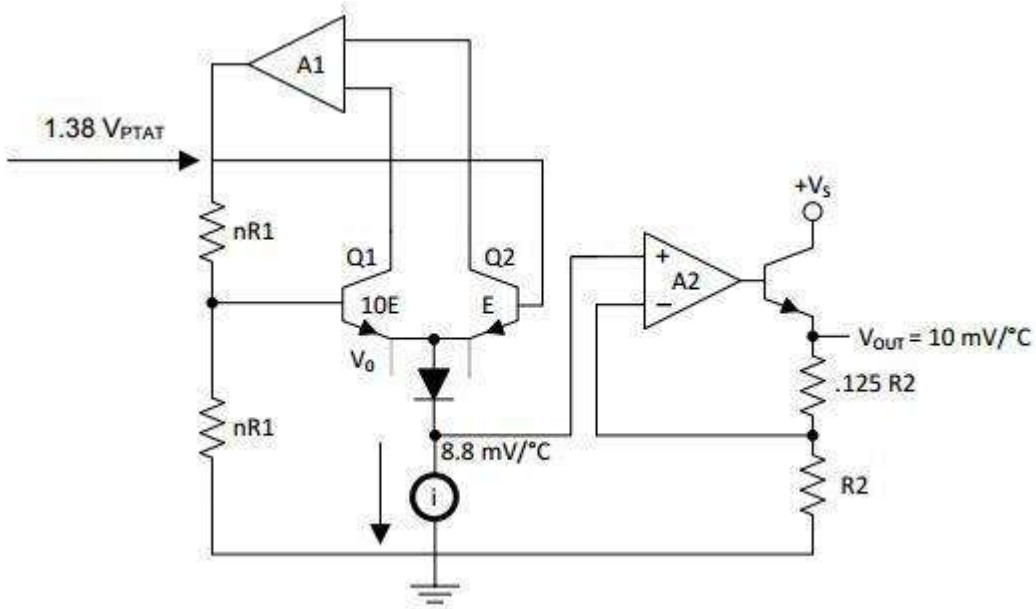

Fig 2.2.2-Functional block diagram for Temperature sensor

2.3. Humidity sensor

Because of their low cost and small size, DHT11 humidity and temperature sensors are perfect for lots of different DIY electronics projects. Some projects where the DHT11 would be useful include remote weather stations, home environment control systems, and agricultural/garden monitoring systems. DHT11 digital temperature and humidity sensor is a composite Sensor contains a calibrated digital signal output of the temperature and humidity. Application of a dedicated digital modules collection technology and the temperature

and humidity sensing technology, to ensure that the product has high reliability and excellent long-term stability. The sensor includes a resistive sense of wet components and an NTC temperature measurement devices, and connected with a high-performance 8-bit microcontroller.

The DHT11 humidity and temperature sensor measures relative humidity (RH) and temperature. Relative humidity is the ratio of water vapor in air vs. the saturation point of water vapor in air. The saturation point of water vapor in air changes with temperature. Cold air can hold less water vapor before it is saturated, and hot air can hold more water vapor before it is saturated. The formula for relative humidity is as follows:

Relative Humidity = (density of water vapor / density of water vapor at saturation) x 100%

Basically, relative humidity is the amount of water in the air compared to the amount of water that air can hold before condensation occurs. It's expressed as a percentage. For example, at 100% RH condensation (or rain) occurs, and at 0% RH, the air is completely dryThe temperature readings from the DHT11 come from a surface mounted NTC temperature sensor (thermistor) built into the unit. To learn more about thermistors and how to use them on the Arduino, check out our Arduino Thermistor Temperature Sensor Tutorial .The DHT11 uses one signal wire to transmit sensor readings to the Arduino digitally. The power comes from separate 5V and ground wires. A 5K– 10K Ohm pull-up resistor is connected from datasheet for specifics on how the signal is sent. There are two different variations of the DHT11 sensor you might come across. One type has four pins, and the other type is mounted to a small PCB that has three pins. The PCB mounted version with three pins the signal line to 5V to make sure the signal level stays high by default (see the is nice since it includes a surface mounted 10K Ohm pull up resistor for the signal line:

Humidity Range: 20-90% RH

Humidity Accuracy: ±5% RH

Temperature Range: 0-50 °C

Temperature Accuracy: ±2% °C

Operating Voltage: 3V to 5.5V

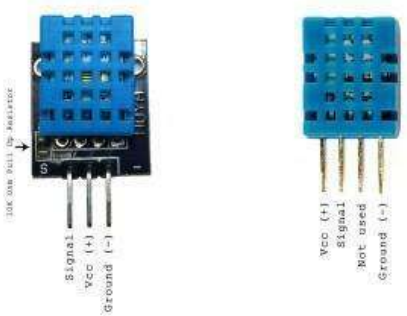

Fig 2.3.1-Humidity Sensor

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Typical circuit:

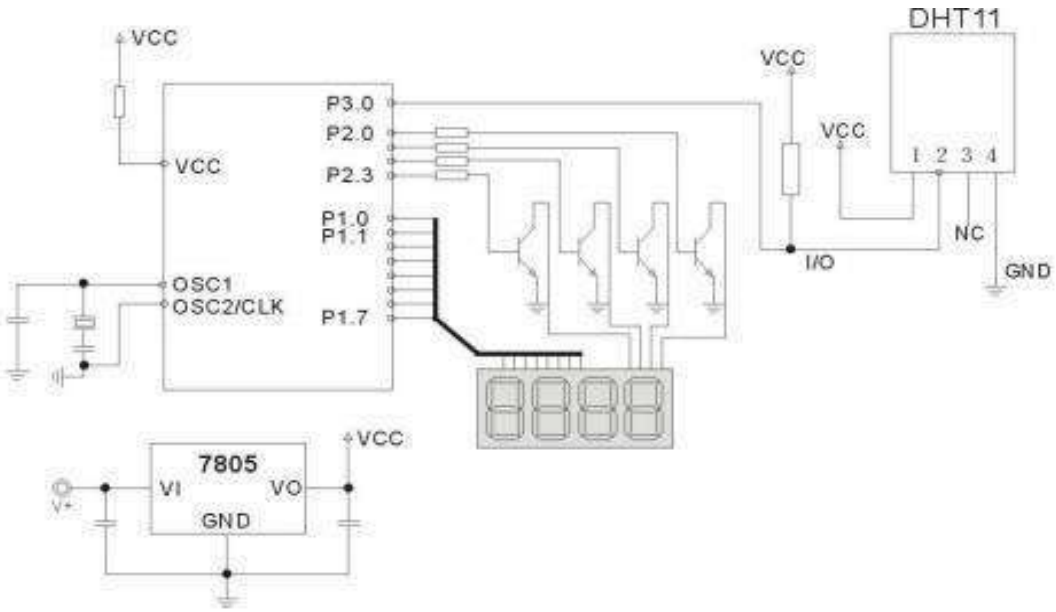

Fig 2.3.2-Typical circuit for Humidity sensor

2.4 Intensity sensor

A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or simply photocells. They are made up of semiconductor materials having high resistance. There are many different symbols used to indicate a LDR, one of the most commonly used symbol is shown in the figure below. The arrow indicates light falling on it. A Light Dependent Resistor (LDR) is also called a photo resistor or a cadmium sulfide (CdS) cell. It is also called a photoconductor. It is basically a photocell that works on the principle of photoconductivity. The passive component is basically a resistor whose resistance value decreases when the intensity of light decreases

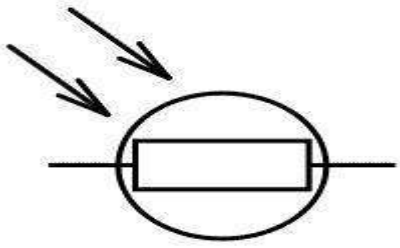

Fig 2.4-Intensity Sensor

2.5. DC water pump

8v-12v Small DC Submersible Water Pump for Arduino A submersible pump (or sub pump, electric submersible pump (ESP)) is a device which has a hermetically sealed motor close-coupled to the pump body. The whole assembly is submerged in the fluid to be pumped. The main advantage of this type of pump is that it prevents pump cavitation's', a problem associated with a high elevation difference between pump and the fluid surface. Small DC Submersible water pumps push fluid to the surface as opposed to jet pumps having to pull fluids.

III.IMPLEMENTATION

By implementing automation inside the polyhouse all things are monitored through the mobile by IoT. Here the temperature sensor sense the temperature, humidity sensors sense the moisture. If the temperature goes down, the light will glow and the temperature increases. All things inside the farm are controlled by Arduino. This product can be implemented easily in the farm. Anyone can farm the polyhosuse with few agricultural knowledge.

IV.CONCLUSION

This project is used to automate the poly house. These method yields more crops than the existing method .The yield product will enrich in their quality. But there is a chance of problem is occur only through the manual error. The manual errors are made by the farmer or the client. This project ensures the security of the crop from the animals and the birds. The PIR sensor makes the security assurance of the crop. The mist controller is controlled by the motor. The water supply is feed through the pipe to the plant. As a result the crop will yield more quantity without infection interms of insect. The temperature, humidity, light intensity are measured and controlled. The lab View is used as the monitoring system for the controlling of the poly house. It has been interfaced with arduino .Thus the poly house has been automated.

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