Assistant For Greenhouse Farming

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Abstract **- India is a developing nation with a very large population. The basic need for food and water is increasing every day, because of the growing population in the country. Even today, a traditional method and backward techniques are used in the agriculture sector. In India, agriculture technology is labor intensive whereas modern agriculture technology is mainly capital intensive. With smart greenhouse farming, it is possible to produce more yield in less land. The IOT is furnishing people with the smart and remote approach, the remote applications such as smart agriculture, smart environment, smart security and smart cities etc. These are the upcoming technologies now a day, making things easy. Farmers need a verity of data and services to improve crop production based on land, crop, climate conditions, finance availability, irrigation facilities etc. IOT plays a major role in meeting these needs. In this article, system provide information about watering plants according to the moisture present in the soil, maintain temperature and humidity and provide proper sunlight to crops.**

Keywords **- Temperature and humidity, Soil moisture, Soil pH, Sun-light intensity and Arduino.**

I. INTRODUCTION

India is an agricultural country wherein about 70% of the population is depending on agriculture. In the agriculture sector, space which employs more than 50 per cent of the total workforce in India and contributes around 17-18 per cent to the country's GDP.

Due to the present day Industrialization, High tech living of people and many other intentional or non-intentional deeds, atmosphere quality is reducing drastically at a much-unexpected rate. This is one of the reasons for the reduction of soil moisture. As the average temperature of Earth is increasing, which is termed as Global Warming, Soil becomes barren and crops cannot be cultivated. Along with this, the pH level of soil plays a main role in the effective growth of each and every crop. This is because the proper pH level helps a particular crop to be healthy. In this paper, care of the monitoring process for these two unforgettable aspects of farming. Improper and insufficient knowledge of the parameters, Farmers keep using pesticides, growth chemicals to achieve greater crop production. But unfortunately, this even causes more damage to crop by reducing its quality. If consumed by a person, it will gradually show its impact on health in the long-term intake. Extreme use of fertilizers and pesticides undermine fertility of soil, contaminate groundwater and nearby water sources whenever it rains. Variety of plants require a different amount of moisture, humidity, temperature, lack of awareness of this information can cause plants to die before fully developing.

All above Stated problems of present agricultural practices should be improved to produce a better yield. Therefore, moving towards a smart greenhouse farming where the plant is provided with an environment for its optimum growth. Because of the closed structure of greenhouse, insects and pests cannot enter inside, thereby eliminating the requirement of insecticides and pesticides. Growing LED lights are turned on whenever light intensity is low for photosynthesis, this ensures faster rate of growth. The humidity and temperature of environment in a greenhouse are measured by sensor and whenever temperature is high or air moisture becomes too low, fogger is turned on to supply the required moisture and cool down the temperature.

II. LITERATURE REVIEW

In a recent days, due to increasing rate of the Global Warming and unpredictable climate condition there is need of such system that utilize the water resources and work according to the climate condition which is necessary for the yield. To carry on with the use of Temperature and Humidity sensor, Moisture sensor and pH sensor are implemented in different location of field for monitoring the crops. Browse some websites related to agriculture and gather some information which is very useful in this article and provide a better idea of how to maintain and monitor the activities in real time. The main focus of this article is

to keep notify or aware about the greenhouse activities to farmer through GSM module.

In general, a greenhouse has a function to:

- Reduce dependency on weather by isolating the cultivation of external environmental impacts.
- In the green house, water and fertilizer more efficient than the conventional system.
- It is better to reduce pests and animal intruders.
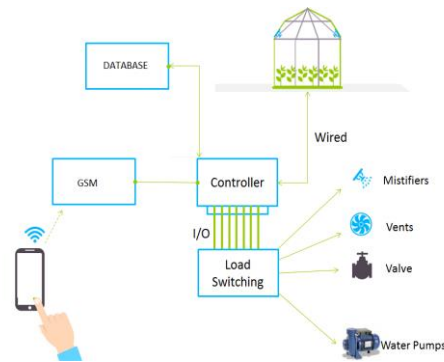- It will improve the quality and quantity of production that will increase farmer's profits.

Figure 2.2 : Work flow Diagram

Figure2.1 : GSM Module.

SYSTEM OVERVIEW:

The system made of 4 sections temperature and humidity sensor node, moisture sensor node and a control system. Directly or indirectly each and every section of this represented system is connected with the arduino. They are interconnected to on central server. All the sensor check the variations in the given threshold value and display data on the control system. If variations is occur relay send the acknowledgment to the system to do their task with the help of arduino. An embedded system closely monitors the microclimatic parameters of a greenhouse round the clock and activates actuators when safe thresholds are exceeded in order to restore optimum conditions. Their design employs a Liquid Crystal Display called LCD which is directly interfaced to a microcontroller that ensures that the user is continuously alerted about the conditions inside the greenhouse.
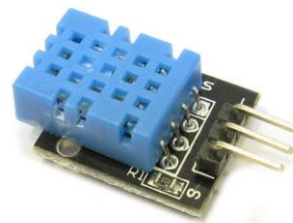
HARDWARE ARCHITECTURE OF THE SYSTEM:

1) TEMPERATURE AND HUMIDITY SENSOR:

This sensor senses the temperature and humidity inside the greenhouse. The changes recorded are sent to a system which will convert the analog form of data to digital form. In this system, there is DHT 11 sensor which sense both the temperature and humidity. This sensor works on the low power input and can be operated in the temperature till 50C and humidity till 80% RH.

Figure2.3 : DHT 11

2) MOISTURE SENSOR:

A soil moisture sensor is used to determine the moisture present in the soil. The moisture of the soil depends upon various factors such as type of soil and salts present in the soil such as iron, manganese, calcium, nitrogen, e it is also depends upon temperature. Based on the result of moisture sensor, irrigation is done. The two large, exposed pads function as probes for the sensor, together acting as a variable resistor. The more water in the soil means the better the conductivity between the pads will be, resulting in a lower resistance.

Figure 2.4 : Soil moisture Sensor

Moisture sensor is two-probe sensor made of pure nickel. Nickel is used since it has equitable conductive properties and also the strength to get buried in the soil for a long time. It will not get corroded in the soil. The length of nickel probes is 9.5 cm and width of each probe is 0.7cm. The distance between the two probes is 0.5cm. The tips of sensor probes are designed in the shape of the triangle so that can be easily placed in the soil. In this article, REES35 moisture sensor is used.

3) PH SENSOR:

pH plays an important role in the growth of any crop. To maintain pH level is a crucial task for healthy growth of yield.

pH is a measure of acidity or alkalinity of a soil, the pH scale ranges from 0 to 14. The pH indicates the concentration of hydrogen [H] + ions present in certain type of soil. The sensor accurately measures the potential difference between two electrodes: a reference electrode (silver chloride) and a glass electrode that is sensitive to hydrogen ion. This is what forms the probe. There is a use of an electronic circuit to condition the signal properly and use this sensor with a micro-controller, such as Arduino.
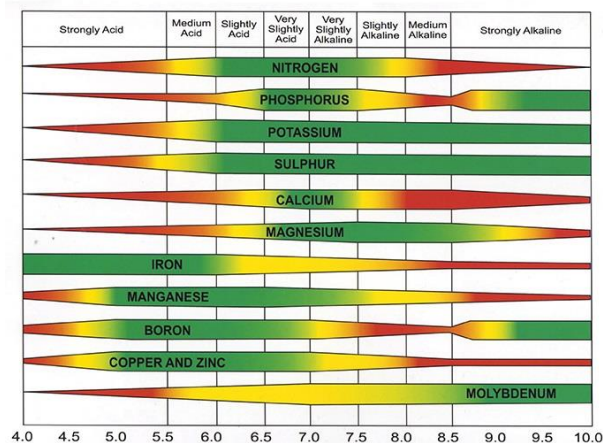

Figure 2.5 : Nutrients present in soil on basis on pH .

In this article with the help of pH reading, system suggest pesticides needed for the crop.

4) ARDUINO:

Arduino is an open-source platform used for constructing electronics articles. Arduino consists of both a physical programmable circuit board (often referred as microcontroller) and a piece of software, or IDE that runs on computer, used to write and upload computer code to the physical board.

Figure 2.6 : Arduino Uno.

"UNO" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The UNO board and version 1.0 of Arduino Software were the reference versions of Arduino, now evolved to newer releases. The UNO board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

III. METHODOLOGY

The automated greenhouse control system is made up of two principal units: Sensors station and Remote Monitoring station. These two units consist of sensors for temperature and humidity (DHT11) and moisture (Rees52) ; fan, fogger, drippers and artificial light; Arduino microcontroller board and a personal computer (PC). The sensors station is the heart of the system that is responsible for regulating the greenhouse environment. The sensors acquire environmental data. After the data have been filtered they are made available to the Arduino board which then computes the current values of the controlled variables and compares them with the set thresholds. If any of the controlled variables are outside a safe limit the corresponding actuator is activated to restore the optimum condition.

The control procedure for the system in this article is developed for the individual parameters to be controlled as follows:

- The temperature control requires two threshold limits: upper limit and lower limit. When the upper limit is exceeded a fan is activated to drop down the temperature of the greenhouse environment and when

the temperature drops under the lower limit, the fan is deactivated.

- Humidity control is defined by a threshold set by the end user. When the humidity of the greenhouse enclosure drops down this threshold, a fogging system is activated and then deactivated when the optimum condition is restored.

- The moisture control is defined by a threshold which ensures that if the soil moisture content falls below the set value drippers are activated, and then deactivated when the optimum condition is restored.

- The pH control is specified by the given pH threshold value which checks the variations in the given threshold value and GSM module send the notification about the variation for better use of fertilizer.

IV.   CONCLUSION

In a greenhouse environment, an automatic irrigation will become more efficient compared to scheduled irrigation using different wired sensors. This automatic greenhouse management system acquires environment conditions, process and analyze this data and controls all related devices to change the climate and irrigation condition according to the requirement. Automatic irrigation will optimize the usage of water and fertilizer. GSM system is also implemented in order to notify farmer if any abnormal condition occurs. In future solar panel for every node will be implemented to reduce power consumption required for sensors.

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