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Greenhousemonitoring and Control System Using IOT

B. Arunkumar*, C. Umesh Srinivas Reddy, K. Jai Surya, I. Vishnu Vardhan Reddy, N. Sai Prakash, Muhammed Jameel

School of Electronics and Electrical Engineering

Lovely professional university, Phagwara-144411

***arun.16518@lpu.co.in**

ABSTRACT:

The pollution in these days is increasing drastically which effects the growth of plants and the agriculture. A general solution for this problem is to cultivate the required quantity of vegetables and eatables at our house using small green houses. But it is not possible control or monitor the green houses all day. So, this project of greenhouse monitoring and control system helps in doing that using the technology. A green house is place covered with a transparent material such as glass and provides the required environment for plants to grow. In these greenhouses one can create the required environment for plants by changing the parameters like temperature required, humidity, water content required in soil (soil moisture) and amount of required as per soil.

The sensors used in this project are DHT 11 for humidity and temperature and soil moisture for measuring water content in soil. The GPS system used in this will send the message to the farmer to his mobile to notify the condition of that area. We use NodeMCU for making a record of greenhouse environment. The record is done in a server called ThingSpeak. The equipment like sensors and actuators in greenhouse can be controlled by a computer program uploaded in Arduino mega.These greenhouses in real-time applications include other equipment like heaters, coolers which can be controlled by Arduino programming.

Keywords: temperature, humidity, soil moisture, ThingSpeak, Arduino mega, GSM, NodeMCU, greenhouse.

INTRODUCTION

Greenhouses are the places where we can grow the plants by creating a particular set of climatic conditions like temperature, humidity, sunlight and soil moisture. These green houses are generally used for growing different categories of crops like fruits, vegetables, flowers and other types of plants. It is hard to control these parameters inside the green houses by manually. This is where the humans are in need of automation system for the growth of crops inside green houses.

Green houses are generally used for achieving the following:

- It provides the optimal temperature which is important to grow the plants.
- These greenhouses protect the plants from extreme weather conditions.

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- One can create a season suitable for growing certain plants.
- The crops in greenhouses can yield more.

Humidity level increases in atmosphere due to the release of high vapour content in atmosphere. Whether the humidity is too low or too high it will result in yielding of crops which will reduce the profits to a farmer. High temperature whether for short or long period of time effects the growth of crops like wheat etc. A plant will have shoots as well as roots which will get effected with high temperature.

Increase in soil moisture more than 45% results in less yielding and leads the plant to die. Water content in soil should always range between 10% to 45% only.

To avoid these effects, we use greenhouses also for researches other than better crop yielding.

REVIEW OF LITERARTURE

The paper proposed by Enokela and Theophilus [1] discus the idea of automation in agriculture which can be achieved by using two separate stations namely sensors/ actuator station and remote controlling station. In this model sensor/actuators station acts as the heart containing Arduino UNO, micro controller etc. But in this model the drawback is the complexity of circuit and cost.

In this paper, the Design had been aimed for data acquisition in greenhouse with the help of multiple sensors through which we can achieve better enchantment of growth of plants in greenhouse. This data about the climate of greenhouse will have effects on plants to be grown. To reach a certain growing condition, we need to all about the sensors and the other components like motor fans et are required. Arduino mega board provides multiple inputs analogy and I / O digital signals to made read data of sensor and write data and easy to take temperature, humidity, and also measuring the soil moisture that needed for irrigation of plants.

PROPOSED METHOD

This proposed method of greenhouse monitoring and control system can also be used as an automation for agriculture as well as smart gardening in households. This saves a lo of human effort of agriculture and gardening. It also increases the yielding of crop. In households this method of gardening can be used along with home automation. This approach to agriculture is very dissimilar to the method which is in use in these days. This saves electricity and energy.

Two sensors DHT 11 and soil moisture sensor are used in this method. This soil moisture sensor detects the moisture content in soil and relays this information to Arduino mega which controls the mini submersible water pump. According to this input arduino makes pump to pump the enough amount water which increases the water content in soil.

By using the DHT 11 sensor we also can control the temperature as well as humidity in atmosphere which are most important parameters of this model. DHT 11 senses the

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temperature and humidity in atmosphere and post this information to arduino which activates coolers or heaters to control the temperature. If the temperature is less than required, then arduinoactivates heaters. Otherwise if the temperature is more than required, then arduino activates coolers to reduce the temperature.

This system is very simple to adapt and can easily be replaced by the new technology. LM35 sensor can be used in replacement for the DHT 11 sensor in this proposed method. But DHT11 is recommended because of its ability to measure both humidity and temperature.

This method continuously monitors the area and collect the information regarding water content in soil and temperature. This collected information is saved in a server called ThingSpeak in the form of graphs as per time. This information is send to this server using wi-fi module called NodeMCU which is having ESP8266 microcontroller embedded in it. And this information is also conveyed to the respective person through a message using GSM.

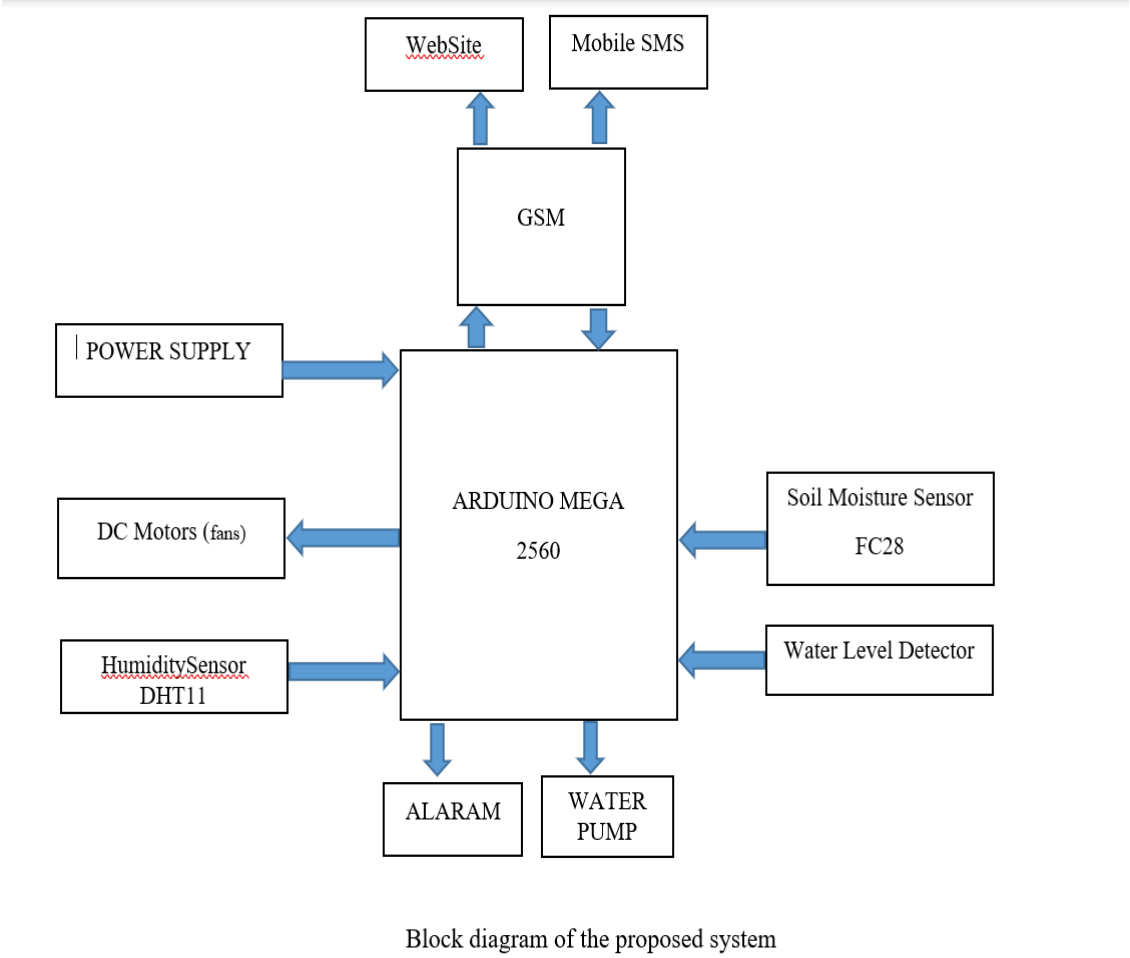

Fig.1. Block diagram of proposed system

RESULTS

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The graphs in these results are showing time to time values of temperature and soil moisture sensors stored in ThingSpeak server. The points temperature graph gives the information of temperature at point of time. This information can be used for future reference.

The temperature graph shows the increase and decrease of temperature happening at every point of time. This increase or decrease in temperature can be controlled by using coolers or heaters respectively. The same go with soil moisture sensor. The increase and decrease values of soil moisture sensor indicates the increase and decrease values of water content in soil.

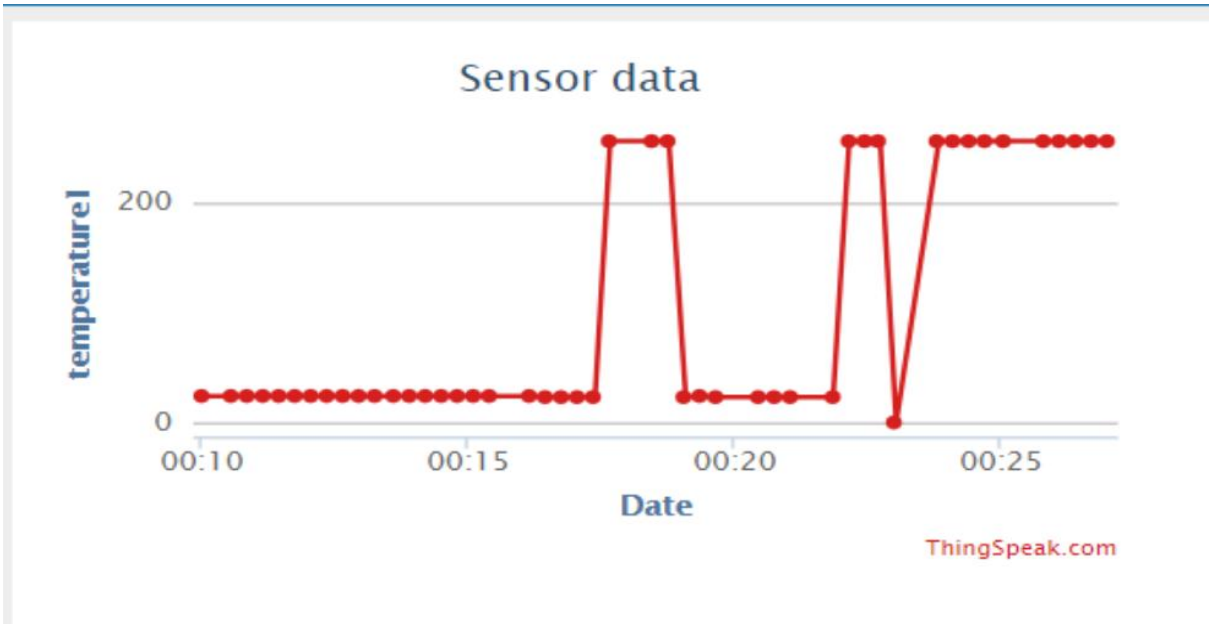

Fig.2. Results of temperature stored in ThingSpeak server

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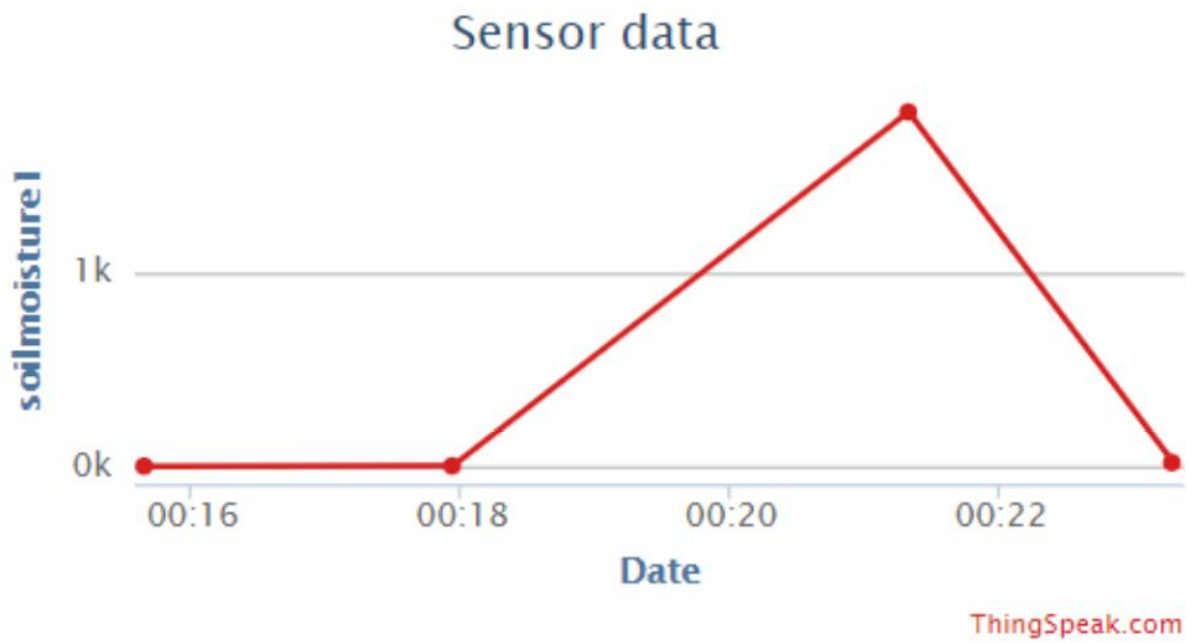

Fig.3.Results of soil moisture sensor stored in ThingSpeak server

CONCLUSION

Our system enables people to monitor and manage growing conditions of their greenhouse. The use sensor nodes, internet connection, and the cloud will deliver real-time updates about plants and help people grow plants more efficiently, with all observation and conventional tests results conclude that our project will provide a solution for automating greenhouse activities and irrigation activities. Implementation of such a system in the field can definitely help to improve the yield of the crops and overall production, and with its quality to cost ratio, it will be affordable to the majority of the community and also for the Agro-based industries.

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