IoT Based Energy Efficient Environmental Monitoring Alerting and Controlling System

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***Abstract*- Indian economy mainly depends on Agriculture. Monitoring and controlling of greenhouse plays a crucial role in crop production. This paper consists of design and implementation that can monitor the temperature, humidity, soil moisture in the greenhouse filed area. Sensors gather various physical data from the Green house field in real time and transmit it to the processor and to the end user via Arduino communication. Then actions are performed5 in order to reduce or eliminate the need of human labour. Since Bluetooth is one of the protocol of IoT and is cheaper. So this system is implemented using Bluetooth technology(IoT).**

***Keywords* - IoT, Bluetooth, Arduino UNO, Sensor devices, Green house, VB.net.**

I. INTRODUCTION

The purpose of this project was to make it easier to grow food at home. This can be achieved with the use of an automated greenhouse. A greenhouse makes it possible to replicate a different climate and consequently grow food that would not typically grow in the area. Additionally, making the greenhouse automated enables people to grow their own food or plants at home without having to constantly look after them. It can be reassuring to know that the plants are taken care of while one is on vacation or not around the house for a longer period of time. Another objective was to investigate if the watering system is reliable, that is whether or not it can obtain a perfect soil moisture level for the chosen plant. This paper focuses on implementing a smart greenhouse that can monitored using Bluetooth technology Automated greenhouse is the key of modern agriculture.In this system we are controlling the four main parameters of green house like humidity, temperature, light intensity, soil moisture. And we have used different sensors for sensing these different parameters

II. LITERATURE SURVEY

Before studying our project we undergone through some papers, that papers which have led us to approach new idea of wireless technology.

- An Embedded Systems Approach to Monitor Green House [3]. They are used an embedded system approach to monitor and control the greenhouse parameters. They are measuring humidity, temperature, pH of the water, soil wetness and light intensity by sensors. The message will be sent to the owner through GSM [2]. The disadvantage of this work is few parameters are measured. So the uneducated people cannot be able to use this system.
- Providing Smart Agricultural Solutions to Farmers for better yielding using IoT. They explained about the IoT [5] concept. The issues related to the farmers are hampering the cause of our evolution. One of the solutions for these problems is to help farmers using modernization techniques. This paper explains combining the advantages of the major characteristics of emerging technologies such as IoT and web service.
- An Effective Method of Controlling the Greenhouse and Crop Monitoring Using GSM. The greenhouse approach has been presented supporting GSM wireless technology. This effectively monitors and controls the temperature, humidity, soil moisture, light intensity and CO2 gases. Here the GSM will send message. And the owner must reply back to take an appropriate action.

III. PROBLEM DEFINITION

The Complexity involved in monitoring parameters like humidity, soil moisture, illumination, soil pH, temperature, etc., which affect the plant growth. Investment in the automation process are high, as today's greenhouse control systems are designed for only one parameter monitoring to control more than one parameter simultaneously there will be a need to buy more than one system. The modern systems use the mobile for communication and wireless data acquisition systems, providing global access to the information about one's farms. But this has various limitations like design complexity, inconvenient repairing and high price. Also the reliability of the system is relatively low.

IV. METHODOLOGY

An automated greenhouse, with a temperature control system and a watering system, is built in order to answer the research

questions [4]. The microcontroller used to create the automated greenhouse was an ATMEG 328P. The watering system consists of a soil moisture sensor, a water tank, a water circulator pump and a hose. The watering was turned on or turnoff based on the soil moisture level read from the sensor.

V. BLOCK DIAGRAM

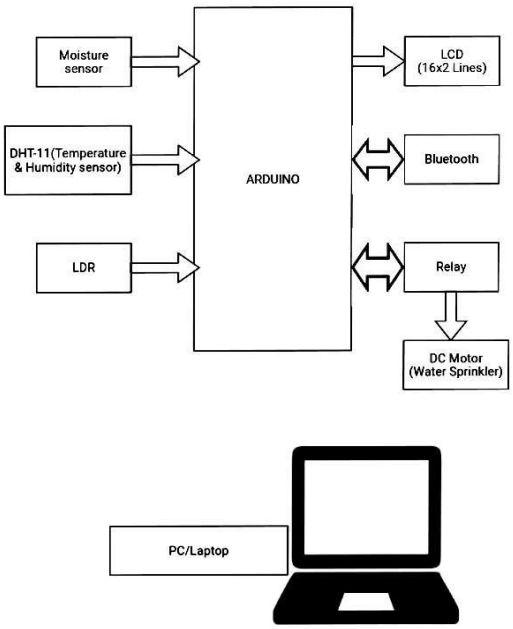

Figure.1. Block Diagram

TABLE I. ARDUINO SENSOR CONNECTION

DEVICE	PORT	ARDUINO PIN
DHT-11	DATA VCC GND	D3 5V GND
MOISTURE SENSOR	OUT VCC GND	A1 5V GND
LDR	VCC GND	A0 GND
Bluetooth HC-05	VCC TX RX GND	3.3V D0 D1 GND
RELAY	VCC SIGNAL GND	5V D13 GND
LCD 16X2	VCC RS E DB4 DB5 DB6 DB7 GND	5V D12 D11 D5 D4 D3 D2 GND

A. ARDUINO UNO

Figure.2. Arduino UNO

The Arduino is an open source electronics platform based on easy to use hardware and software. It can be powered by connecting it to computer or AC to DC adapter. It is based on ATMEG 328.

B. DHT11 (Humidity and Temperature)

Figure.3. DHT11

The DHT11 is a both temperature and humidity Sensor. It has 3 pins VCC, GND and data pin.

C. MOISTURE SENSOR

Figure.4. Moisture Sensor

The Moisture Sensor measures the amount of water content in the soil. It has 4 pins VCC, GND, A0 and DO. It has 2 probes which measure the volumetric content of water.

D. LDR SENSOR

Figure.5. LDR Sensor

LDR is Light Dependent Resistor. It is an analog sensor, when light falls on it value of resistance changes.

E. LCD 16X2

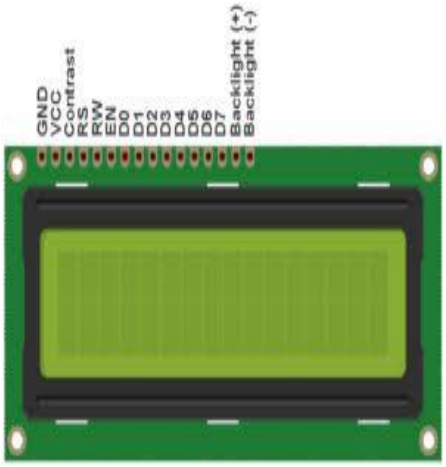

Figure.6. LCD 16x2

Liquid Crystal Display (LCD) is used to display the different parameters of the system. 16x2 refers to 16 columns and 2 rows.

F. RELAY

Figure.7. Relay

As Arduino operates at 5v it cannot be used to control higher devices. A 5v Relay is used to switch 240v current and use arduino to control relay.

G. Bluetooth HC-05 Module

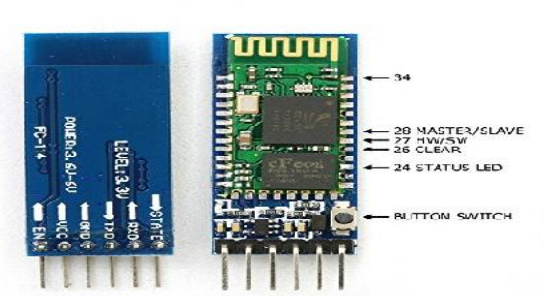

Figure.8. HC-05

Since Bluetooth is one of the protocols of IoT so we use a Bluetooth modem in our system [1]. Since Bluetooth is cheaper compared to other IoT protocols it reduces the overall cost of the system.

H. DC MOTORS

A 230v DC motor is used to pump the water and hose it back[6] v. It is connected to aurdino through relay.

Figure.9. DC Motor

VI. SOFTWARE REQUIREMENT

A. VB.Net

VII. RESULT

The system has successfully overcome quite a few shortcomings of the system by reducing the power consumption, complexity and maintenance at the same time providing a flexible and precise form of maintaining the environment.

We designed this project to monitor and control the various greenhouse parameters. We got result based on effective management of greenhouse environment by both automatic manner and human involvement manner. Automatic controlling process is fully done based on coding. So at that time human involvement will be very useful for greenhouse environment. The sensors are connected to the Arduino UNO microcontroller. When it starts raining, the humidity rises above 40% but still in a normal condition. Humidity is proportional to temperature. So, the condition inside this greenhouse for temperature and humidity are much higher than other kind of plants that used a greenhouse concept. Besides that, a Bluetooth sensor network is used to maintain network performance at a high level despite the data rate that Bluetooth could transmit is lower than any other wireless devices. In this the humidity sensor and the soil moisture sensor are connected through the ADC because they are analog sensors. The sensors will sense all the available parameters.

Figure.10. Result

VIII. CONCLUSION

In designing the Arduino based system for monitor and control of four parameters which is needed for green house i.e. temperature, humidity, soil moisture and light intensity has been followed. By continuously monitoring the status of parameters, we can control these green house parameters and reduce wastage. The measurement which obtained result has shown that the system's performance is reliable and accurate. The smart agriculture software is appropriate with the purpose in the starting that is to get parameters value from green house and input to control components in green house. Here automatic greenhouse predefined sensors design could help to improve productivity of plants. We are introducing the facility that provides remote control to user. Then in this system using Bluetooth technology which reduce the cost of network usage to a extent by using Bluetooth when in the range of few meters with the devices. In this system is scalable and allows number of different devices to be added with no major changes. It can be conclude that the system, which are software and hardware is work properly and accurate.

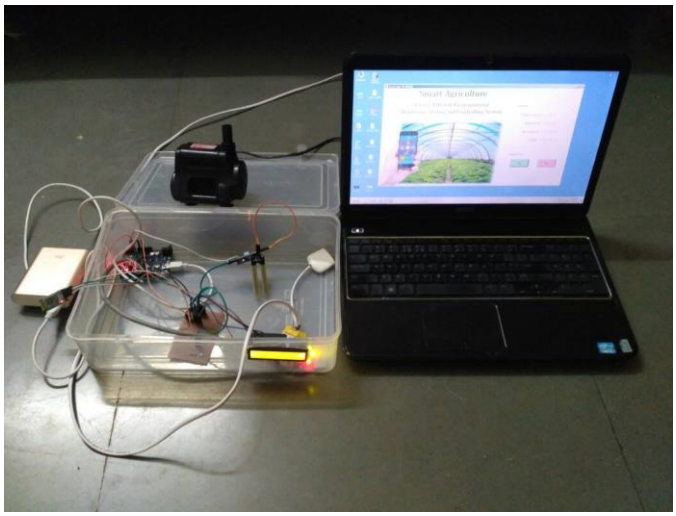

Figure.11. Conclusion

REFERENCES

[1]. J. Yick, B. Mukherjee, and D. Ghosal, "Wireless sensor network survey," Computer Networks-Elsevier, vol. 52, no. 12, pp. (2292-2330), Aug. 2008.

[2]. Shen Jin, Song Jingling, Han Qiuyan, Wang Shengde, and YangYan,"A Remote Measurement and Control System for Greenhouse Based on GSM-SMS", IEEE 8th International Conference on Electronic Measurement and Instrument,pp. (45-82), 2007.

[3]. Stipanicev, D.; Marasovic, J., "Networked embedded greenhouse monitoring and control," in Control Applications, 2003. CCA 2003.Proceedings of 2003 IEEE Conference on, vol. 2, no.,pp.(1350-1355) vol.2, (23-25) June 2003.

[4]. N. Bennis, J. Duplaix, G. Enea et al. "Greenhouse climate modeling and robust control", Computers and N. Bennis, J. Duplaix, G. Enea et al. "Greenhouse climate modeling and robust control", Computers and electronics in agriculture, 2008, vol.61,pp. 96–107

[5]. Mihai T. Lazarescu, "Design of a WSN platform for long-term environmental monitoring for IoT applications," Emerging and S elected Topics in Circuits and Systems,J. Peng, X.

[6]. Hongbo and W. Zheming, "Design of a Water Environment Monitoring System Based on Wireless Sensor Networks",