

# IOT based greenhouse monitoring system by using solar energy

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## Abstract

This project explains the design and implementation of an electronic system based on GSM (Global System for Mobile communication), cloud computing and Internet of Things (IOT) for sensing the climatic parameters in the greenhouse. Based on the characteristics of accurate perception, efficient transmission and intelligent synthesis of Internet of Things and cloud computing, the system can obtain real-time environmental information for crop growth and then be transmitted. The system can be monitors the varieties of environmental parameters in to the greenhouse effectively and meet the actual agricultural production requirements. Devices such as temperature sensor, light sensor, relative humidity sensor and soil moisture sensor are integrated to demonstrate the proposed system. This research focuses on developing a system that can be automatically measures and monitor changes of temperature, light, Humidity and moisture level. The quantity and quality of production in greenhouses can be increased. The procedure used in our system provides the owner with the details online irrespective of their presence onsite. The main system collects environmental parameters inside greenhouse tunnel every 30 seconds. The parameters that are collected by a network of sensors are being logged and stored online using cloud computing and Internet of Things (IOT) together called as Cloud IOT.

**Keyword:** cloud computing, GSM modern, Im35 sensor, moisture sensor, temperature sensor, humidity sensor, solar panel.

## 1. INTRODUCTION

The greenhouse industries are the fastest growing sector worldwide. The greenhouse separates the crop from the environment, thus providing some way of shelter from the direct influence of the external weather conditions. This is enable the production of crop which otherwise could not be produces at that specific location. The greenhouse enclosure enables the manipulation of the crop environment. This asset allows the farmer to improve the cultivation in a way the plants need. It is lead to higher crop yield, prolonged production period, better quality, and less use of protective chemicals. The added value per unit area in greenhouse crops is much higher than that in open-field cultivation. In moderate climate zones, energy is needed, whereas in arid zones, the cooling and availability of water is of major concern. The use of materials and energy as well as crop yield and quality can be influenced by operating the adjustable components of greenhouse, such as heating and cooling inputs, window opening, drip irrigation, screening and CO<sub>2</sub> dosage. Hence, it can be expected that the way these controls are operated influences the final economic results. To fully exploit the enhanced possibilities for crop and resource

Management in greenhouse, it is indispensable to Know the control variables with a remote sensing system using the GSM. This is because it is almost difficult for human being to manipulate and be present every day near the system. Indeed, remote communication systems are a major component of the policy of modernization and technology transfer, due to the increasing development of mobile telecommunications. Internet of Things (IOT) is the network

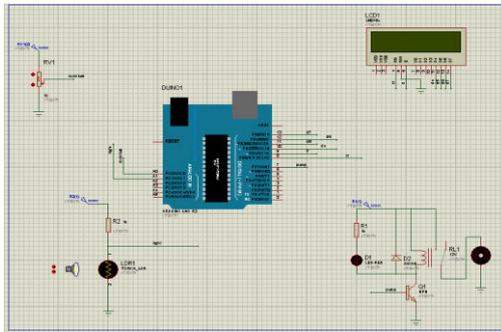
of physical things embedded with electronic circuits, sensors, software and network connection which enables these things to exchange data from one another. IOT is the fusion of the digital and physical world. In a world of IOT, millions of things or devices will be interconnected and uniquely identified on the Internet. The Internet of Things allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration between the physical world and computer-based systems, and resulting in improved efficiency, accuracy and economic benefit. In near future, IOT is expected to provide many more services like advanced connectivity of physical objects over a wide network and also many applications.

It is obvious to think that in using these service provides by this technology, it is possible to control and monitor systems from a distance using the GSM network. Mobile internet are integrated-applications as useful as home automation, industrial applications for handling and remote monitoring of complex systems but also in security systems, and protect property and people. Most physical variable relevant in a greenhouse can be measured by automatic sensor.

From last few years, there has been popularity in rise of electronic technology for control of greenhouse. The most important improvement in technology based climate control are found in data logging which means recording the data monitored from the greenhouse. Greenhouse cultivation represents a very important role in modern agriculture. As the greenhouse usually equips with various high-tech equipments, management tend to be very complex. A fully automated greenhouse control systems along with improved



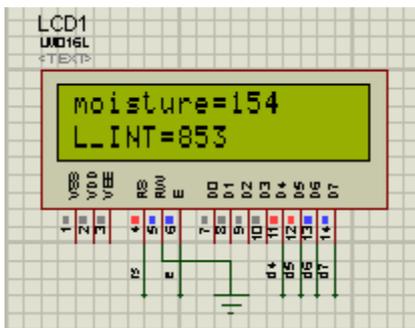
## F. SIMULATION



### 3. ADVANTAGES OF THE PROPOSED SYSTEM

- User friendly
- Easily implementable
- Focuses on main parameters
- Uses GSM because of their availability
- Easy network coverage
- Easier group collaboration
- Resource continuity

### 4. RESULTS



### 5. CONCLUSION

This paper describes the design of a greenhouse monitoring system based on Cloud IoT. Agriculture projects even in urban areas are on a rise in recent times, in unique forms. technological progress makes the agricultural sector grow high, which here is made by the Cloud IOT. The IOT will change the way we live our daily lives and what information is stored about us. This cloud computing is free to use anytime and anywhere as long as the computer is connected with the Internet. This monitoring system is percept different parameter inside the greenhouse using sensor, GSM and cloud to provide the update. The developed system can be proved profitable as it will optimize the resources in the greenhouse. The Mechanical complete module is of low cost, low power operation hence, easily available to everyone.

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