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# A Survey on IOT Based Smart Greenhouse

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**ABSTRACT:** Now a days, as we know the demand of high quality products are increasing and people are more concern about food quality and security. Green house is use to improve the production of growing crops within sheltered structure covered by transparent material. It helps to control sunlight, humidity, soil moisture and temperature as per the need of plants. IOT smart farming solution is a system that is build for monitoring for the crop field with the help of sensors. This paper reviews the smart green house technologies and the IOT technologies for smart green house farming.

**KEYWORDS:** Green house, Internet of Things (IOT)

## I. INTRODUCTION

Today due to the growing influence of the internet on day to day lives, we have the infrastructure to connect billions of devices together [4]. The smart greenhouse is a revolution in agriculture, creating a suitable environment for plant growth. Due to the sudden climatic changes that occur because of global warming, human causes and many other natural causes such as the earthquake, ocean currents etc. Growth of the seasonal crops like the millets, beans, cotton and sugar cane gets affected causing a decrease within the production rate of those crops. So in order to control a proper climatic condition by perfectly controlling the temperature humidity, soil moisture and the luminous entailed by the crops the green house is preferred in most places.[2].

Green house structured with transparent sheets or glasses everywhere maintains perfect weather conditions under the human monitoring. It requires a continuing and periodic human monitoring to manage the temperature, light intensity, soil moisture and the humidity to retain the specified climatic condition that is entailed for the crop growth. It helps to protect the farm against the sudden climatic changes to increase the season for the growing the crops.

Despite the green house being very beneficial for the farmers because it increase the yield of the crops and production rate; it causes a discomfort for the farmers as they need to stay a periodic check on the green house by making regular visits and failure to maintain the perfect weather conditions will result in the destruction of the crops and the production rate.[2].

The term "Internet of Things (IOT)" refers to a masssystem which is connected to numerous sensors, embedded controllers, decision-making platforms, Internet, cloud server and many other platforms [8]. Because world is trending into new technologies and implementing. It is a necessary goal to trend up with agriculture also; IOT plays a really important role in smart agriculture.[5]

## II. RELATED WORK

S. Vatari, A. Bakshi, T. Thakur [1] describe that Green House is the best solution to regulate and mange all this problem It is more important to search a method that gives perfect analyzation and controlling to develop proper environment. Large areas covered by sensor network this can establish greenhouse with precision environment required for different crops. This environment builds up by using two technologies IOT and cloud computing. By using IOT we control devices or any environmental needs anytime, anywhere and the cloud which provides storage. This system will sense all the environmental parameter and sends that data to the user via cloud as user can take control action.

D. J. S. Raj and V. J. Ananthi [2] proposes the automation using internet of things in green house environment by using the Netduino 3 and employing the sensors for the sensing the moisture, temperature, sunlight and humidity, to increase the production rate and decrease the discomfort caused to the farmers. The system using the Netduino ensures production increase and a stress reduction for the farmers providing a capable automated system for green house management with a SMS alters to the users.

S. Bhujbal, Y. Deshpande, A. Gupta and O. Bhelsekar [4] proposed smart greenhouse parameters monitoring system using Raspberry pi 3 (microprocessor) and various sensors connected over the web. During this the various parameters are monitored and the data will be sent to different devices like PC, Smart phones, etc. Author says that the system uses Internet of Things technology, due to this the parameters can be controlled from anywhere in the world. This helps the farmers to grow crops properly. The humidity threshold can also be changes as per the crop requirement. Use of this method ensures better farming for the farmer.

P. D. O. Shirsath, P. Kamble, R. Mane, A. Kolap and P. S. More [6] proposed system for monitoring and controlling weather conditions inside the greenhouse to improve the production of crops. . It also focuses on the Generic Architecture which can be applied for many other Automation Application. They used Arduino platform for greenhouse monitoring, controlling temperature and soil moisture with the help of Web server using IOT.

P. D. Shiyale, H. Thombre, G. Tyagi and A. Chauhan [5] proposed IOT based smart greenhouse farming system that monitors factors like temperature, humidity, soil moisture, light with the help of sensors and notify the users through mobile application. Sensors values demonstrated on GSM module will be used to examine agricultural data. The authenticated mobile application development can be used to keep track of the parameter from anywhere.

### III. PROBLEM STATEMENT

One of the most challenging problems is because of unequal distribution of rain water, it is very difficult to farmer to manage the water equally to all or any the crops in whole farm it requires some irrigation method that suitable for any environmental condition, soil types and variety of crops. Greenhouse is the best solution for all this, but for this farmer need continuous tracing of a green house to maintain all environmental conditions that needed for different crops. If there is any change in the system should change or maintain that changes according to farmer instruction.[1].

### IV. OVERVIEW OF IOT USED IN SMART GREENHOUSE FARMING

The Internet of Things is an emerging subject of technical, social, and economic significance. Nowadays, the IOT enabled devices are widely used in the control and monitor systems of the agriculture industry [7]. The IOT technologies comprise of sensors, actuators, cloud computing based data amenities, drones, navigation and analytical system, which allows the architecture to make intelligent decisions to extend the crop yield [7]. IOT connects devices through networks and tracks performance of those devices from anywhere. A large amount of communication devices in the IoT are embedded in to sensor devices within world [3]. Sensor plays a very important role in IOT technologies.



Fig.1 Greenhouse using IOT

Devices with sensor used to monitor physical conditions or weather conditions, when it is combined with RFID systems to better track the status of such things, their location, temperature, and movements [3]. IOT devices can

provide information about the environmental variables including, humidity, temperature and climatic conditions, and also about the field variables such as soil and plant bio-masses. It can be employed to predict and monitor the quality of the crops.

## V. FUTURE CHALLENGES

IOT system is believed of as the greatest change agent within the agriculture industry for upcoming years. IOT system enables farm manager with real-time crop monitoring, precision farming, livestock management, and smart greenhouse, etc. Unfortunately, the rate of attrition of the workforce from the agriculture sector to other sectors is too high. In contrast to other sectors, instalments and maintenance of IOT system devices are a small amount tricky and requires lots of investments.

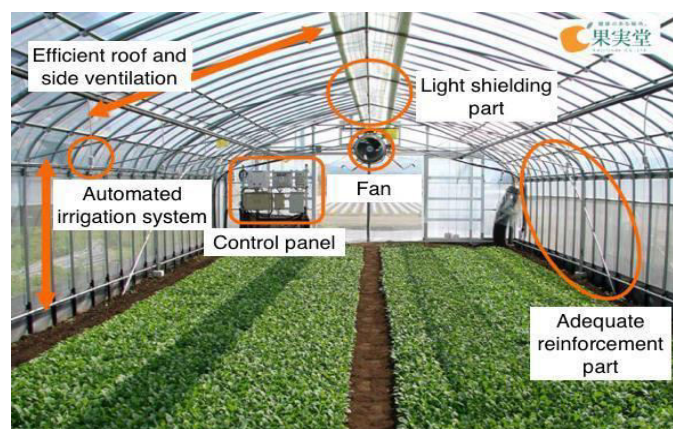


Fig.2 Challenges in Smart Greenhouse

Some challenges faced by farmers in adopting IOT for agriculture:

**Lack of Infrastructure:** Even if the farmers using IOT technology they won't be able to take advantage of this technology because of poor communication infrastructure. Farms are usually located in remote or rural areas and far away from access to the internet. Thus connection issue would cause an advanced monitoring system to be useless.

**Lack of Security:** IOT devices interact with older equipment they have access to the internet connection, there is no guarantee that they would be able to access drone mapping data readouts by taking benefits of public connection. An enormous amount of data is collected by IOT agriculture system which are difficult to protect.

**High Cost:** Equipment needed to implement the IOT system in agriculture is very expensive. Sensors are the least expensive component, yet outfitting all of the farmers fields to be with them would cost more than a thousand dollars.

## VI. CONCLUSION

In this survey paper, we discussed about smart greenhouse farming based on IOT technologies which helps farmer to enhance the productivity of crops and manage the weather under the greenhouse as per the need of crops. IOT smart greenhouse solutions is the system that is build for monitoring the crop field that the farmer can monitor farm condition from anywhere. Use of this system ensures better farming for the farmer.

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