

# Smart Green house and insect monitoring through WSN

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**Abstract:** Agriculture is one of the most widespread activities practiced in India. A huge population of Indian farmers depend on the same for their day to day livelihood. But in recent years as population has increased a lot, so fulfilling of basic food requirements for people has become a challenging task. Also as the Indian farmers are uncivilized they are unknown to the new and latest advancements in technologies which would help them to grow crops quickly and efficiently and that too in good amount. To make all these things happen WSN technologies need to be implemented in agricultural farms efficiently and successfully. Farmers should be trained to use these technologies to their possible understanding.

In this paper different parameters such as Temperature, Humidity, Light, Water level of soil and soil moisture measured one after another is described. Also GSM technique is used to communicate between two greenhouse models placed at a distance of 100 meters. Insect monitoring techniques discussed to save the crops through image processing by using tools like MATLAB .



## I. Smart Green House

### INTRODUCTION:

India is a country where the livelihood of the farmers depend solely on agriculture. It is a well known fact that around two-third of Indian population depend on agriculture for employment. We people also depend on agriculture indirectly. We depend on farmers for our daily food that we consume. Also unfavorable weather conditions deteriorate their conditions to worst. Due to these and many more reasons farmers are either quitting farming or ending their lives.

So in order to improve farmers conditions we need to improve the standards of farming in agricultural fields. After a long research done technology benefited farming known to all of us by now is WSN. Environmental farming has proved to be very

competitive to farming due to un-natural and variable weather conditions. So instead of this, Greenhouse farming can be a very beneficial option for growing different crops all over the season.

Using greenhouse environment the farmers can easily set the desired environment for growing crops in Precision agriculture. Outside environment has no major role to play in growing crops. This concept of greenhouse will help the farmers to grow large amount of crops irrespective of outside environment conditions. WSN are installed inside greenhouse to monitor different parameters for the growing crops. Parameters such as temperature, humidity, light, water level and soil moisture are measured and monitored in real time [1]. Farmers can easily monitor the parameters on the LCD display or via sms through GSM technology if residing far from farm field. The techniques of

WSN applied in agriculture assists to gather distributed data, monitoring of crops in harsh environment, production with minimum cost [2]. Two or more greenhouse models can communicate with each other and share their relevant data with the help of GSM technique. Zigbee helps to connect two or more greenhouse models with each other. Each WSN sensors measure the readings of its own parameter and send the data to the end user sitting far away from farm field for further investigation. This process happens with the help of sms via GSM. WSN has become very popular as it is scalable and easy to handle in automation and control applications. Observing the variation in environmental weather conditions by the researchers over recent years led to the development of Greenhouse concept. The concept of greenhouse is new in agriculture. Under this concept less problems of the changing weather conditions is faced by farmers. Blackmore et al. in 1994 [3], explained that, the system can be designed to increase the quality agricultural yield by, properly monitoring soil and environment. Such technique allows savage of water upto 50%.

In spatial data collection, a mobile field data acquisition system is available to collect useful data for crop management [4]. Greenhouse climate can be maintained by proper ventilation and heating. It is necessary to understand and monitor outside wind direction and wind flow as these parameters help to locate fans at different places such that it will

synchronize with outside wind flow to throw the inside air outside or vice versa.

Soil sensor based on Time Domain Reflectometer is used to measure various soil parameters such as soil moisture, soil temperature, soil pH value and soil electric conductivity. For a real time environment we require only soil temperature and soil moisture. On the basis of these two parameters readings either the sprinkler or drift irrigation will be controlled.

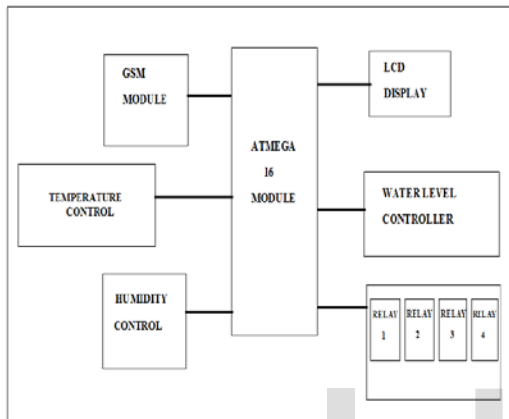
## **II. Controlling parameters used in**

**Greenhouse:** i) Ventilation is done to maintain temperature inside greenhouse. ii) Heat insulation system can be applied for reducing energy. iii) In case of external brightness shading can be done with curtain system. iv) Fan system must be circulated for regulating air flow to maintain humidity and temperature at required level.

## **III. Proposed Model:**

This model is based upon an agricultural concept consisting of number of control functions in it. It can be used in a smart greenhouse environment. In this paper five different parameters are described along with the communication between two greenhouse models. The block diagram, circuit diagram and other necessary diagrams are shown. GSM concept for receiving information from greenhouse models for comparing their readings for better productivity is also done. The five different parameters such as temperature, humidity, light, water level and soil moisture are measured one after

another and displayed on LCD. If an end user residing far away from the farm field wants to check the readings of different parameters he can just give a miss call to the SIM number installed in GSM. Water motor is also controlled by GSM.



Block diagram

Initially, the circuit is connected as per the circuit diagram and all the connections are checked up on the basis and then the procedure is further proceeded. The GSM module is connected to the power supply with a SIM initially inserted in the module. As, the power supply is ON the SIM searches for the network. In the module the mid LED glows continuously until the network is found. Then, as the module is in network the LED starts glowing once in 3 seconds. As the module is in network it is capable of transmitting and receiving the signals. Furthermore, the process starts as the  $T_x$ ,  $R_x$  and GND is connected to the microcontroller. The module starts functioning as per the need. It receives data from the

There are various sections in the model as follows:

- a) GSM module
- b) Parameter controls
- c) Microcontroller operation

microcontroller, transmits the data in form of signals by using SIM to the destination.

#### IV Insect Monitoring through Image processing:-

As we know that insect are damaging our crop which create great pressure on farmers so to avoid this in intelligent green house we can control this with the help of Image processing. Where we can capture the image through any fine tune camera then process that image through MATLAB tool then compare with the ideal image. Finally deviation of image of crops will get the idea of damage crops. And then we can apply the pesticide. The technological solution toward this issue is to implement wireless image-sensor node these work as it take images of pests that harm crops these images are further transmitted through a wireless sensor network to collect the database of the pest. In this technology it includes of processing of data and transmission of images at the lower cost [5].

#### MATLAB Image Processing algorithm

1. Algorithm to read original image
2. Select colour then define images
3. Define size of image
4. Define the noise consider external noise

5. Capture noisy image
6. Compare the noise with original image
7. Capture the distortion
8. Edge detection
9. Finally draw the graphs

**V Conclusion:-** In this paper, we given general framework to intelligently monitor the smart green house and through image processing we can find the actual position of insect from remote location without physical presence of farmer. In future we can identify the insect through their other behaviors like unique smell, wing frequency, sounds which we get when they move in groups. Such system will help in agronomy by analyzing the environmental situations. The agro-ecological specialists will get a large amount of benefit by receiving the complete real-time and past factual environment information to achieve efficient management and utilization of agro-ecological resources.

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