

## INTRODUCTION:

Most important factors for the quality and productivity of plant growth are temperature, humidity and light. Continuous monitoring of these environmental variables provides valuable information to the grower to better understand, how each factor affects growth and how to maximize crop productiveness

[1]. The optimal greenhouse micro climate adjustment can enable us to improve productivity and to achieve remarkable energy savings especially during the winter in northern countries

[2]. WSN composed of hundreds of nodes which have ability of sensing, actuation and communicating, has great advantages in terms of high accuracy, fault tolerance, flexibility, cost, autonomy and robustness compared to wired ones. Moreover, with the onset of IoT and M2M communications, it is poised to become a very significant enabling technology in many sectors, like military, environment, health, home and other commercial areas [3]. IoT is a general term, covering a number of technologies that allows devices to communicate with each other, with or without human intervention.

## IOT TECHNOLOGY AND AGRICULTURE:

### Raspberry Pi

The Raspberry Pi is a credit card sized single-board computer developed in the UK by the Raspberry Pi Foundation with the intention of stimulating the teaching of basic computer science in schools. The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700MHz processor (The firmware includes a number of "Turbo" modes so that the user can try to attempt over clocking, up-to 1GHz, without affecting the warranty), Video Core IV GPU, [5] and 256 megabytes of RAM

### Arduino:

The Arduino UNO is a widely used open-source microcontroller board based on the ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.[1] The board features 14 Digital pins and 6 Analog pins

### DHT11 Temperature & Humidity Sensor:

This DHT11 Temperature & Humidity Sensor features a temperature & humidity sensor complex with a calibrated digital signal output. By using the exclusive digital-signal-acquisition technique and temperature & humidity sensing technology, it ensures high reliability and excellent long-term stability

## LITERATURE SURVEY:

In the literature there are numerous examples of versatile IoT application-oriented studies. In [4], an example of control networks and information networks integration with IoT technology has been studied based on an actual situation of agricultural production. A remote monitoring system with combining internet and wireless communications is proposed. Furthermore, taking into account the system, an additional information management sub-system is designed. The collected data is provided in a form suitable for agricultural research facilities. In their work Liu Dan et al. [5] take a CC2530 chip as the core and present the design and implementation of an Agriculture Greenhouse Environment monitoring system based on ZigBee connectivity. Additionally, the wireless sensor and control nodes take CC2530F256 as a core to control the environment data. This system comprises front-end data acquisition, data processing, data transmission and data reception. The ambient temperature is real-time processed by the temperature sensor of the terminal node and is sent to the intermediate node through a wireless ZigBee based network. Intermediate node aggregates all data, and then sends the data to the PC through a serial port. At the same time, staff may view, and analyze the data, storage of the data on a PC is also provided. The real-time data is used to control the operation of fans and other temperature control equipment and achieve automatic temperature control in the greenhouse.

## IMPLEMENTATION:

This project can be implemented in a real greenhouse for growing good agricultural produce like ornamental flowers (Gerbera, Carnation, Anthurium etc.), which can be of export quality. The system will take care of automatic irrigation control and various parameters of the greenhouse can be monitored like Temperature, Humidity and Soil Moisture. The Android Application will form the user interface and to record the parameter details we use an application server module. This recorded data can be used for analysis and help in taking decisions.

## CONCLUSION:

This concept can be implemented in a real greenhouse for growing good agricultural produce which can be of export quality. The system will take care of automatic irrigation control and various parameters of the greenhouse can be monitored like Temperature, Humidity and Soil Moisture. The Android Application forms the user interface and to record the parameter details we use an application server module. This recorded data can be used for analysis and help in taking decisions. The main advantage of this paper

is that, all the functions to be performed by the Fan and Sprinkler to control the climatic conditions like temperature, relative humidity and soil moisture levels in the Greenhouse environment are all automated and it does not require any human intervention. This is particularly an important factor because the presence and availability of the human cannot always be trusted on. For important structures like the greenhouses,

#### FUTURE SCOPE:

Future work would be focused more on increasing sensors on this stick to fetch more data especially with regard to Pest Control and by also integrating GPS module in this IoT Stick to enhance this Agriculture IoT Technology to fullfledged Agriculture Precision ready product. ☒ Implementation of Foggers ☒ Implementation of sliders. ☒ Implementation of roof sheets. ☒ Implementation of controllable water motor. ☒ Detection of gases/minerals above/under the ground & detection of insects.