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IOT Based Automated Greenhouse

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ABSTRACT: Cultivation is the fundamental wellspring of pay of the general population in a nation like India adding up to 15-16% of the Gross domestic product of the nation. As per the financial overview of India 2018, around 55% of the number of inhabitants in India relies upon cultivating as wellspring of occupation pay and time has come to acquaint a few changes with supplant those conventional cultivating rehearses with the development of money trims undercomputerized nursery utilizing IoT through remote sensors, actuators, microcontroller, raspberry pi, GSM module and associating links. In this paper is a proposed a low cost greenhouse prototype model which can be afforded by the Indian farmers for the cultivation of cash crops such as saffron, vanilla, sugarcane, etc. and they can carry out the cultivation under this automated greenhouse thus improving their social, economic and financial condition by a great extent. With use of modern-day technology, automated greenhouses have become widely popular among professional greenhouse caretakers and hobbyists alike. With the advent of newly affordable technologies such as microcontrollers and environmental sensors, engineers and hobbyists have devised ways to cut plant maintenance to a minimum. While some automated greenhouses require little to no additional caretaking, others are simplistic and control only limited functions such as watering and timed lighting. By allowing as much automation as possible, the Automated Greenhouse will reduce the amount of time spent caretaking for plants, and eliminates worry when a user is away for long durations. The Automated Greenhouse control unit will allow the user will stray from the tedious job of tending to the nutritional needs of plants. Under one interface, one can monitor important plant growth factors, such as lighting, soil moisture, relative humidity, and temperature, as well as monitor incoming power sources to be used to operate greenhouse equipment. The autonomous system will nurture the plants without the user being present, under a pre-set rangeof optimal conditions, while having the ability to run more efficiently off of alternative energy sources.

KEYWORDS: GDP,IoT, Sensors, Actuators and Microcontroller .

I. INTRODUCTION

Crops allude to the products which return significantly more benefit to the agriculturists than the typical harvests and demands as well. In the meantime, the cultivation of such crops is not usually carried in India out because of the climatic barriers of the country and these crops need intensive care for producing the best yields otherwise can be easily affected by diseases andpests. This issue can be overwhelmed by the utilization of computerized automated greenhouse technology which can be constructed using advanced technologies of the Internet of Things i.e., IoT through various sensors, actuators, microcontrollers, etc. The automated greenhouse technology is one of the best options by which farmers can be benefitted from all over India and in this paper, we have proposed the greenhouse technology having the minimal construction cost so that it can afford by the Indian Farmers and if not then they can apply for loans from the govt available under various schemes for rural and agricultural development. The majority of the cultivating hones incorporate vegetation or regularly cultivating in India, which ordinarily doesn't deliver the adequate measure of benefit for a standard living often farmers. This is the principle motivation behind why huge no. of agriculturists are conferring suicides now-a-days and furthermore, they wind up unfit to reimburse the advances they ordinarily take from the legislature of India. Just because of this reason people are showing less interest towards such traditional cultivation processes and due to which industrialization, urbanizations are happening on a large scale.

II. SIGNIFICANCE OF THE STUDY

The main objective over here is to build a low cost automated greenhouse system for cultivating cash crops in India, which can be afforded by all groups of farmers in India. This proposed design of automated greenhouse technology for cultivation can be one of the best alternatives to help India change its traditional farming practices to cultivation of cash

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crops by this new innovation. personnel. Our proposed System It includes internal cameras, more flexible user-controlled cooling options, and the ability for to interact with its features using smart phone or tablet. This proto type hasthe ability to know the quantity of items present. It will provide notifications to the user and the dealeror shopkeeper, if they are out

The out-paced population growth to adequate food supply in today‘s world has posed a serious threat to the peace and stability of the global community. There are a vast number of people living in today‘s world lack access to enough food for healthy lives. The United Nations Food and Agriculture Organization (UN-FAO) has identified 82 poor countries that face rapid population growth do not produce enough food domestically, constrained to producing more food, and cannot import enough to make up the deficit. More than 840 million people, with disproportionately women and children, suffer malnourishment. Each year about 18 million people, mostly children, die from starvation, malnutrition, and related causes. With one-third of world population lacking food now, the UN-FAO estimates that world food production would have to double to provide food security for 8 billion people with 6.8 billion living in developing countries.

III. REVIEW OF RELATED STUDIES

K. Rahmathulla (2016): The proposed system discuss about the role of temperature and humidity on growth and development of silkworm including recent studies on heat shock protein. Silkworm is one of the most important domesticated insects, which produces luxuriant silk thread in the form of cocoon by consuming mulberry leaves during larval period. The growth and development of silkworm is greatly influenced by environmental conditions. Temperature plays a vital role on the growth of the silkworms. As silkworms are cold-blooded animals, temperature will have a direct IoT Based Automated Greenhouse Dept. of ISE 2020-21 8 effect on various physiological activities. In general, the early instar larvae are resistant to high temperature which also helps in improving survival rate and cocoon characters.

Mubashar Hussain, Shakil Ahmad Khan : In sericulture, it is established fact that several factors contribute in the growth and development of silkworm for the production of quality eggs. Temperature and humidity are key environmental factors that influence the physiology of insects. The range of adaptations to changing environments and maintenance of homeostasis is a complex and dynamic display of species inherent potential to keep internal changes within tolerable limits under wide fluctuations in their surroundings. The silkworm is sensitive to environmental fluctuations and unableto survive naturally due to continuous domestication since the dawn of sericulture. The larvae of eleven silkworm lines (M-101, M-103, M-104, M-107, Pak-1, Pak-2,Pak-3, Pak-4, PFI-1, PFI-2 and S-1) were reared.

Cina Mathew, Rinsu Mathukutty, Ponni Madhanan : The new milestone in computer communication is Internet of Things (IoT), gaining importance because of wide variety of application in project developments. The IoT is furnishing people with , the remote applications such as smart agriculture, smart environment, smart security, and smart cities etc. The IoT has essentially, increased the remote distance control and variety of interconnected things or devices, which becomes an interesting aspect. This paper discuss about an IoT application for smart agriculture. The paper proposed a remote sensing of agriculture parameters and control system to the greenhouse agriculture. The planis to control CO2, soil moisture, temperature, and light, based on the soil moisture the controlling action is accomplished for the greenhouse windows/doors based on crops once a quarter complete round the year.

IV. OBJECTIVE OF THE STUDY

a. Easy to use, install, operate & troubleshoot.
b. Useful for small scale farmers & greenhouse owners.
c. Total automation of greenhouses nurseries / bio tech parks.
d. This project are build greenhouse with automatic monitoring and controlling system.
e. To enhance the revenue of both farmers and the government.

The advantages of this project is automatically control environmental conditions within greenhouse allowing any type of plants to be grown all year around.

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V. METHODOLOGY

a) An Arduino is an open-source microcontroller development board. In plain English, you can use the Arduino to read sensors and control things like motorsand lights. This allows you to upload programs to this board which can then interact with things in the real world.
b) In farm monitoring, different devices are used to monitor the various environmental conditions and the observed details can be accessed from a remote place.
c) In automatic irrigation system, based on the environmental conditioning system, automatically irrigates the field, which saves farmer‘s time, efforts and lot of water wastage.
d) To make the greenhouse fully automatic we have to set an efficient control framework utilizing the Internet of Things innovation.
e) In this we have used 6 sensors i.e., the temperature sensor, pressure sensor, humidity sensor, soil moisture sensor, light sensor and the color sensor.
f) When the color sensor notices any variation in the color it sends the signal to the microcontroller and us to see the changes in our laptop through the raspberry pi. So that we can investigate why the color changes and it may be due to any disease outbreak or pest attack and we can take preventive measures from a much earlier time.
g) This electrical output given to Arduino, Arduino consists of data regarding temperature andweight of the products inside the storage box.
h) Arduino is programmed so that the data present in it is given to raspberry pi. Using pythonprogramming the raspberry pi analyses the data. An app is created to notify the user.

VI. SAMPLE DATASET

- Greenhouse:

1. 12L Capacity
2. 0°C to 50°C Degree Celsius
3. 48W to 65W Colling Power and 30W to 55W Heating Power

- Captures 50 samples of each product.
- **Sensors and Actuators are placed inside the storage box.**
- DHT11:

1. Operating Voltage: 3.5V to 5.5V
2. Operating current: 0.3mA (measuring) 60uA (standby)
3. Humidity Range: 20% to 90%
4. Resolution: Temperature and Humidity both are 16-bit
5. Accuracy: ±1°C and ±1%

VII. TECHNIQUES USED GREENHOUSE

- **Automatic Irrigation System** : In automatic irrigation system, based on the environmental conditioning system, automatically irrigates the field, which saves farmer‘s time, efforts and lot of water wastage. Potamitis proposed smart traps, which helps farmers to monitor agricultural land from remote places against insects. The basic mechanism is smart trap, which has a light emitter and a light receiver sensor, facing each other. Whenever an insect crosses this setup it disturbslight and voltage and gets trapped.

- **Controlling System :** To make the greenhouse fully automatic we have to set an efficient control framework utilizing the Internet of Things innovation. devices include sensors, actuators, microcontroller, GSM module (optional) and also the connecting cables. The sensors used in our proposed model include the followings: temperature, sensor, and pressure. Then a microcontroller has been used connecting the sensors and actuators to sense the climatic conditions from the environment and act accordingly.

- **Sensors:** In this we have used 6 sensors i.e., the temperature sensor, pressure sensor, humidity sensor, soil moisture sensor, light sensor and the color sensor.

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- **Pest Detection** : When the color sensor notices any variation in the color it sends the signal to the microcontroller and us to see the changes in our laptop through the raspberry pi. So that we can investigate why the color changes and it may be due to any disease outbreak or pest attack and we can take preventive measures from a much earlier time.

- **Temperature Identification:** The DHT11 is a commonly used Temperature and humidity sensor. The sensor comes with a dedicated NTC to measure temperature and an 8-bit microcontroller to output the values of temperature and humidity as serial data. The sensor is also factory calibrated and hence easy to interface with other microcontrollers.

- **Notifications:** After the identification of the data regarding the weight of the products and temperature inside the Greenhouse the user is notified through an app. An app named all thingsmaker is created and linked to the program using its ID. Using this mobile application, the image identified and updated in the app.

VIII. CONCLUSION

In a developing country like India, where cultivating is the principle wellspring of wage in the vast majority of the districts, individuals should know about new innovations in this field with the goal that they can actualize it in their cultivating hones and can be profited by a substantial degree. People really need to get aware of cultivation of such cash crops and use of automated design and technology and by implementing it in their daily lives can help them as well as the country to improve significantly both by socially, economically and financially. IoT is widely used in connecting devices and used to gather information. The system is designed to remotely monitor the greenhouse parameters such as soil moisture, temperature, this information can be collected by the farmers with the help of cloud account and internet connection. There is also controlling action taken automatically that is greenhouse windows/ doors roll on/off based on the soil moisture levels. Thus, the system will help the farmers to avoid physical visit to the field, and increase the yield with the maintenance of précised parameters such as soil moisture, temperature, and light in the greenhouse with the help of IoT.

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