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Implementation of Smart Green House Monitoring System

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Abstract

A greenhouse (also called a glasshouse, or, if with sufficient heating, a hothouse) is a structure with walls and roof made chiefly of transparent material, such as glass, in which plants requiring regulated climatic conditions are grown. These structures range in size from small sheds to industrial-sized buildings. Many commercial glass greenhouses or hothouses are high tech production facilities for vegetables or flowers. The glass greenhouses are filled with equipment including screening installations, heating, cooling, lighting, and may be controlled by a computer to optimize conditions for plant growth. Different techniques are then used to evaluate optimality-degrees and comfort ratio of greenhouse micro-climate (i.e., air temperature, relative humidity and vapor pressure deficit) in order to reduce production risk prior to cultivation of a specific crop.
According to the requirement of the crops the threshold will be set, if the any environmental condition like temperature, soil conditions and humidity goes below or above the threshold value, then IoT sense the changing in parameters are monitored simultaneously and all the data will be transmitted to farmers, according to that farmer will take the controlling decision and send to the system. The system will run the actuator and control the parameter. Types of sensor used and controlling action are taken according to them.

Key Words –Green house, Raspberry-pi, IOT,Sensors.

INTRODUCTION

Greenhouses are frames of inflated structure covered with a transparent material in which crops are grown under controlled environment conditions such as surrounding temperature, humidity, nutrient, soil moisture, etc. Greenhouse cultivation as well as other modes of controlled environment cultivation has been evolved to create favorable micro-climates, which favors the crop production could be possible all through the year or part of the year as required. The environment inside the greenhouse will affect the quality of the plants. As a result, it is important to maintain the parameter such as temperature, light, humidity, and soil moisture. There are number of facilities for performing experiments related to plant growth research, where high degree of climate control is needed especially in greenhouse. Climate control requires real-time precise measurement.

Greenhouse industry is the fastest growing sector. Greenhouse crops are separate crops from the farm so it can get proper environment and fertilization. The main advantage of greenhouse is we can produce many crops at a time by manipulating environmental conditions as per different crops require. This asset allows the farmer to improve the cultivation in a way the plants need. A greenhouse should provide a structure for growing plants that is transparent to sunlight, yet sufficiently enclosed to reduce convective heat loss (the exchange of air between inside and outside). Some of the solar radiation travelling through the covering material produces heat, and some of it is used for plant photosynthesis, resulting in the production of useful biomass.

LITERATURE SURVEY

The paper, “A monitoring and control system for greenhouse through Internet of Things (IOT)” is presented by Ravi Kishore Kodali, Vishal Jain and Sumit Karagwal [1]. The system monitors the various environmental conditions such as humidity, soil moisture, temperature, presence of fire, etc. If any condition crosses certain limits, a message will be sent to the registered number through GSM module. The microcontroller will automatically turn on the motor if the soil moisture is less than a particular value. A color sensor will sense the color of the leaves and send message. This work is primarily about the improvement of current agricultural practices by using modern technologies for better yield. This work provides a model of a smart greenhouse, which helps the farmers to carry out the work in a farm automatically without the useof much manual inspection. Greenhouse, being a closed structure protects the plants from extreme weather conditions namely: wind, hailstorm, ultraviolet radiations, and insect and pest attacks. The irrigation of agriculture field is carried out using automatic drip irrigation, which operates according to the soil moisture threshold set accordingly so as optimal amount of water is applied to the plants. Temperature and air humidity are controlled by humidity and temperature sensors. A tube well is controlled using GSM module (missed call or sms). Further, the readings collected from storage containers are uploaded to cloud service (Google drive) and can be forwarded to an e-commerce company.

The work proposed by Imran Bin Jafar, Kanij Raihana, Sujan Bhowmik and Shifur Rahman ShakilIn [2] on Wireless monitoring system was practically implemented to establish the Smart Greenhouse Management. Here, the control system can repeatedly handle vital factors for plants according to the real time clock set with microcontroller and routinely carry out wireless transmission of sensors‟ information to remote software for any further analysis. Moreover, the essential factors, Sunlight, Temperature and Humidity are controlled by the whole system. Particularly, a sensing network running by ATmega328 microcontroller based Arduino UNO Module was exclusively deployed to digitally process analog value of sensors attached to plants.

The method suggested by Remya Koshy, M D Yaseen, „Greenhouse Monitoring and Control Based on IOT Using WSN‟ [3] presents a monitoring and control system for greenhouse through Internet of Things(IoT). The system monitors various environmental conditions such as humidity, soil moisture, temperature, presence of fire, etc. If any condition crosses certain limits, a message will be sent to the registered number through GSM module. The microcontroller automatically turns on the motor if the soil moisture is less than a particular value. A color sensor senses the color of the leaves and send message. The prototype was tested under various combinations of inputs in our laboratory and the experimental results were found as expected.

Sandip Balaso Khot and M. S. Gaikwad have suggested the Development of cloud-based Light intensity monitoring system for green house using Raspberry Pi [4]. Light measurement with accuracy is essential in creating desired outcomes in practical daily applications such as poultry industry, traffic lighting system, gardening or farming, at emergency exits, etc. Hence, light measurement and scrutiny is an important step to ensure the efficiency as well as safety. Normally the growth of plants depends on light intensity falls on top of canopy. In this paper we have presented the real-time remote Light intensity monitoring system using Raspberry Pi, which provides the facility to monitor the lighting system remotely. The main characteristic of the proposed system is timely light intensity monitoring and storage of data in the database on the cloud for further reference in future. Because of this facility it is easy to take proper decision at proper time to obtain the required result for the growth of plant.

PROPOSED SYSTEM

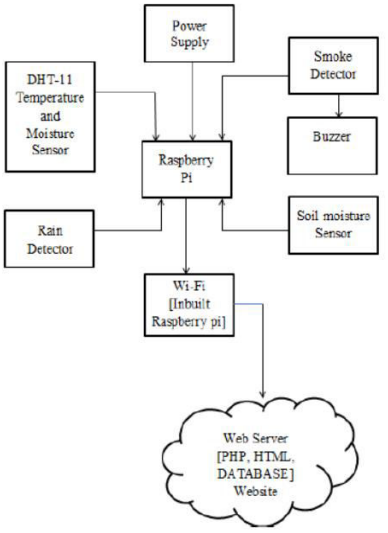
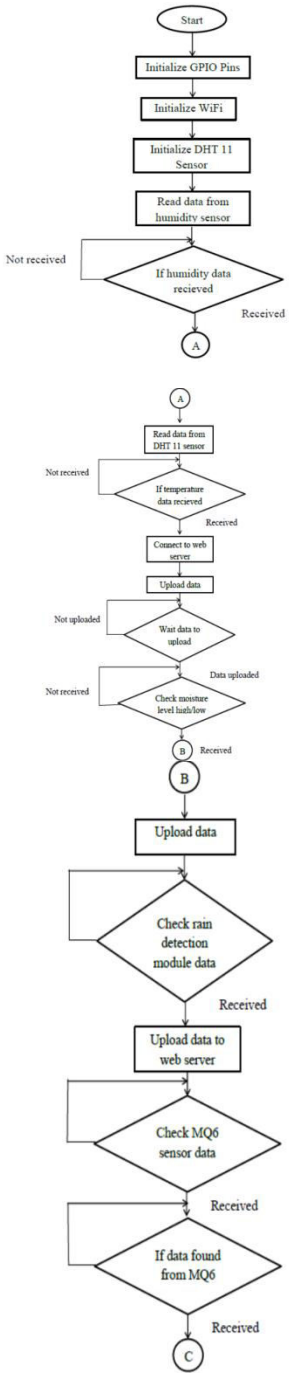


Figure 1. Block diagram of Green House Monitoring System

The basic architecture of wireless sensor node for environment monitoring is presented. The system is designed based on the following features: all nodes are similar in architecture and functionality, architecture can be improved in simple way; low power consumption, power effective, every node is capable of transmitting the data collected to the central system directly of working cooperatively with the rest one. We have developed the sensor nodes network using raspberry pi and IoT. Raspberry pi acts as a main processor. A wireless sensor network consists of raspberry pi as a master as well as different types of sensors. A regulated power supply is provided to the overall system. The block diagram of proposed work is depicted in figure. The wireless sensor technology comprises of raspberry pi, wireless sensor network (WSN) and sensors. Realization of data gathered by sensors based on embedded Raspbian linux is displayed on Graphical User Interface (GUI). The system is developed using open source hardware raspberry pi which proves to be cost effective and having low power consumption. The sensors will gather the data of various environmental parameters and provide it to raspberry pi which act as a base station. Some sensors will directly process the data and provide it to the raspberry pi while some sensors will provide the data through Arduino Nano to raspberry pi using serial interface. The raspberry pi will then transmit the data using IoT and the processed data will be displayed on GUI through IoT that is on the receiver side.

FLOW CHART FOR GREEN HOUSE MONITORING SYSTEM



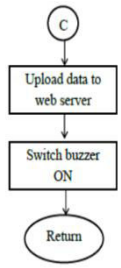


Figure 2. Flow Chart for Green House monitoring system

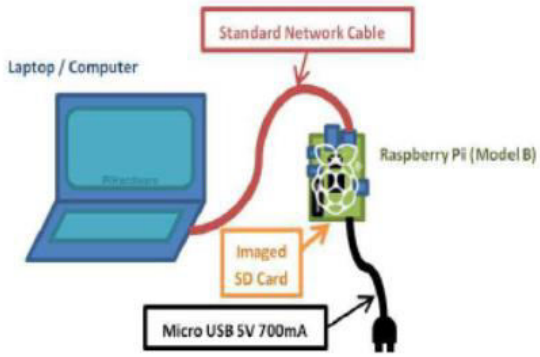


Figure 3. Raspberry Pi Connections

RESULTS

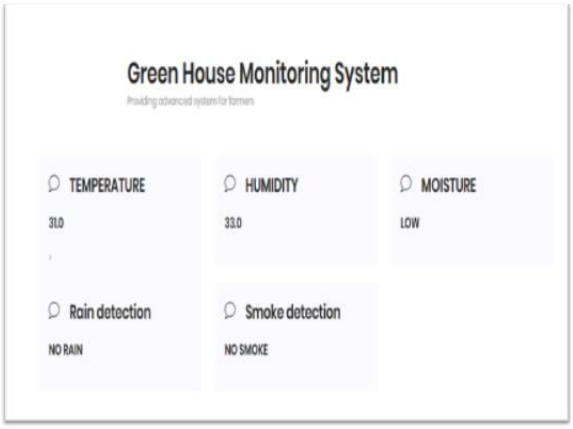


Figure 4. Web Page Output Window

The figure 4 gives us the webpage result. We can observe the current climatic conditions in the green house on the webpage. One can watch it from anywhere because of internet of things. Green house monitoring system provides advanced system for farmers. Every time the sensors sense the climatic conditions it is displayed on this webpage. The

refresh time is about 10 seconds. The changes in temperature, humidity, moisture, rain detection and smoke detection are displayed on this page. The changes in temperature and humidity are displayed in terms of digits. Soil moisture measures the water shortage and gives output either low or high. Rain detector detects rainfall, if there is no rain it outputs as no rain otherwise it indicates as raining. As soon as smoke is detected it outputs as detected otherwise no smoke.

CONCLUSION

The advantage of smart greenhouse over conventional farming is that we were able to produce insecticide and pesticide free crops and create a climate for proper growth of plant and even provide alternative source of income though apiculture, selling tube well water, etc. Moreover this system can be installed by any individual in his house, who doesn"t have knowledge about farming. Since one can maintain any climatic condition in this type of greenhouse, it is possible to cultivate any type of crop. Most importantly, we are able to connect farmer directly to consumer using IoT, which can save him from clutches of middleman. It reduces effort and time of farmer and makes farming efficient and profitable activity.

REFERENCES

[1] Ravi Kishore Kodali, Vishal Jain and Sumit Karagwal, Department of Electronics and Communication Engineering National Institute of Technology, Warangal. *"IoT based Smart Greenhouse"* Region 10 Humanitarian Technology Conference (R10-HTC) IEEE 2016.

[2] Imran Bin Jafar; Kanij Raihana; Sujan Bhowmik; Shifur Rahman Shakil. "*Wireless monitoring system and controlling software for Smart Greenhouse Management"* International Conference on Informatics, Electronics & Vision (ICIEV) 2014.

[3] Remya Koshy, M D Yaseen, "*Green house Monitoring and Control Based on IOT Using WSN"* Dept. of Electronics and Communication Engineering, RRCE, Bangalore. Vol.4, Issue 3, 2016

[4] Sandip Balaso Khot; *M. S.* Gaikwad*, "Development of cloud-based Light intensity monitoring system for green house using Raspberry Pi"* International Conference on Computing Communication Control and automation (ICCUBEA) 2016.