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Greenhouse Automation System

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A B S T R A C T

The aim of this project is to design a greenhouse monitoring system based on the Internet of things (IoT).A greenhouse is a covered area where plants grow and cultivate. It is also known as land of controlled crops and plants. In this we used some sensors to monitor the soil level and Temperature and Humidity by using IoT. If the water level is less than particular level means suddenly relay will trip ON to Get ON the Water pump. If water is in sufficient level means the water pump will get OFF state. There are some important parameters to be monitored inside the greenhouse are temperature, relative humidity and temperature using DSB1820. It will start monitoring when its sensor is connected to the wireless embedded system. We also show how pervasive computing technology is invading our greenhouse. They are representing the technology solution to automate and improve the management of greenhouse. Internet of things (IoT) was developed for connecting a billion of devices into an internet. A huge amount of information is transferred between the electronic devices. It is a new way to interact between device and people. This shows that how the embedded wireless system has been for future vision in the monitoring system. Internet of things (IoT) will play a major role in day today life in the future

1. Introduction

A greenhouse is a Modern off season, cultivating method that gives high yields at any season. Due to wide growth o1f greenhouse an intelligent monitoring system gives more attention in a Modern greenhouse system. A greenhouse is a multivariate interactive system due to the inside weather Deflection with outside. Most of the agricultural sector in the country is facing the low economical resource, but some of the greenhouse running in the low tech. So many researchers have been focusing on the automated wireless embedded intelligent monitoring system for greenhouse. This paper shows the experimental wireless embedded intelligent monitoring system for greenhouse which will improve crop growth and reduces cost and manpower. If monitoring has been implemented using the wired networks, the cables connected to the devices need to be rearranged for every crop, so it is waste of money and manpower, so it needs to be replaced by the internet of things (IoT) because it provides a new method for accessing the farmland information. It expands the communication between the devices and the people by sensing a physical world using a sensing technology that information has been processed by the intelligent embedded wireless system using this methodology to achieve the real time monitoring of the physical world to get a data using that data to make decisions for what action to make. The information gained by the embedded wireless node has been sent to the server through "message queuing telemetry transport" broker, server which is a standalone privatewebserver. The server will manage the sensor data, it stores the data every five second time stamps. Time, temperature, carbon-di-oxide and relative humidity data have been stored in the database. This shows how the internet of things (IoT) has made revolution for the future communication and computing. It's just not just extension of internet or communication. It has the features for both the internet and communication. It has its own features of three layer architecture, which is not enough so, the five layers were introduced. A first IoT has been used by Kevin Ashton in a presentation in 1998. The main purpose of IoT is for exchanging information. IoT will serve as the backbone for computing and networking of embedded system

1.1 Problem Statement

- Green house temperature should not go below a certain degree, High humidity can result to crop transpiration, condensation of water vapour on various greenhouse surfaces, and water evaporation from the humid soil.

•To overcome such challenges, this greenhouse monitoring and control system comes to rescue.
•This project demonstrates the design and implementation of a various sensors for greenhouse environment monitoring and controlling
.

1.2 Objectives

- To design and build a greenhouse controller that can maintain the environment, by acting upon live sensor readings and be able to display the status of the system.
- Constantly monitor and control environmental conditions in greenhouse to ensure it remains at present temperature, light, moisture, and humidity levels.
- It focuses on saving water, increasing efficiency, and reducing the environmental impacts on plant production.
- The user can see the atmospheric conditions of the greenhouse plants on websites and control the greenhouse from faraway places.

1.3 Scope of the Project

An automated system for greenhouses is developed, which allows the user to remotely monitor as well as control all the parameters. With the help of this system, the user will be able to control the four most important parameters of the greenhouse; temperature, humidity, soil moisture, and light**.**

2. Literature Survey

The Internet of things have become the heart and soul for a wide range of applications by enabling a connectivity between the all the tangible things that are enabled with internet connection. The author
Sreekantha et aL [1], presents the literature survey on the internet of things for the online crop monitoring. He describes that the IOT enables an effective and an easy production of the crop, increasing the profits of the farmers. The Sensors also play a vital role in the monitoring of the crop growth by gathering information about the growth and sending them to the farmer's mobile devices for implementing the corrective measures. Vatari, et al [2], the author initiates a green-house environment combining the IOT and the Cloud, to control the system and enable the information to be stored respectively. G. Parameswaran et al[3] proposed "Arduino based smart irrigation system using Internet of Things" in which various sensors are used to collect the data and it can be viewed in the cloud.SonaliD.Gainwar and Dinesh V. Rojatkar (2015) [4]proposed a paper in which soil parameters such as pH, humidity, moisture and temperature are measured for getting high yield from soil. This system is fully automated which turns the motor pump ON/OFF as per the level of moisture in the soil. The current field status is not intimated to the farmerV. R. Balaji and M. Sudha (2016)[5]proposed a paper in which the system derives power from sunlight though photo-voltaic cells .This system doesn't depend on electricity. The soil moisture sensor has been used and based on the sensed values PIC microcontroller is used to ON/OFF the motor pump. Weather forecasting is not included in this system Shukla et al [6], the author use the "microcontroller board, IOT and the Cloud server to develop an intelligent green-house to control as well as monitor the cloud and the data's can be viewed in cloud.

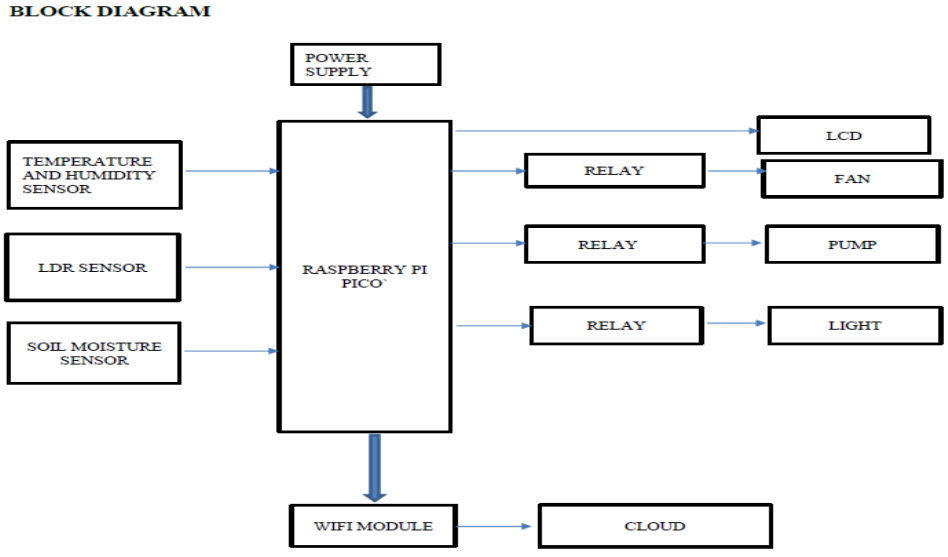

Fig.1– Block Diagram

3.Proposed System

This study proposes an IoT-based Greenhouse Monitoring that contributes to the various range of agricultural greenhouse; the system not only allows intelligent monitoring of the internal climate and working conditions of the greenhouse but also enables the supervisor to control the greenhouse over the internet wherever he/she is through the interface. In the proposed model's architecture, the data collected experience various stages during their transition from sensors to interfaces and occasionally to actuators. These stages have a significant impact on technologies used for IoT context. These stages are divided into six main data flow phases: sensing, communication/transport, processing, storage, analysis, and actuation. In this paper, we proposed an automated greenhouse monitoring and controlling system that incorporate various sensors such as temperature sensor, humidity sensor, light sensor and soil moisture sensor to collect possible environmental parameters of greenhouse as well as integrate Raspberry pi pico (to store and process data), IOT cloud platform which is ubidot (to send the measured value of the various parameters to the user cell phone to ensure efficient growth of plants). Moreover, Internet of Things (IoT) is used to store data to a database and process the collected data and finally send the information to the device which has been developed for monitoring and controlling of greenhouse by the user. Moreover, the proposed greenhouse model with some recent works and found the proposed system cost effective, efficient and effective by analyzing major environmental parameters. The cost associated with the deployment of proposed greenhouse model which depict quite affordable for farmers and worth deploying. A review of the recent trends in greenhouse environmental monitoring shows that research and development in this field are shifting from offline systems to wireless and cloud-based data collection architectures. Various data acquisition platforms, either prototype or commercial, have been used for improving the performance of greenhouse production. Some of the most recent examples include web-based, cloud-based, IoT communication and control, wireless sensor networks, field-server based monitoring, field router systems, and distributed data acquisition with local control management

1.4 Hardware Components Used

- Soil moisture sensor
- Temperature and humidity sensor
- Gas sensor
- LDR sensor
- Pump
- Light
- Relay
- Power supply
- Esp2866 Wi -fi module

4.Results and Discussion

The paper presented automatic greenhouse monitoring System based on IOT using Raspberry pi pico, Temperature,humidity, soil moisture and light sensors have been used to sense the environmental parameters. These parameters are then monitored using Raspberry pi pico controller which actuates exhaust fan, pump and lights if required. Special purpose plant grow LEDs have been used to enhance the productivity of crops. The presented system also includes an android application for monitoring purpose. The presented paper is a fully automated one.

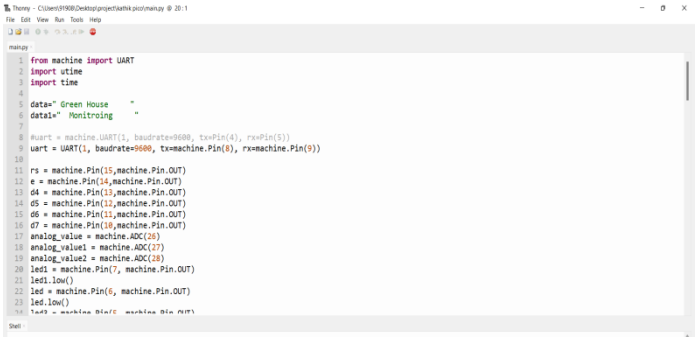

Fig.2– Software implementation – interfacing raspberry pi pico with sensors

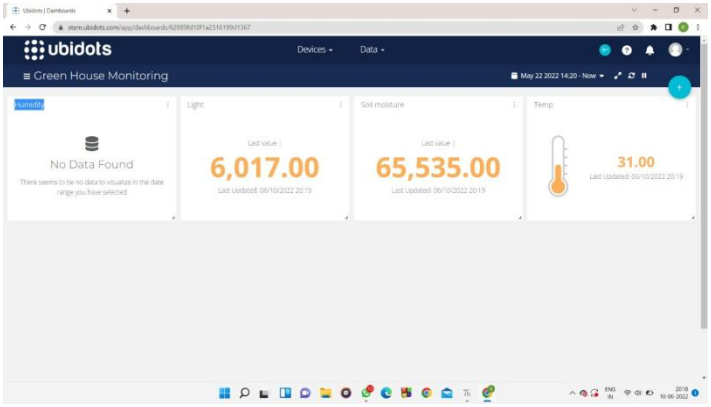

Fig.3– IOT FRONT PANEL– UBIDOT WEB PAGE

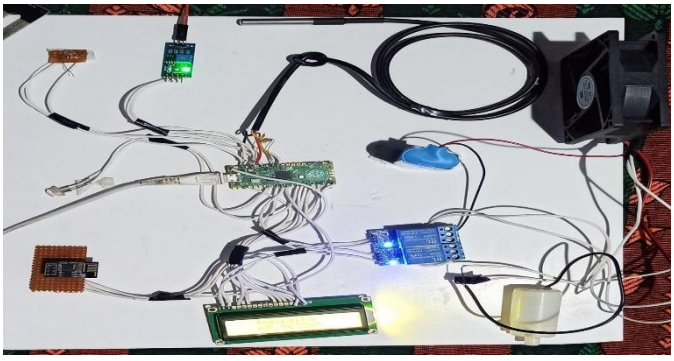

Fig.4– Hardware implementation

5.Conclusion

The paper presented automatic greenhouse monitoring System based on IOT using Raspberry pi pico, Temperature, humidity, soil moisture and light sensors have been used to sense the environmental parameters. These parameters are then monitored using Raspberry pi pico controller which actuates exhaust fan, pump and lights if required. Special purpose plant grow LEDs have been used to enhance the productivity of crops. The presented system also includes an android application for monitoring purpose. The presented paper is a fully automated one

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