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IoT based remote controlled intelligent polyhouse For celery crop

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Abstract

The system proposed is an advanced solution for monitoring the environmental parameter of "celery crop" in polyhouse and make the information visible anywhere in the world. The technology behind this is Internet of Things (IoT), which is an advanced and efficient solution for connecting the things to the internet and to connect the entire world of things in a network. Here things might be whatever like electronic gadgets, sensors and automotive electronic equipment. The system deals with monitoring and controlling the environmental conditions like temperature, relative humidity, with sensors and sends the information to the web page and then plot the sensor data as graphical statistics. The data updated from the implemented system can be accessible in the internet from anywhere in the world.

I. Introduction

The Internet of Things (IoTs) can be described as connecting everyday objects like a smart phones, Internet TVs, sensors and actuators to the internet where the devices are intelligently linked together enabling new forms of communications between things and peoples and between things themselves. This is a low cost and flexible monitoring & controlling system using an atmega 328 microcontroller. It allows the people to directly check the parameters online without the need of forecasting agency to accessing and controlling parameters. Here the different parameters are controlled automatically using microcontroller-based internet application. The proposed system does not require a dedicated server PC with respect to similar system and offers the communication protocol to monitor and control the greenhouse environment with more than just the switching functionality. Now anyone from anytime and anywhere can have connectivity for anything and it is expected that these connections will extend and create an entirely advanced dynamic network of IoTs.

The system proposed in this paper is an advanced solution for monitoring the weather conditions in polyhouse and make the information visible anywhere in the world. The technology behind this is Internet of Things (IoT), which is an advanced and efficient solution for connecting the things to the internet and to connect the entire world of things in a network. Here things might be whatever like electronic gadgets, sensors and automotive electronic equipment. The system deals with monitoring and controlling the environmental conditions like temperature, relative humidity, with sensors and sends the information to the web page and then plot the sensor data as graphical statistics. The data updated from the implemented system can be accessible in the internet from anywhere in the world.

II. Design of Green House Monitoring and Controlling System

This embedded system for monitoring and controlling the green house is based on measuring the humidity and temperature by sensor that located at different places. The monitoring and controlling is conducted through Android Smartphone.

A. Hardware Description

Design of hardware for green house monitoring and controlling are used to control the environment condition of greenhouse to get a good condition. The parameters are humidity and temperature in the greenhouse. The monitoring and controlling of greenhouse component consists of sensor for the humidity, Arduino UNO microcontroller, serial communication, wireless connection, LED module change for water pump, model of greenhouse, personal computer as server, and power supply unit. The output for the sensor become an input to microcontroller and sent to computer through serial communication. The task of the computer is to transfer the data through wireless communication to application software at Android Smartphone. The task of the Android Smartphone to control microcontroller and the components.

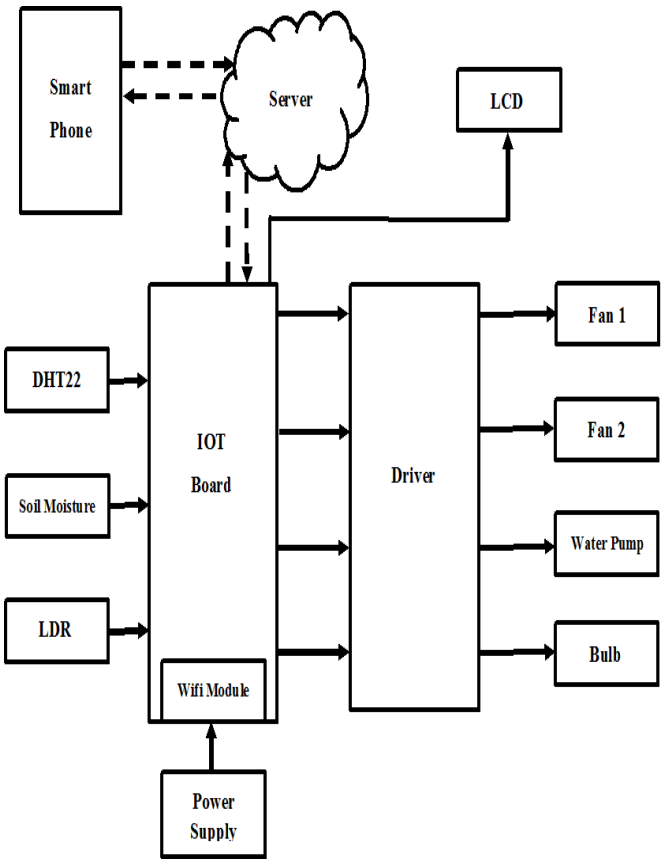
- B. Software Description
- ARDUINO IDE1.8.4

• The Arduino integrated development environment (IDE) is a cross-platform app. written in Java and is derived from the IDE for the Processing programming language and the Wiring projects.
• A program or code written for Arduino is called a "sketch".
• The Arduino IDE uses the GNU toolchain and AVR Lib. to compile programs, and uses avr dude to upload programs to the board

- ANDROID APP

Blynk is an open source android app specially designed for IOT applications. The user needs to create an account to access the application. The app does not store any data. It is only designed to monitor the data sent from a microcontroller.

III. Block Diagram



Description of Block Diagram

- The project is broken down into 4 major subsystems: monitoring system, control system, wireless communications system and the web server-based user interface. This allowed for easier debugging and helped make the integration phase of the project go smoothly.
- This project utilizes Arduino microcontrollers in a configuration to obtain sensor readings and operate the greenhouse temperature controls. Additionally, this controller transmits control signals and receives sensor data through a Wi-Fi module.
- Sending data includes temperature, humidity and light intensity readings as well as receiving and relaying control signal input by the user to the motor controller.
- The monitoring system consists of four sensors that interface with the slave Arduino UNO microcontroller.
- These sensors include: a temperature sensor, humidity sensor, light intensity sensor. Sensor data is relayed wirelessly to the Arduino Mega where it is logged and uploaded to the web server.
- The Arduino UNO was chosen as the slave microcontroller. The UNO is a microcontroller board based off of the ATmega328P chip.
- The UNO provides 14 digital I/O pins along with six analog input pins. The monitoring system required a total of eight digital pins and three analog pins making the Arduino UNO a perfect candidate.
- The UNO has a clock speed of 16 MHz and a flash memory of 32 KB which was more than enough to run and process the monitoring system code.

IV. Results

- The data sent from the microcontroller is displayed in this application
- The buttons are used to control the device remotely
- Sensor values such as humidity, temperature, light intensity and moisture value are displayed.

- When the device is in manual mode the output peripherals such as water pump, light bulb and fan operate automatically without any intervention.
- When in manual mode we get the full control of the device which helps us to control all the peripherals remotely.
- The upper left corner of the application indicates the time in milli seconds , this time indicates if the device is online or offline.

V. Implementation of Greenhouse Monitoring And Controlling System

A. Hardware Implementation

In the hardware implementation, it has wired components sensor to microcontroller arduino by jumper cable and use protoboard as a board for the components like stepper motor and LED module in the hardware. The 5V DC power is provided for microcontroller arduino UNO. Then, the connection between for microcontroller arduino, sensor circuit, water sprayer replace by LED module are
Made through serial communication and APP as a server

B. Software Implementation

After logging in the app, we get a authorized token. This token is hardcoded in the microcontroller, which uses the token to connect to the app. Data from each sensor is displayed separately on the display. Buttons are provided for two-way control.

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[9] Towards Green IoT Networking: Performance Optimization of Network Coding BasedCommunication and Reliable StorageJIAN LI1, YUN LIU1, ZHENJIANG ZHANG1, JIAN REN2, (Senior Member, IEEE), AND NAN ZHAO31School of Electronic and Information Engineering, Beijing Jiaotong University, Beijing 100044, China2Department of Electrical and

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