IOT BASED GREEN HOUSE MONITORING SYSTEM

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ABSTRACT

Monitoring the vital parameters of a greenhouse namely temperature and soil moisture through internet of things technology (IOT). Irrespective of wherever in the world you are through IOT technology we can monitor and control the greenhouse parameters. All the vital sensor data will be available to authorised users via internet. Even though the technology is yet to take off globally, this report analyses the possibility of integrating a greenhouse and the IOT. The project covers wide area of embedded system and networking.

This paper presents a low cost and flexible greenhouse monitoring system using an embedded MCU with wifi connectitivity to the internet. The proposed system does not require a dedicated server PC with respect to similar systems and offers a light weight communication protocol to monitor and control the environment. To demonstrate the feasibility and effectiveness of this system, devices such as soil moisture sensor and temperature sensor have been integrated with the proposed greenhouse control system.

Keyword: IOT, MQTT, CC3200

I. INTRODUCTION

In the present scenario were people are moving around the world, there is an increased demand for connectivity with our properties wherever we are on the planet. Here comes the role connecting every device to the internet so that it is accessible wherever we have an internet access. This interesting fact throws upon us the need to implement a solution integrating our present resources. This is where internet of things comes into the picture. This report focuses on implementing a smart greenhouse that can monitored using IOT technology.

II. OBJECTIVE

The objective of the project is to implement a miniature model of a smart monitoring and control system of greenhouses through the internet of things technology.

The proposed project aims at monitoring the various analog parameters like temperature and soil moisture and send the processed data over a wireless network to an online broker and analysed in real-time. Moreover it is proposed to enable the end users control the greenhouse parameters remotely from anywhere in the world.

III. IMPLEMENTATION

The whole idea of smart greenhouse monitoring is accomplished using IOT[1]. The project provides access to control and monitor vital parameters of the farm through a network of sensors which forms the lowest nodes of a multi level IOT platform.

The coding started from the TI project example which came as part of the SDK of CC3200 launch pad. A real time OS called Free RTOS was used to implement the tasks as the project involved WLAN, http server, socket programming over TCP/IP for MQTT [1]. Without an OS this would have been difficult to manage these tasks. Initially the board and the needed peripherals were initialised and two tasks were created for device configuration and data publishing/subscription. The TI support forums on CC32XX devices was extremely useful to overcome the issues that came up during coding.

Paho Embedded C [2] & [3] client gave us the necessary support to integrate MQTT protocol into this project. Using this could send packets every 3 hours to the cloud server and it was verified using MQTT lens chrome application. This application enables users to subscribe to a particular topic or publish data to a particular topic. The same device configuration page of CC3200 which was loaded into serial flash was used for configuring the device initially [1].

Device reads the soil moisture in fixed intervals of time (in every 3 hours), and sends the data over a Wi-Fi network [2] through the gateway to the cloud application. Device supports sending the soil moisture data when it is requested from the cloud application to the end device. Device will get 1024 samples from the sensor when the request is given. Among 1024 samples the average value (simple arithmetic – average) and will be passed to the gateway for cloud application update.

The idea of soil moisture sensing [3] is that, when the soil is wet, more current flows between the two electrodes and consequently the resistance will be low. When the soil is dry the current flow is less and hence resistance is more. Resistance variation largely depends upon the exposed area of the electrode surface. The moisture sensors reads the soil moisture in fixed intervals of time (in every 3 hours), and sends the data over a Wi-Fi network through the gateway to the cloud application. Device supports sending the soil moisture data when it is requested from the cloud application to the end device. Device will get 1024 samples from the sensor when the request is given. The average value (simple arithmetic – average) of these 1024 samples is calculated. This is to account for the noise that is generated in the circuitry. These values are passed to the gateway for cloud application update. The greenhouse temperature is measured using the inbuilt temperature sensor of CC3200. Both these parameters along with the timestamp is send as a packet to the cloud server every 3hours. There is also provision for changing this updation time remotely. Moreover users can send request to get the current sensor values via MQTT.

IV. CONCLUSION

This paper shows the basic format of research paper preparation and IOT based greenhouse monitoring was successfully implemented with the help of internet of things technology. The basic idea of the project was achieved despite being an area yet to explored completely. Moreover there are lot of areas to be improved.

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