Temperature, Humidity, and Soil moisture monitoring in Greenhouse crop environment

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Abstract

Humidity and Temperature are critical factors for a biological system to respond optimally because each factor has a different influence on crop's health and productivity. Humidity and temperature can be measured in a lot of different ways. However, significant technical innovation is still necessary to enable repaid, real-time, and distant monitoring of these data. The goal of this project was to develop a greenhouse crop temperature and humidity measurement hardware and software system.

Introduction

- Greenhouse farming is planting crops and vegetables in a greenhouse. Temperature and humidity are important factors in growth of the crop to be healthy and productivity.
- Generally, the plant will be healthy at a temperature of 27 °C [1]. However, each kind of plant has slightly varied temperature and humidity requirements. For example, some crops such as tomatoes or melons love a ton of sun, then the temperature should be warmer. In general, do not rise above 32°C and do not fall below 24°C. If a farmer is concerned about disease or infection on their crop, they should check the temperature and humidity carefully and regularly.
- This study proposes an internet of Things (IoT) system based on the temperature and humidity in the greenhouse environment.
- This system will be monitor and record humidity and temperature and then present information on the web server and send information to the farmer's smart phone over the internet. Additionally, it concentrates on controlling humidity in the soil by automatically refilling water.

Reference

[1] https://www.happysprout.com/outdoor-living/greenhouse- temprature-humidity
[2] S.Praveen & Dr.N.Shenbagavadivu, IoT based multiple sensor (DHT11, Soil moisture sensor) monitoring, 2019

Methodology

- **System Framework**: All sensors devices connect to central board ESP8266 which connected to internet gateway. ESP8266 collects data from sensors and then send information to store in cloud database. Farm owner can use app on android phone for checking and monitoring temperature humidity and soil moisture in farm from everywhere.

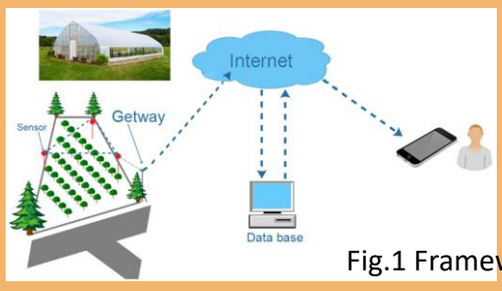

Fig.1 Framework

- **System architecture diagram**: All IoT devices to used for build the system such as ESP8266, breadboard, DHT11 sensor, Soil Moisture sensor, water pump 5V-DC, Relay-5V and battery (5V). All devices are connected as following diagram.

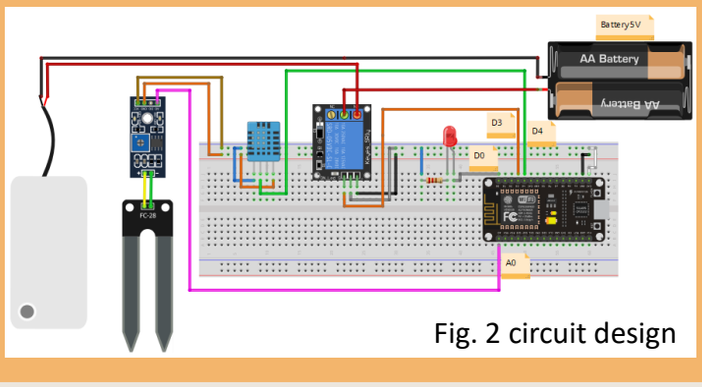

Fig. 2 circuit design

Implement and Result

After all of the devices have been connected follow figure(2) and the code have uploaded to Esp8266. The environment condition such as temperature, humidity and soil moisture maybe detected by sensors. we use Ubidots to store data and delivery information to smartphones.

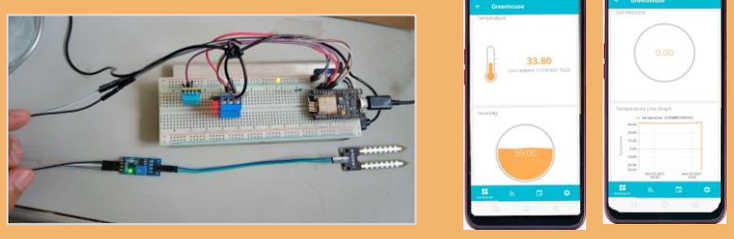

Fig. 3 display information on mobile app

Discussion

The recommended IoT-based real-time environment monitoring system is a reliable and quick tool to monitor environmental factors including temperature, humidity, and soil moisture. Our goal was met by the results of real-time, accurate temperature and humidity measurements.