

SMART CARE PLANT NOTIFICATION

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To my beloved

Parents

Haji Ismail Bin Haji Ya'amat and Suhana bt Abd. Kadir

siblings,

Intan Syafinas, Mohamad Syazwan and Mohamad Hakim

Dedicated in thankful appreciation for your supporting, encouragement and best wishes

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ABSTRACT

The global warming nowadays give a big impact to the farmers. The idea to monitor the environment parameter for the plant. The purpose of this project is to develop data monitoring system for plant care. The sensor used in this project are soil moisture sensor and two in one humidity and temperature sensor (DHT11). These sensors will detect the environment parameter in term of moisture, humidity and temperature by read the voltage output of the sensor. To make the sensors operate in the monitoring system and data monitoring system, Arduino Mega was used as the microcontroller for the whole system. The circuit also includes DC water pump and Internet Shield to send the data reading from the sensor to data monitoring system that display on webserver and android application by wireless. A graphical user interface (GUI) for android application was created using MIT Apps Inventor for end user monitoring purpose.

ABSTRAK

Pemanasan global pada masa kini memberi impak yang besar kepada petani. Idea untuk memantau parameter alam sekitar untuk kilang. Tujuan projek ini adalah untuk membangunkan sistem pemantauan data untuk penjagaan tumbuhan. Sensor yang digunakan dalam projek ini adalah tanah kelembapan sensor dan dua dalam satu kelembapan dan suhu sensor (DHT11). Ini sensor akan mengesan parameter alam sekitar dari segi kelembapan, kelembapan dan suhu dengan membaca output voltan sensor. Membuat sensor beroperasi dalam sistem pemantauan dan data sistem pemantauan, Arduino Mega telah digunakan sebagai pengawal mikro untuk keseluruhan sistem. Litar ini juga termasuk pam air DC dan Internet Shield untuk menghantar data membaca dari sensor untuk sistem pemantauan data yang dipaparkan pada pelayan Web dan aplikasi android oleh wayarles . Satu antara muka pengguna grafik (GUI) bagi permohonan android telah dicipta menggunakan MIT Apps Inventor untuk tujuan pemantauan pengguna akhir.

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CHAPTER I

INTRODUCTION

1.1 Overview

During this global warming phenomenon, the farmer are going through a hardship in the farming. This because the high temperature raising will cause the water in the soil easily drain. This modern days, the agriculture start to integrate with the technology to make the job much easier. This Project will help user to check up the soil condition of the plant wirelessly so that the user can have importance information about the wetness of the soil, the temperature and humidity around the plant when user are not around.

The device have two input sensors that are connected to the microcontroller. The first sensor, moisture sensor detects the moisture level of the soil and by doing that the user can assume the present of water in the soil. Meanwhile, the second sensor is two in one sensor that can detect the temperature and humidity of the area around the plant. The inputs will be sent to the microcontroller for display.

Next, after the inputs are processed the output will be generated. There are one outputs that connected to the microcontroller in this project, which are water. When the moisture level reach the certain threshold, it will be pumped using handmade water pump which will be controlled by DC motor. Last but not least, the moisture condition of soil of the plant will be informed to the user wirelessly by via internet through android application.

1.2 Problem Statement

The concern with a lot of consumer needs and demand for the agriculture products has stimulated awareness among the farmers to implement agro-condition. Farmers cannot precisely detect environmental condition around the plant. Farmers only know the wetness of soil, the humidity and temperature around the plant by feel it themselves.

Nowadays, there is wireless technologies that being implement in many fields. The user need device that can send the condition of plant wirelessly. The user will get notification about the environmental condition around the plant.

1.3 Objective

The main objective of this project is to build a monitoring system that able to notify the user through android apps and automatically watering the plant based on the moisture level.

1.4 Scope

To improve the efficiency of the water intake of the plant, this android bases wireless notify the soil moisture level, humidity and temperature around the plant to the user even the user are far from the location. So, that user can access from the various place to check the environmental condition around the plant. Therefore, the alternative way of this case are android based wireless notification by using a modem. There is still have the limitation for this project which is the wifi area for connection. The microcontroller used in this project is Arduino Mega.

The Arduino is a platform to design and create the device that can interact with their environment using sensor and actuators. There are various types of Arduino controller board available in the market including the Arduino kits and Arduino shields. Arduino IDE software is been used in this project. The Arduino Mega Board act as a controller to control the moisture level that suitable for the plant so that the supply water to the soil does not cause flood. Limitation in term of budget and timeframe so, the project cannot be to complex and expensive.

1.5 Expected Output

After completing the prototype, the result from the project compared to analysis of efficiency of the wireless system used. The expected results from this project are the moisture sensor be able to measure the water level in the soil that around the plant. Then, design the android based wireless notification for soil moisture level to achieve the following :

1. To design an android platform for the wireless notification for the environment parameter around the plant.
2. To build a simple inexpensive device that can integrate with the android application.

3. To analyse the performance of the wireless soil moisture notification using android based compared to the current system used.

CHAPTER II

LITERATURE REVIEW

This chapter explain about the background research which is related to this project. A brief explanations about the perspective and methods used in the previous research is presented in this chapter. At the end of the chapter, we will show how this project is related to the available research and how it is different from the others.

2.1 Previous Research on Plant Monitoring System.

Soil wetness notification via android application for plant is a device that will sense the important variable of the plant, then process it and give a supplement to it. This allow the user to manage the moisture level by comparing the measured values with expected ones and takes action if needed. This project is to aim the flexibility, maintainability and usefulness in more modern ways. With the current technology available, lots of features can be installed on the green house such as sensor for monitor condition of the plant, gsm module for notification and etc. However, when it involved the global warming environment that occurs nowadays it will give an impact to farmers. The wireless notification using internet is the best solution to notify to the farmers the condition of the plant because it can alert the selected recipient through via android application. This device is used to measure the soil moisture level around the

plant. This method will help the farmer to check their soil wetness, so that the soil around the plant will be wet and plant can consume the water from the wet soil.

2.1.1 Agriculture Parameter

Green house environment monitoring technology has continuously improved every year. The good and efficient greenhouse environment can improve the crop quality, short the growth cycle and increase the production, which this is have a very crucial theoretical significance and value for study. [4] The parameter for the plant is the main thing in this project.

K. Rangan and T. Vigneswaran proposed that the cultivation method of greenhouse is that the growth of crops doesn't depend on the nature environment only. They need to keep the best optimization of environment by controlling the environment artificially using a device. The green house monitor is designed based on the measuring of various parameters like humidity, temperature, pH of water, soil wetness and light intensity by sensors that are located at different places .[1]

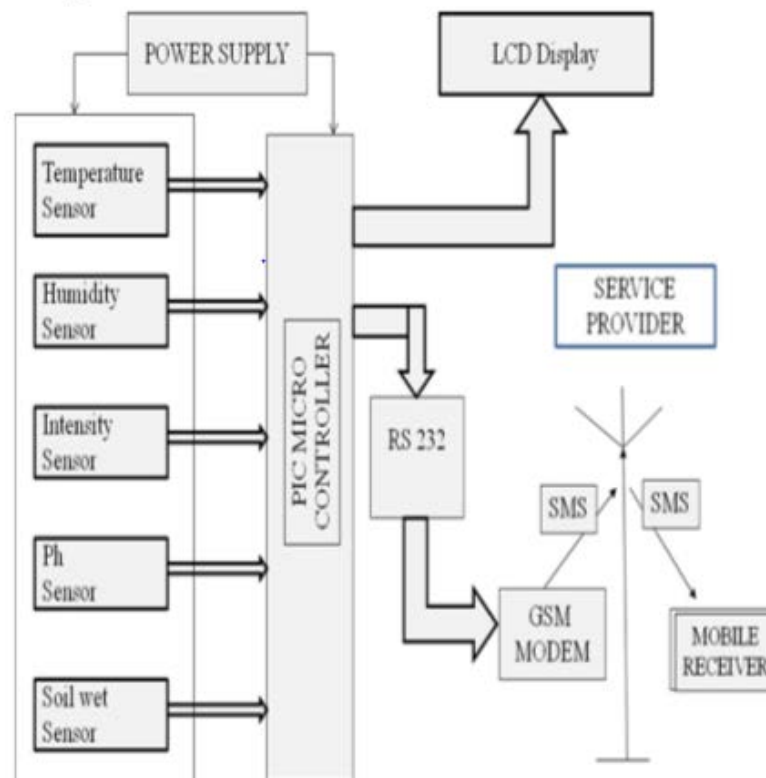


Figure 2. 1: Schematic showing the green house monitoring [1]

P.S Asolkar and Prof. Dr. U. S. Bhadade present an effective method for crop monitoring in agricultura, that it can replace the traditional crop cultivation techniques. The proposed greenhouse system will provides an impact on varieties of crop species. The presented system state that the most crucial and important parameter for the green house monitoring system is temperature, humidity, soil moisture, and light intensity and CO_2 gas. The system had been tested in the green house environment and an observation is recorded. The crop analysis will helps farmer for monthly future prediction. This system is very effective solution to increase the efficiency in the farmer line of work and can prevent disease. [5]

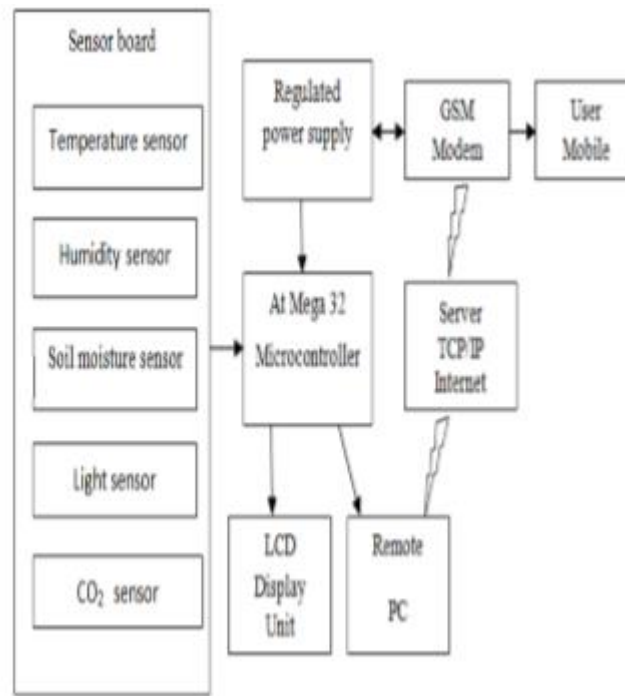


Figure 2. 2: Functional block diagram of greenhouse communication system[5]

2.1.2 Sensor

P. S. Asolkar and Prof. Dr. U. S. Bhadade proposed that the use of moisture sensor is because plant take water from root system and will lose water through transpiring leaves. When this process happen a large amount of water will be loss. The water lost per day from the transpiration process is equal to twice the weight of the plant. The rate of water lost depends on condition of the plant environment, that means it relate to the condition of the soil, air flow, relative humidity in air and the temperature of the environment. The losses of water from the soil is quite common during the dry season. In addition, when the absorption of water by the roots fails to keep up with the rate of transpiration the stomata will close. This immediately reduces the rate of transpiration as well as photosynthesis. The cucumber is the plant that need a lot of water. So, the soil moisture is crucial to this plant because it soil need to always wet so that the cucumber does not dry up.[5]

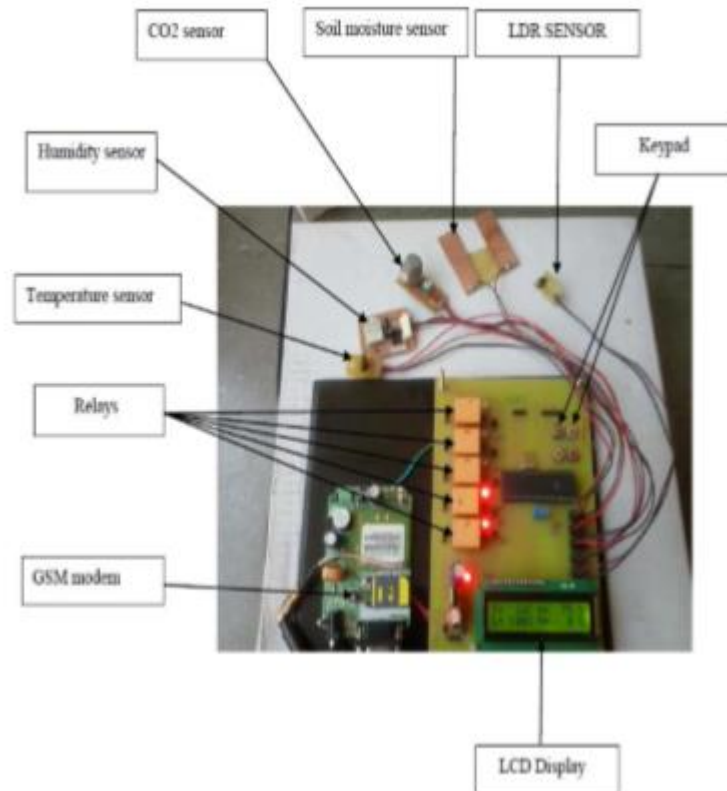


Figure 2. 3: PCB board showing sensor and relay circuit [5]

The cucumber is the plant that need a lot of water. So, the soil moisture is crucial to this plant because it soil need to always wet so that the cucumber does not dry up

Aji Hanggoro et al. present that the use of humidity sensor can detect the level of humidity inside the green house. When the humidity sensor reach a certain threshold, the humidity sensor will then process signal to be sent to microcontroller. The humidity sensor must relate to the use of water sprayer. This because the water from the water sprayer can increase the humidity level inside the greenhouse.[3]

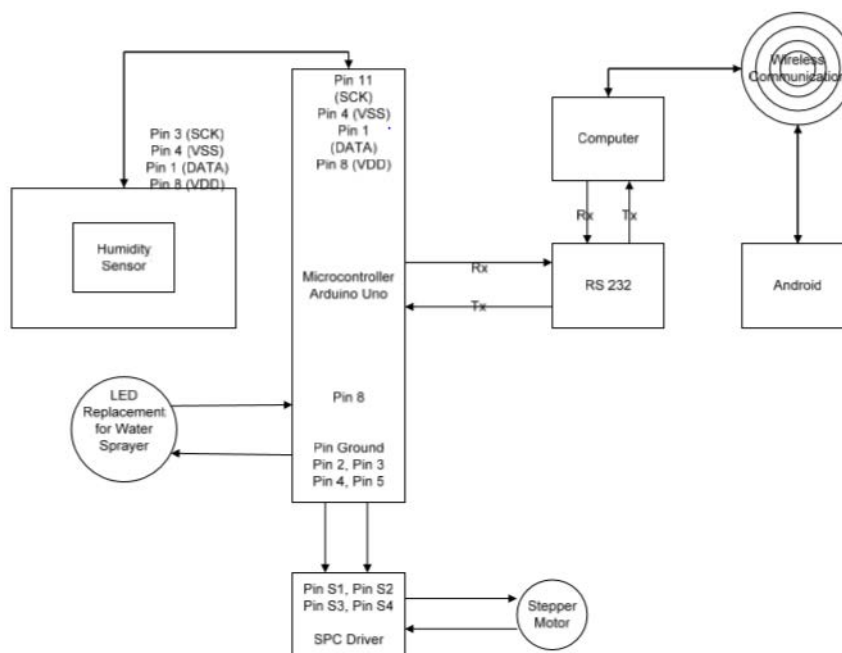


Figure 2. 4Schematic Diagram Showing the Green House Monitoring and Controlling System [3]

Akshay C et al. proposed that using the humidity sensor to control the temperature. The different between the other project that is using three pump as output to make the change on the greenhouse temperature. The three pump respectively for drip irrigation, cooling pad and fogging system and two aero exhaust fans to control temperature and humidity. In addition, using the HSM 20 G is a precision integrated- circuit humidity and temperature sensor has more advantage. The advantage over the linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. It requires an input voltage of 5V. The HSM 20G is rated to operate over a 0⁰ to 50⁰ C temperature range. [6]

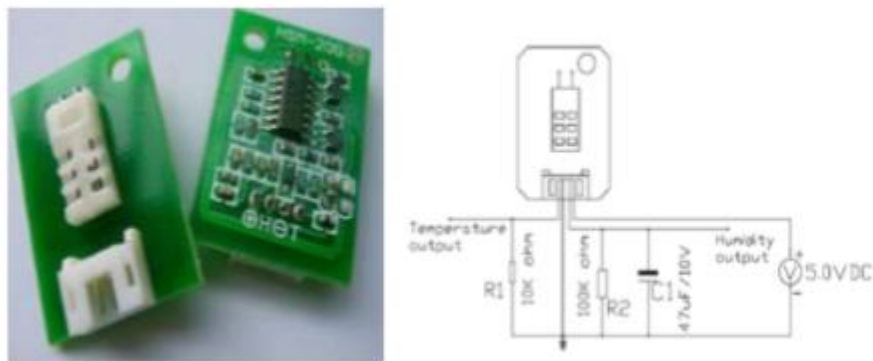


Figure 2.5: Humidity and Temperature sensor HSM 20G[6]

S. Sulaiman, A. Manut and A. R. Nur Firdaus (2009) present a fringing electric field (FEF) capacitance based wireless soil moisture sensor has been designed, fabricated and tested to measure the volumetric water content (VWC) of soil. Soil moisture content is determined by observe the effect on dielectric constant by measuring the capacitance between two electrodes implanted in the soil. Futhermore, the soil predominatly in the form of free water, the dielectric constant is directly proportional to the moisture content. By using the fringing electric field (FEF) sensor can be visualised as a parallel plate capacitor whose electrodes open up to provide a one-sided access to material under test. Meanwhile, FEF sensing is so that it can apply a spatially periodic electric potential to the surface of the soil. In addition, the combination of the signals produced by variation of the spatial period of the interdigital electrodes combined with the variation of electrical excitation frequency potentially provides extensive information about the spatial profiles and dielectric spectroscopy of the soil. [7]

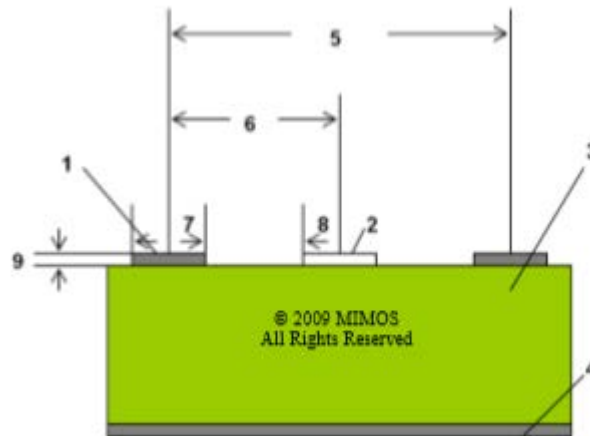


Figure 2. 6: Schematic diagram of cross section of FEF soil moisture sensor. [7]

2.2 Pump

Greenhouse Pumps can be used to move large quantities of water from one place to another - for example you could fill your water butt with water taken from a well, river or stream. Where water pressure is poor or mains water is not available, a pump can be used to take stored water, increase the pressure, and deliver the water to your plants via a hosepipe. Greenhouse Pumps can also be used to take water from a tank or water butt to increase the water pressure to run an Overhead Spray Kit or a Deluxe Misting Kit. The pump we use works at 12V DC. [9]



Figure 2. 7: Water Pump [9]