IJFEAT

INTERNATIONAL JOURNAL FOR ENGINEERING APPLICATIONS AND TECHNOLOGY

GREENHOUSE AUTOMATION WITH PLANT DISEASE DETECTION

Vishal Rohile[1], Nachiket Thosar[2], Bhagyashree Bhavsar[3], Rohan Musale[4]

[1]*Student, E&TC, SKNSITS Lonavala, Maharashtra, India,* ***vishalkrohile@gmail.com***
[2]*Student, E&TC, SKNSITS Lonavala, Maharashtra, India,* ***nachiket.kj@gmail.com***
[3]*Student, E&TC, SKNSITS Lonavala, Maharashtra, India,* ***bhavsarbhagyashree29@gmail.com***
[4]*Assistant Professor, E&TC, SKNSITS Lonavala, Maharashtra, India,* ***musale.rohan@gmail.com***

Abstract

One of the main reasons for decline in agriculture in our state is the lack of availability of cheap labour in our state. This problem can be overcome by automation in agriculture. The introduction of "GREENHOUSE AUTOMATION WITH PLANT DISEASE DETECTION "can bring a green revolution in agriculture. Introducing this system can help in increasing the cultivation in a controlled environment. Greenhouse environment, used to grow plants under controlled climatic conditions for efficient production, forms an important part of the agriculture and horticulture sectors. Appropriate environmental conditions are necessary for optimum plant growth, improved crop yields, and efficient use of water and other resources. Automating the data acquisition process of the soil conditions and various climatic parameters that govern plant growth allows information to be collected with less labour requirements. Existing EMSs are bulky, very costly, difficult to maintain and less appreciated by the technologically less skilled work-force. This project is designed using world's most powerful microcontroller PIC 18F452 where the temperature, humidity, soil moisture and illumination conditions are analysed.

Digital image processing has three basic steps: image processing, analysis and understanding. Image processing contains the pre-processing of the plant leaf as segmentation, colour extraction, diseases specific data extraction and filtration of images. Image analysis generally deals with the classification of diseases. Plant leaf can be classified based on their morphological features with the help of various classification techniques such as PCA, SVM, and Neural Network. These classifications can be defined various properties of the plant leaf such as colour, intensity, dimensions. Back propagation is most commonly used neural network. It has many learning, training, transfer functions which is used to construct various BP networks. Characteristics features are the performance parameter for image recognition. BP networks shows very good results in classification of the grapes leaf diseases.

Index Terms: *PIC18F452 Microcontroller, Temperature, Humidity, Soil Moisture & Light Sensors.*

---------- *** ----------

1. INTRODUCTION

With use of modern-day technology, automated greenhouses have become widely popular among professional greenhouse caretakers and hobbyists alike. With the advent of newly affordable technologies such as microcontrollers and environmental sensors, engineers and hobbyists have devised ways to cut plant maintenance to a minimum. While some automated greenhouses require little to no additional caretaking, others are simplistic and control only limited functions such as watering and timed lighting. By allowing as much automation as possible, the Automated Greenhouse will reduce the amount of time spent caretaking for plants, and eliminates worry when a user is away for long durations.

The Automated Greenhouse control unit will allow the user will stray from the tedious job of tending to the nutritional needs of plants. Under one interface, one can monitor important plant growth factors, such as lighting, soil moisture, relative humidity, and temperature, as well as monitor incoming power sources to be used to operate greenhouse equipment. The autonomous system will nurture the plants without the user being present, under a pre-set range of optimal conditions, while having the ability to run more efficiently off of alternative energy sources.

2. OBJECTIVE & SCOPE OF THE PROJECT

2.1 Main Objective

To automate the management of crop growth in a greenhouse

2.2 Specific Objectives

To study and investigate the current operation and management of greenhouses by agriculturalists in Uganda today and costs involved.
To analyse data available on automated greenhouse crop production to see how this system will address issues and its convenience to people who will use it.
To design and implement a temperature assessment and control system in the green house, a soil moisture control module, which will predict and appropriately irrigate the crops and assess adequate sunlight requirements for crops and control crop exposure.
To apply our knowledge of systems analysis and design to appropriately test, validate and verify the green house automated system and design a user manual and deployment strategies to ensure that it is working in its intended environment.

2.3 Scope

This research is intended to cover the agricultural sector specifically crop husbandry (horticulture) in green houses. This is to boost crop productivity despite the harsh factors that exist in the natural environment. For example
The system is to be used in the automatic management of conditions such as temperature, humidity, sunlight and irrigation in a green house. The green houses under study are those found in East Africa and specifically in Uganda, since the climatic conditions in these areas are similar.
The user will be provided with information about the state of conditions in the green house. This information will be relayed in form of a user interface which the user will also be able to control and adjust values accordingly which will in turn change the state (conditions) of the green house appropriately.

3. Methodology

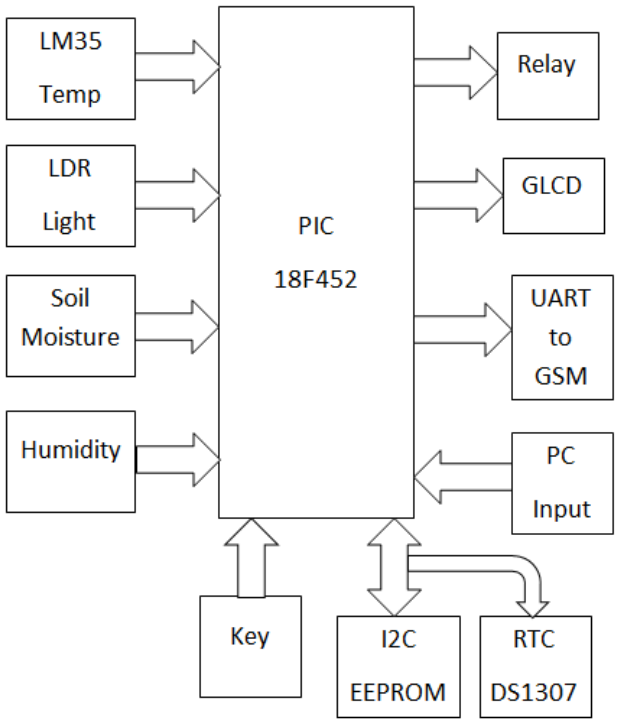

Fig-1: Block Diagram

3.1 Description

For our Project we selected PIC18F452 as our main processing unit. PIC18F452 is 8-bit microcontroller with peripheral features like I2C, UART, ADC, Interrupts, Timers etc.
LM35 is used as temperature sensor for sensing environmental temperature
LDR is used for sensing ambient light
SOIL MOISTURE sensor is used for measuring moisture in the soil
HUMIDITY sensor is used for measuring relative humidity of the room
Relays are used for controlling the output devices
GLCD is used to display the sensor readings & plot the graph.
GSM is used to alert the Owner.
Keys are used for input to switch GLCD content
I2C EEPROM is used to store the readings of the sensors
RTC DS1307 is used as real time clock.

4. HARDWARE & SOFTWARE TO BE USED

4.1 Hardware

1. PIC Microcontroller PIC18F452
2. LM35 Temperature sensor
3. LDR ambient light sensor
4. Soil moisture sensor

5. Humidity sensor
6. Relay 12v
7. 128*64 GLCD
8. SIM900 GSM module
9. RTCDS1307
10. I2C EEPROM 24LC512

4.2 Software

1. MPLAB X v3.35 for PIC Programing
2. XC8 Compiler for PIC Programming
3. CADSOFT EAGLE for PCB Designing
4. Proteus for simulation

3. CONCLUSION

Automated greenhouse monitoring system consists of various sensors, namely soil moisture, temperature and light. These sensors sense various parameters temperature, soil moisture and light intensity and are then sent to the PIC microcontroller and control action taken by the PIC to compare with preset values. AGMS eliminates risk of greenhouse not being maintained at specific environmental conditions due to human error and labour cost can be reduced and it is eco-friendly. Pests are eliminated by this system and also the quality of yield can be increased.

ACKNOWLEDGEMENT

I take this opportunity to record my profound gratitude and indebtedness to Mr. R. S. Musale, Assistant Professor, and Electronics & Telecommunication Department for their inspiring guidance, valuable advices, constant encouragement and untiring supervision throughout my research work.

I express my deep sense of gratitude to Mrs. R. M. Thadi, Asst. Professor and Head, Dept. of Electronics Engineering, for his continuous inspiration and encouragement.

Finally, I would like to acknowledge and express my special thanks to my family, friends and classmates for their patience, encouragement, support they have made during the period of this work.

REFERENCES

1. Savita N. Ghaiwat, Parul Arora, "Detection and Classification of Plant Leaf Diseases Using Image Processing Techniques: A Review", International Journal of Recent Advances in Engineering and Technology, ISSN: 2347-2812, Volume 2, Issue 3, 2014.

2. Prof. Sanjay B. Dhaygude and Mr Nitin P. Kumbhar, "Agricultural plant Leaf Disease Detection Using Image Processing" International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Volume 2, Issue, 2013.

3. Mr Pramod and S. landge, "Automatic Detection and Classification of Plant Disease through Image Processing", International Journal of Advanced

4. Greenhouse Structures (University of Arizona, 2001) http://ag.arizona.edu/ceac/sites/ag.arizona.edu.ceac/files/Gree nhouse%20Structures.pdf

5. PIC18F452 Datasheets.

6. Technology Student, Light Dependent Resistors, Viewed 30August 2010, http://www.technologystudent.com/elec1/ldr1.htm.

7. 7805 Datasheets B. Vidyasagar," Green House Monitoring and Automation using GSM", in International journal of Scientific and Research Publications, Volume 2, Issue 5, May 2012