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MICROCONTROLLER BASED GREEN HOUSE TEMPERATURE, HUMIDITY AND LIGHT INTENSITY MEASURING AND CONTROLLING SYSTEM

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ABSTRACT

Microcontroller based greenhouse temperature, humidity and light intensity measuring and controlling system and is used the automatic measuring and controlling Equipment and quantities such as heating and cooling(temperature),humidity and light intensity in Green houses. In measuring pars consist on fore microcontrollers and each microcontroller has temperature sensor light sensor and humidity sensor. I used I2C protocol connect base microcontroller and other fore microcontrollers. And Base microcontroller was controlled all Equipment and quantities. And I used labVIEW program for analysis that measurement and change its variables. Green houses from an important part of the agriculture and horticulture sectors in our country. Famer can be used to grow plants under controlled climatic conditions for optimum production. Automatic monitoring and controlling of the climatic parameters which directly or indirectly govern the plant growth and hence their production.

Keywords: Temperature, Humidity, Light Intensity, Microcontroller, LabVIEW

1 INTRODUCTION

A greenhouse is a building in which plants are grown for commercial or research purposes. These structures range in size from small sheds to very large buildings, with different types of covering materials, such as a glass or plastic roof and frequently glass or plastic walls; it heats up because incoming visible solar radiation from the sun is absorbed by plants, soil, and other things inside the building. Air warmed by the heat from hot interior surfaces is retained in the building by the roof and wall. In addition, the warmed structures and plants inside the greenhouse re-radiate some of their thermal energy in the infrared spectrum, to which glass is partly opaque, so some of this energy is also trapped inside the glasshouse

Framer can be used to grow plants under controlled climatic conditions for optimum production. But farmers have to provide and control all conditions such as temperature, light, humidity. wetter supply, soil PH and etc. Because Green houses are separate with natural environment .It is very diffult. Therefore utomatic monitoring and controlling of the climatic parameters which directly govern the plant growth and hence their production.

Embedded green house parameters measuring and control is proposed to provide a highly detailed climate data for plants within a greenhouse environment with an innovative method of growing temperate crops in a tropical environment using climatic conditions. The greenhouse was equipped with conventional wired sensors that provide readings of the air temperature, light intensity and humidity.

The proposed system is an embedded system which will monitor and control the climatic parameters of a greenhouse using microcontroller .This system enhance production over the whole crop growth season and to eliminate the difficulties involved in the system by reducing human intervention to the best possible extent using sensors, Analog to Digital Converter, microcontroller and actuators and LabVIEW National Instrument program

The base microcontroller then performs the needed actions by switching relays until the strayed-out parameter has been brought back to its optimum level, And Base microcontroller communicate with PC using Serial communication, because climatic parameters monitoring system and variable controlling system was there in LabVIEW program . Since base microcontroller is used as the heart of the system, it makes the set-up low-cost and effective. As the system also have an LCD display .It was show current temperature ,Humidity and light intensity In the green house.

2 EXPERIMENTAL

2.1 Introduction

This project involved the implementing of a green house control device in order to control, monitor and maintain the desired temperature in the green house by turning ON and OFF two Exhouts fans and Misters and foggers as when due also study the humidity level by turning the Misters and foggers ON or OFF and also light level in the green house by On and OFF switches of light And covering net .I implement that system controlling green house inside climate .Because it haven't natural climate.

2.2 Description Of The Device

The block diagram below shows how the inputs section is connected into the microcontroller through an arrow, the arrow indicate that data is passing through the microcontroller. The output section is connected out of the microcontroller through the arrow.

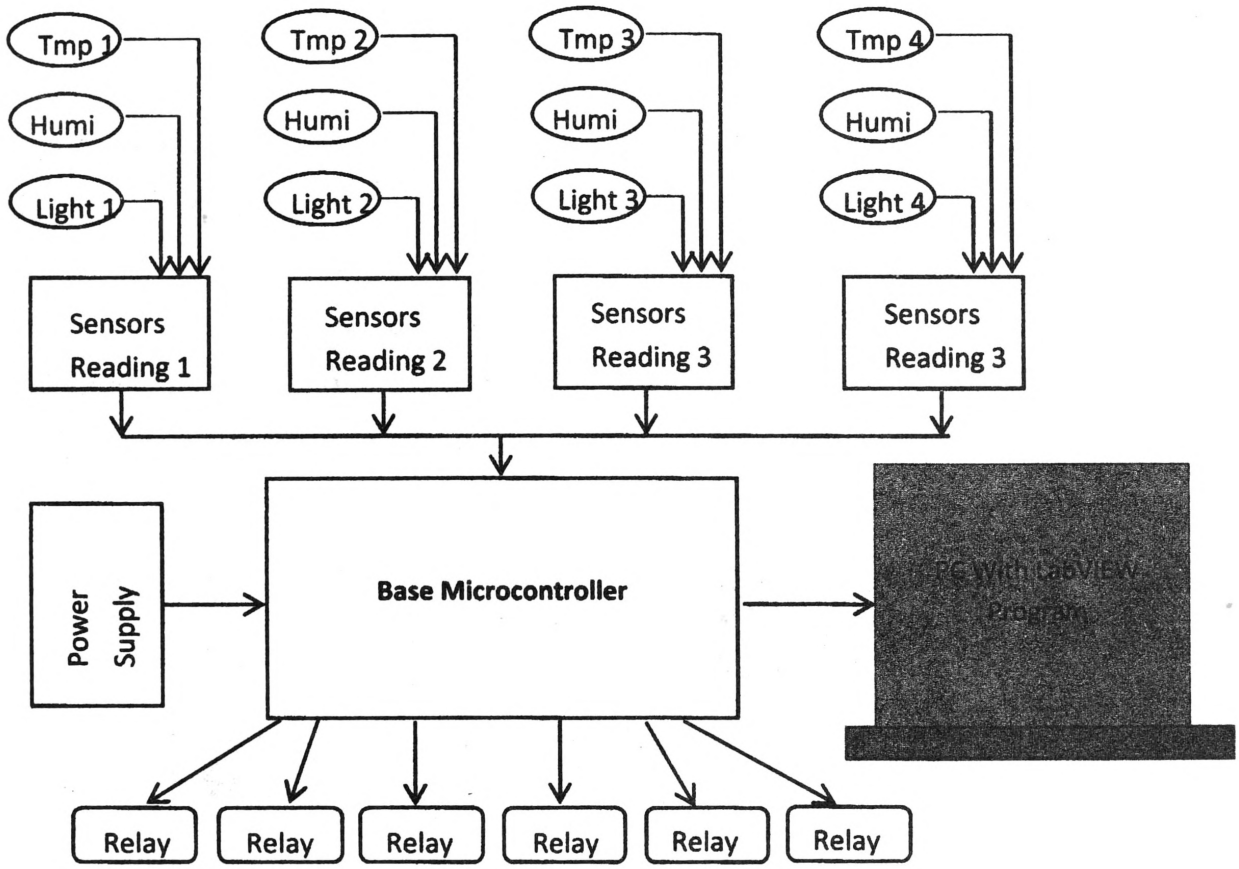

Figure 1: Block Diagram of unite

2.3 Main Units Of The Device

- Climate Condition Monitoring Unite.

This unite consists of PIC16f88 Microcontroller for controlling and read sensors convert that values analog to digital and send to It's base Microcontrollers Using I^2C ,LM35 sensor for monitoring temperature , Photo diode for monitoring light intensity also DHT 11 Humidity sensor for monitoring humidity.

- Main Controlling Unit.

Main controlling unit consist of PIC16f877A microcontroller as a main control unit, LED display and switching relays. It is control all climate condition unites which are exhouts

fans, misters and foggers, lights, covering net and also it use communicate between Climate Condition Monitoring Unite and LabVIEW program and it's use to do all calculations parts.

LED display shown as climate condition of inside green house.

- LabVIEW Program.

2.4 I2C Communication

This I2C tutorial shows you how the I2C protocol works at the physical bit level discussing single master mode which is the most common use for I2C in a small system.I²C created by Philips Semiconductors and commonly written as 'I2C' stands for Inter-Integrated Circuit and allows communication of data between I2C devices over two wires. It sends information serially using one line for data and one for clock I2C is not only used on single boards, but also to connect components which are linked via cable. Simplicity and flexibility are key characteristics that make this bus attractive to many applications.

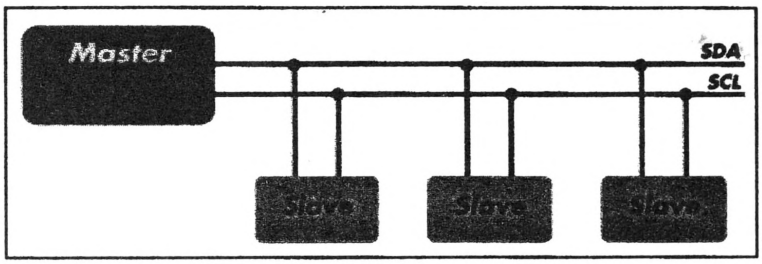

Figure 2: Master Slave System

Most significant features include Only two bus lines are required, No strict baud rate requirements like for instance with RS232, the master generates a bus clock, Simple master/slave relationships exist between all components Each device connected to the bus is software-addressable by a unique address,I2C is a true multi-master bus providing arbitration and collision detection

2.5 Serial Communication Between Pic16f877 And PC

This article series aims at teaching serial communication between a PIC microcontroller and a PC. We first introduce you with what is serial communication is and how it can used. Then we tell you how to perform serial communication using PIC microcontroller and how we use the USART peripheral for the purpose. We will tell you how our usart library for PIC16F series can be used for easy serial communication, in this part we also discuss how to set up a

MPLAB X project for using the USART library. After that we will build a demo project to explore the library. Finally we will burn this demo in a PIC16F877A and establish a serial communication with PC

3 RESULTS AND DISCUSSION

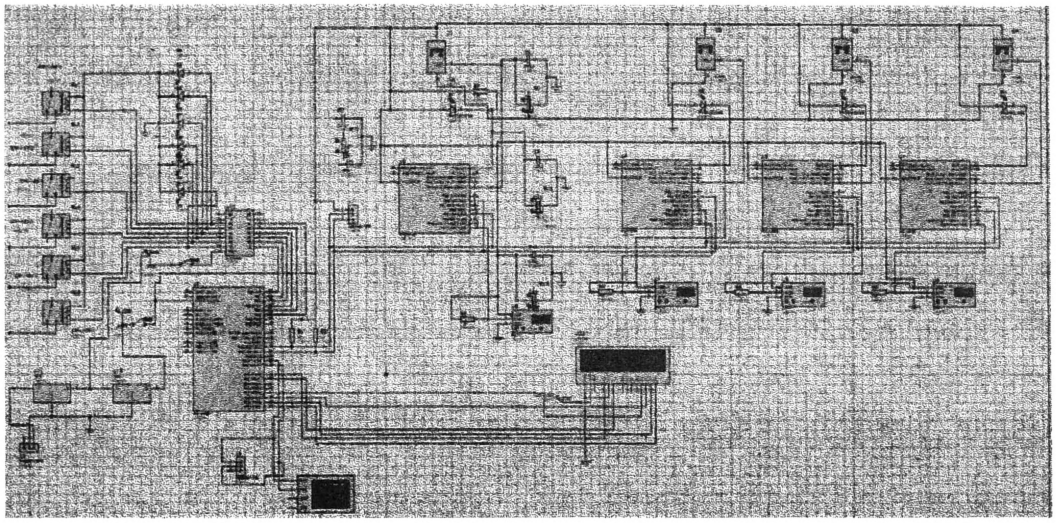

Figure 3: Proteus Schematic Diagram

The circuit was designed to collect the analogue data readings using humidity, temperature and light sensors. PIC16F88 microcontrollers were programed to implement the desired function. It was programed to convert the captured analogue data into digital and I2C protocol carried the data into base microcontroller.

Base microcontroller was able to read the digital input signal and display the values and it was programmed to control the climate conditions using relays base on the given data. Analyze the captured data by PC using serial communication.

This project is to design a simple, easy to install, microcontroller-based circuit to monito and record the values of temperature, humidity and sunlight of the natural environment tha are continuously modified and controlled in order optimize them to achieve maximum plan growth and yield. The controller used is a low power, cost efficient and easily available. I communicates with the various sensor modules in real-time in order to control the light, aeration and drainage process efficiently inside a greenhouse by actuating a fans, fogger an lights respectively according to the necessary condition of the crops. An integrated Liqui crystal display (LCD) is also used for real time display of data acquired from the variou sensors and the same data is sent serially to a remote computer where complete data loggin takes place. Also, the use of easily available components reduces the manufacturin

andmaintenance costs. The design is quite flexible as the software can be changed any time. It can thus be tailor-made to the specific requirements of the user.

In this proposed Green house automation system, when climate condition change then Switches are automatically ON and OFFF which are connect to the climate controlling elements.This process was done by basically using two type of microcontroller which are PIC 16f88 and PIC 16f877A .When design the Green house automation system, the effectiveness and efficiency and reliability of the system must be considered in first.Hence this system was designed by considering reduce the human involvement.

4 CONCLUSION

A step-by-step approach in designing the microcontroller based system for measurement and control of the four essential parameters for plant growth, temperature, humidity and light intensity, has shown that the system performance is quite reliable and accurate. This will reduce the time of using the manual way of watering. Fewer workers are needed to maintain the plants or crops. The sensors such as temperature sensor, LDR and humidity probe are used to control the temperature and watering and lighting in the greenhouse. The system has successfully overcome quite a few shortcomings of the existing systems by reducing the power consumption, maintenance and complexity, at a reduced cost and at the same time providing a flexible and precise form of maintaining the environment.

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