

# **TEMPERATURE MONITORING SYSTEM**

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This Report Is Submitted In Partial Fulfillment Of Requirement For The Bachelor of  
Electronic Engineering (Telecommunication Electronic)

Faculty of Electronic and Computer Engineering

Universiti Teknikal Malaysia Melaka

MAY 2011



UNIVERSITI TEKNIKAL MALAYSIA MELAKA  
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN  
PROJEK SARJANA MUDA II

Tajuk Projek : TEMPERATURE MONITORING SYSTEM

Sesi Pengajian : 

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Dedicated to my beloved parent;

Zakaria Bin Hj. Md Rani

&

Fatimah Binti Jasim

Thank you for your support and love to guide me through this thesis.

My Supervisor;

Puan Nur Alisa Binti Ali

Thank you for your loving and taught me that even the largest task  
can be accomplished if it is done one step at a time.

My siblings;

My brothers Mohd Hilmi Bin Zakaria & My sisters Zahirah Binti Zakaria

Hoping that you will be successful in whatever field you are involved in and may Allah  
bless all of you.

All My friends in university;

Without you and your strength this project would not be completed. I appreciate all  
support and confidence I gained and I learned from you all.

It may not be enough to contain the words of thanksgiving, it may not capture the  
endearing love that we have for all of you but now we are making this compilation to let  
the world know that your place is a place of love, generosity, and peace.

## **ACKNOWLEDGEMENT**

First of all, I would like to thank to Allah S.W.T for helping and blessing me through all the obstacles that I faced during the work of this project. As my individual project, this project would not have been possible without considerable guidance and support. I would like to knowledge those who have enable me to complete this work and my years of graduate study.

In the first place I would like to record my gratitude to Puan Nur Alisa Binti Ali for her supervision, advice, and guidance from the very early stage of this research as well as giving me extraordinary experiences throughout the work. Above all and the most needed, she provided me unflinching encouragement and support in various ways.

I gratefully acknowledge to my friends for his advice, supervision, and crucial contribution, which made they a backbone of this project to become successfully. Thank you for lending hands during progress of the project. Your contributions are highly appreciated.

To the family, thank for giving me a blessing and moral support. I was extraordinarily fortunate to having all of them as my family. Without their support, I might not be able to complete this project. Lastly, it is a pleasure to express my gratitude wholeheartedly to lecturers, classmates and friends who contributed in this project directly and indirectly.

## **ABSTRACT**

This project will describe about Temperature Monitoring System. This project can utilize in factory because it can improve system by monitoring and control machine temperature to avoid machine breakdown thus can improve productivity. Temperature Monitoring System will be use to monitor temperature data. Temperature Monitoring System will also allow the worker to know about the condition of a system. In this project, Visual Basic 6 will be use as the interface to display the temperature data For this project, it will use two circuit that is Temperature Control System using LM 35 with Serial Interface Circuit . The main component in Temperature Control System using LM 35 consists of PIC Microcontroller which will be used to control the operation of the circuit, Temperature Sensor to sense the temperature, LCD display that will display the temperature that has been sense by the Temperature Sensor. The Serial interface circuit will consists of IC MAX 232. This circuit connect between PIC with the PC by using serial cable RS232. At PC, by using Visual Basic 6 the temperature will display temperature data and this can be used to monitor. The data also will be store for further action and also as the reference to make a maintenance and to know the machine performance from time to time.

## ABSTRAK

Project ini menerangkan tentang system pemantauan secara terus ataupun secara langsung. Project ini boleh digunakan di kilang kerana ia boleh memperbaiki system dan juga mengawal suhu mesin untuk mengelakkan mesin dari mengalami kerosakan dan meningkatkan produktiviti. Sistem pemantauan secara terus untuk suhu ini akan digunakan untuk memantau data suhu. Sistem pemantauan secara terus untuk suhu juga membolehkan pekerja untuk mengetahui keadaan sebenar sesuatu sistem itu. Dalam projek ini, Visual Basic 6 akan digunakan sebagai pemapar maklumat untuk memaparkan data suhu. Untuk projek ini, ia akan menggunakan 2 litar iaitu Temperature Control System menggunakan sensor LM 35 bersama Serial Interface Circuit. Komponen utama dalam litar Temperature Control System menggunakan sensor LM 35 ialah PIC Microcontroller yang akan digunakan untuk mengawal operasi litar. Sensor suhu digunakan untuk mengesan suhu, LCD untuk memaparkan data yang telah dikesan oleh sensor suhu. Serial Interface Circuit mengandungi IC MAX 232. Litar ini akan menjadi penghubung antara PIC dengan computer menggunakan kabel serial RS 232. Di komputer, dengan menggunakan Visual Basic 6, suhu boleh dipaparkan dan ini boleh digunakan untuk memantau suhu. Manakala data suhu akan disimpan untuk tindakan selanjutnya dan juga menjadi rujukan sekiranya ingin membuat baik pulih dan mengetahui prestasi mesin dari masa ke semasa.



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## LIST OF ABBREVIATION

ASM	-	Assembly Language
CU	-	Control Unit
CPU	-	Central Processing Unit
GUI	-	Graphical User Interface
IC	-	Integrated Circuit
I/O	-	Input/ Output
LCD	-	Liquid Crystal Diode
LED	-	Light Emitting Diode
PC	-	Personal Computer
PIC	-	Programmable Integrated Circuit
RTD	-	Resistive Temperature Device
VB	-	Visual Basic



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# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

Nowadays, temperature is an important element to be monitored. Human monitor the temperature of world's climate, server room and house to predict the environment climate, to prevent server from overheated and to provide a comfortable room. That's the reason why temperature monitoring system is important. The main issues in a temperature monitoring system are how the system communicates with the user if the temperature is beyond the stable temperature defined by the user. The readings accuracy must be as accurate as the real environment temperature.

This project will focus on the first issues regarding the communication between system and user. It is a system that is applied to detect temperature and display the value of temperature and take action to give alarm when the temperature condition is exceeded from what has been set. While the monitoring system use a computer system to monitoring the temperature data.

“Temperature Monitoring System”, is a system that can be used in an industrial like factory or inside the main distribution frame room for telecommunication company. In this project it will consists of hardware and software.

As for hardware part, it will use Temperature Control Circuit that use temperature sensor LM 35 as the input. Microcontroller PIC (Programmable Integrated Circuit) will be used to control the operations for this circuit. For software, it will

consist of VB 6. VB 6 is use as the interface for this project. VB 6 will display the temperature data that sense by the temperature sensor. While VB6 display the data, at the same time data will be store inside other windows program that is Notepad.

“Temperature Monitoring System” will work by relationship between Temperature Control Circuit using temperature sensor LM 35, Microcontroller PIC, VB 6 (interface). Most control actions are performed automatically by PIC. Data collections begin at the PIC level that are communicated.

## **1.2 Advantages of Project**

For Temperature Monitoring System, there are several advantages that people will get when use this project. The first advantage that when temperature is detected to exceed the limit that has been set up, it will give warning to the worker and instant action can be taken to accordingly to the situation. Second advantage is when there are section that is affected, the worker will be provided with instant information and in addition the engineers will be able to examine the problem for planning and improving system performance.

## **1.3 Problem Statement**

Many companies in this world have problem to know the actual condition of the machine. The reason to know the condition of the machine is to make prevention and to avoid the machine from breakdown. Beside that, the readout of the majority of data collection in environmental or industrial is not true. It is because occur some adjustment to correct the data especially in down time problem. So, this project is developing to monitor temperature sensor system by serial communication and to avoid incorrect data collection and to automate the solution when a problem occurs.

## **1.4 Objective**

The main objective of this project is to design Temperature Monitoring System and using VB6 as the interface to display the temperature data.

## **1.5 Scope of Project**

Temperature Monitoring System consists of two part which are hardware and software part. For Hardware part, this section will have 2 circuit that connected with each other, that is “temperature control circuit” and “serial communication interface circuit”

### **1.5.1 Temperature Control Circuit**

This sensor is used to measure the surrounding temperature and then send the measured values to the microcontroller. The chosen of the right temperature sensor is importance in order to provide the accurate measurement. This is because the temperature is the most significant element in temperature sensor system.

This section is development of system that will control a temperature that will apply for system. It will have the temperature sensor LM 35 as an input while LCD display, LED, Buzzer and Cooling Fan as its output. This system will be control by PIC 16F877A.

### **1.5.2 Serial Communication Interface Circuit**

The meaning of serial communication interface is where the section of transferring data from Temperature controls system with LM35 to the PC or in other word, this equipment will allow PIC communicates with PC.

For Software part, this section will provide an information for item that are use in this project .

This project is about PIC programming of the temperature monitoring system .Visual Basic 6 will use as interface in this project. This project also use Notepad to store data from the Visual Basic 6. Basically, the idea is to connect output devices to the pc via serial port. Then, a software used monitor the system by using Visual Basic 6 software. Thus, the Visual Basic is used to monitor the temperature data.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

The major components consist is temperature control system circuit using LM 35 Temperature Sensor, PIC Microcontroller, Serial Interface RS 232, Visual Basic 6. From this major component, the project will detect temperature using temperature sensor LM 35 with PIC that will control the operation of the circuit. Serial Communication Interface MAX 232 by using serial cable RS 232 is used to send data from PIC to Personal Computer (PC) and thus the Visual Basic 6 is used to display the temperature data.

#### 2.2 Temperature Control System Circuit

##### 2.2.1 Temperature Sensor

According to Dogan Ibrahim (2001)<sup>[1]</sup>, temperature measurement and control is one of the most common applications of microcontroller-based acquisition systems. Four types of sensors are commonly used to measure temperature in commercial and industry applications. These are thermocouples, resistive temperature devices (RTDs), thermistors and integrated circuit (IC) temperature sensors. Each sensors has unique advantages and disadvantages and by understanding how these sensors works, and what type of signal conditioning are required, we can make more accurate and reliable temperature measurement, monitoring and control.

Sensor is transducer that detect or measurement a physical quantity. A traducer is a device that converts physical quantity from one form to another. The different between sensor and traducer is sensor performs the traducer action but transducer sense some physical quantity.

According to Dogan Ibrahim (2001)<sup>[1]</sup> thermocouples are inexpensive sensors which have a wide range of temperature range. Thermocouples work on the principle that when two dissimilar metals are combined, a voltage response across the junction between the metals. By measuring this voltage, we can get temperature reading. Different combinations of metal create different thermocouple voltages and there is a wide range of thermocouple available for different applications. Thermocouple have non-linear relationship to the measured temperature and as a results of this it is necessary either to linearize the characteristics or to use look-up tables to obtain the actual temperature from the measured voltage. Analogue to digital converter devices are required to connect the thermocouples to computer-based equipment.

Dogan Ibrahim (2001)<sup>[1]</sup> also state that a RTDs is a resistor with its resistance changing with temperature. The most popular type of RTD is made of platinum and has a resistance of  $100\ \Omega$  at  $0^{\circ}\text{C}$ . This is because RTDs are resistive devices, a current must pass through the RTD to produce a voltage that can be measured. the change in resistance is very small (about  $0.4\ \Omega/^{\circ}\text{C}$ ) and special circuitry is generally needed to measure the small changes in temperature. One of the drawbacks of RTDs is their non-linear change in resistance with temperature. RTDs are analogue devices and analogue to digital converters are required to interface these devices to computers.

Temperature is a measure of heat intensity. Thermistors are inexpensive, easily obtainable temperature sensors. They are easy to use and adaptable. Circuits with thermistors can have reasonable output voltages. Because of these qualities, thermistors are widely used for simple temperature measurements. They're not used for high temperatures, but in the temperature ranges where they work they are widely used.

According to Dogan Ibrahim (2001)<sup>[1]</sup>, Thermistors are metal oxide semiconductor devices whose resistance changes with temperature. One of the advantages of thermistors is their fast response and high sensitivity. Like RTD's a current is passed through a thermistors and the voltage across the thermistors is measured. thermistors are very non-linear devices and look-up tables are usually used to convert the measured voltage to temperature. Thermistors can be said as a small devices and one downside of this that they can be self-heating under a large excitation current. This of course will increase the temperature of the device and also give erroneous results. Thermistors are analogue sensors and analog to digital converters are required to interface these sensors to computer-based equipment.

Dogan Ibrahim (2001)<sup>[1]</sup> state that an integrated circuit temperature sensors are usually will have 3 – 8 pin active devices which require a power supply in order to operate. Thus it will give out a voltage which is directly proportional to the temperature. There are basically two types of IC temperature sensors that is analogue sensors are usually 3-pin devices and they give out an analogue voltage of typically 10 mV/°C which is directly proportional to the temperature and the other one is digital temperature sensors provide 8-9 bit serial digit output data which is directly proportional to the temperature.

### **2.2.2 Integrated Circuit Temperature Sensors**

According to Dogan Ibrahim (2002)<sup>[2]</sup>, Integrated Circuit Temperature Sensors are semiconductor devices fabricated in a similar way to other semiconductor devices such as microcontrollers. These are no generic types like RTDs but some popular devices are manufactured by more than one manufacturer.