WIRELESS SERVER ROOM TEMPERATURE SYSTEM

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

WIRELESS SERVER ROOM TEMPERATURE SYSTEM

This Report Is Submitted In Partial Fulfillment of Requirements For The Bachelor Degree of Electronic Engineering (Wireless Communication) With Honors

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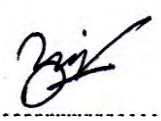
Signature : 

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To my beloved father, mother, brothers, sisters and all my friends

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ABSTRACT

Wireless Server Room Temperature System is a system that help the technician to monitored the server room wirelessly by alert the technician that the temperature in the server room is not compatible with right temperature of server room and it need to be maintained. The technician always have a problem in maintaining server temperature in idle temperature, they are also required a lot of time monitoring while they have other work to do. Normally the technician need to standby in server room to troubleshoot the problem that cause from server room overheating. The technician also have a problem to detect the heat in early stage that maybe cause from slightly malfunction of air conditioner or maybe the direct heat from outside temperature. This entire problem will cause the early stage of server room overheating and bring damage to the component in server room. The function of this system is, if the temperatures reach the setting temperature it will alert the technician by sending message to the technician and also display it's to the control room wirelessly through this system. There are 3 type of alert temperature that will send there are: (24-26°C early stage), (27-29°C middle stage) and (>30°C final stage). There are 3 different temperatures that systems are ready to set as a risk temperature to component in server room. LM 35 is a sensor that I used as temperature detection levels this system will send the alert message from PIC (microcontroller) to LCD display and to technician Hand phone through GSM (Global system of Mobile telecommunication).

ABSTRAK

Sistem Kawalan Suhu Bilik Server adalah satu sistem yang membantu juruteknik untuk memantau bilik server secara wayarles dengan mengingatkan juruteknik bahawa suhu di dalam bilik Server tersebut adalah tidak sesuai dengan suhu yang sepatutnya. Juruteknik sentiasa mempunyai masalah dalam mengekalkan suhu bilik Server, dalam masa yg sama mereka terpaksa melakukan kerja lain. Biasanya juruteknik perlu bersedia di dalam bilik Server untuk pemantauan jika berlaku masalah yang berkaitan. Juruteknik juga mempunyai masalah untuk mengesan haba di peringkat awal yang mungkin berpunca dari kegagalan penghawa dingin atau mungkin haba dari luar bilik Server. Semua masalah ini akan menyebabkan peringkat awal pemanasan melampau bilik server dan membawa kerosakan kepada komponen di dalam bilik server. Fungsi sistem ini direka ialah, jika suhu mencapai suhu yang telah ditetapkan, ia akan memberi amaran kepada juruteknik melalui penghantaran khidmat pesanan ringkas (SMS) dan juga memaparkan amaran di bilik kawalan. Terdapat 3 jenis suhu yang telah ditetapkan sebagai amaran iaitu: (24-26 ° C peringkat awal), (27-29 ° C peringkat pertengahan) dan (> 30 ° C peringkat akhir). 3 tahap suhu ini dianggap sebagai suhu yang berisiko kepada komponen di dalam bilik server. LM 35 ialah sensor yang saya digunakan sebagai elemen pengesanan suhu untuk sistem ini dan ia akan menghantar mesej amaran kepada PIC (mikropengawal) untuk ke paparan LCD dan telefon juruteknik melalui GSM (Sistem telekomunikasi Global).

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CHAPTER 1

INTRODUCTION

This chapter will explain about the background of project, objective of project, problem statement, scope of project and project methodology.

1.1 Background

A server room needs continuous supervision to maintain their temperature. So **t**o make sure the electronic component in the room is not damage, the server room, need to monitor by the technician 24 hours. From this state of problem the idea of Wireless Server Room Temperature System are developed. This project will help the technician to monitored the server room wirelessly by alert the technician that the temperature in the server room is not compatible with right temperature of server room and it need to be maintained. The right temperature of server room is 10°C - 16°C, if the temperatures are above that temperature it will alert the technician by sending message to the technician and also display it's to the control room wirelessly through this system. There are 3 type of alert temperature that will send there are: (24-26°C early stage), (27-29°C middle stage) and (>30°C final stage).In the server room, there are 3 different temperatures that system are ready to set as a risk temperature to component in server room. This system will send the alert message from PIC (microcontroller) to LCD display and to technician hand phone through GSM (Global system of Mobile telecommunication).

1.2 Problem Statement

Server room requires constant monitoring to enable the cooling system running smoothly. The technician always have a problem in maintaining server temperature in idle temperature, they are also required a lot of time monitoring while they have other work to do. Normally the technician need to standby in server room to troubleshoot the problem that cause from server room overheating. The technician also have a problem to detect the heat in early stage that maybe cause from slightly malfunction of air conditioner or maybe the direct heat from outside temperature. All this problem will cause the early stage of server room overheating and bring damage to the component in server room.

1.3 Objective

The objectives of the project are:

- To build the system that can reduce the damage of the component in the server room from the cause of overheating. The damage or the heat can be detected early from the setting of heat sensor in the system that installed in the server room.
- To monitor in 3 stages of heat detection level 24-26°C early stage, 27-29°C middle stage, >30°C final stage. All this level can cause the damage for component in the server room.
- To help the technician easily facilitate the maintenance of the server room, by not wasting time monitoring the server room all the time.

1.4 Scope of Project

Project scope is listed as follow:

- Study the principle and application of the project
- Investigate the problem cause from server room overheating
- Identify the component that related to the system like heat sensor circuit, PIC, Relay circuit, GSM, LCD Display
- Construct the flow of the project progress and set the limitation of the project

Basically, this project is divided into two main parts:

- **Hardware design:** The hardware for system is consist 3 heat sensor that detected 3 different temperature in the server room, it connected to relay circuit that triggered to PIC (microcontroller) to allow the message that can be sent to LCD Display. In The same time it also sent the message to Hand phone through GSM (Global system for Mobile Telecommunication).

- **Software design:** This system need to be programmed to be activated. To make the heat sensor can be detected and triggered to PIC 16F877A programmed it on MP lab software.

1.5 Project Methodology

This project focus on how to solve the problem of overheating in the server room and facilitate the technician in monitoring the server room by sending message to hand phone and LCD display in control room, the system also using GSM technologies to send warning message to technician. The project methodology shows the step by step to complete the project, the step that includes is planning, the

development of the design and the management of the project. The flow of the project are shown in Figure 1.1.

1.5.1 Flow Chart

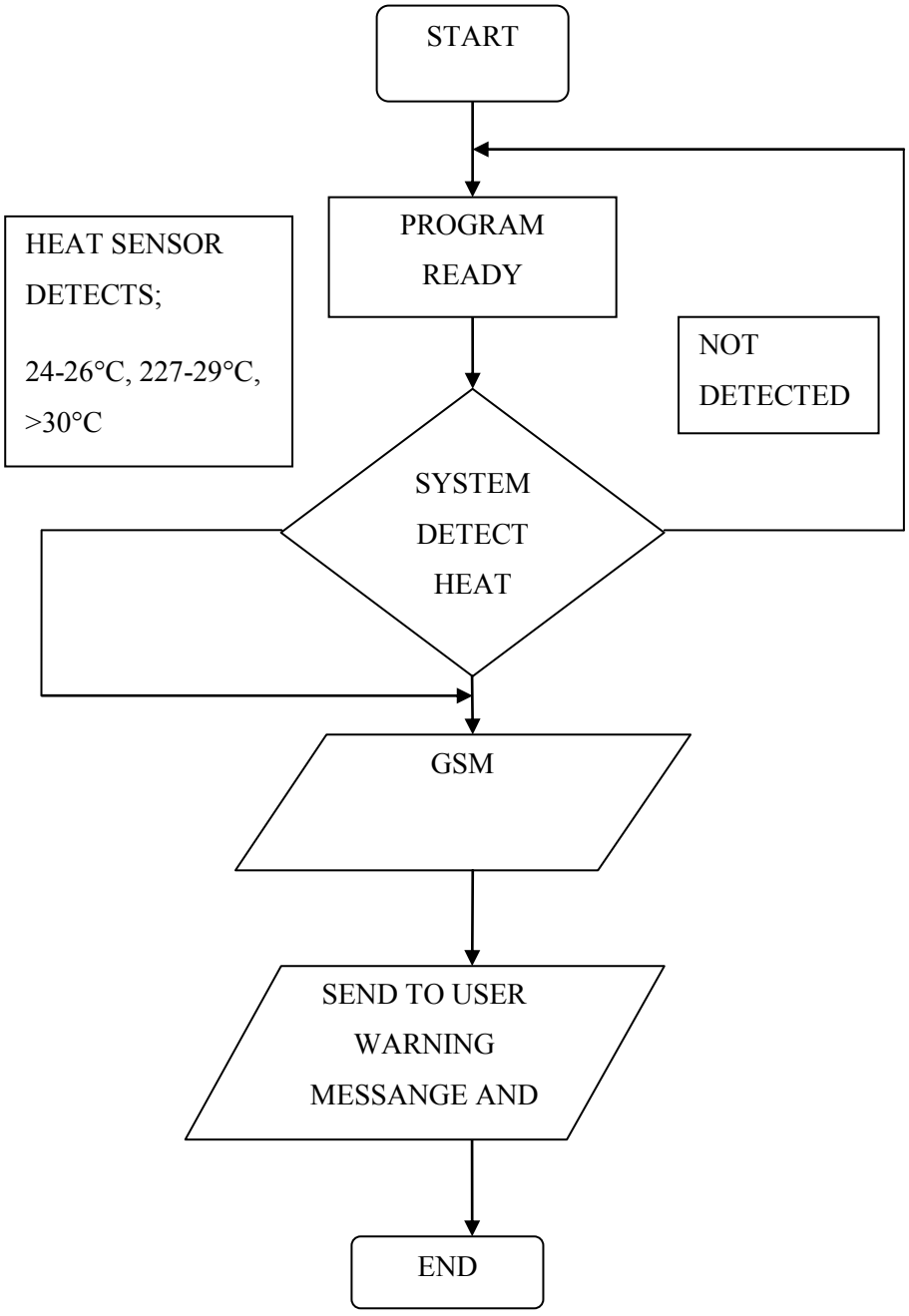

Figure 1.1 : Flow Chart of the Project

1.6 Report Structure

This report represented by 5 chapters. The following paragraph below is the structure of developing Wireless Server Room Temperature System report:

Chapter 1: This chapter discusses about the brief overview about the project likes project background, problem statement, objective, scope of project and project methodology.

Chapter 2: This chapter discusses about all the information that have in this project. This chapter includes more about literature review about the hardware and software for developing this project.

Chapter 3: This chapter discusses more about the methodology, the implementation of the project and the expected result of Wireless Server Room Temperature System, it's also include the explanation about all the flow of the project.

Chapter 4: This chapter discusses about the result and analysis of the development of this project, it's also include the discussion of the project.

Chapter 5: This chapter discusses about conclusion and suggestion for developing this project.

CHAPTER 2

LITERATURE REVIEW

This chapter presents the details about literature review of Wireless Server Room Temperature Sensor. Its consist the review of Precision Centigrade Temperature Sensor(LM 35), PIC Microcontroller, LCD display, MAX 232 and GSM device related with this project.

2.1 Sensor Review

To make the objectives of this project successful, some step must be used as a starting step. First step should be taken is doing a research on sensor that suitable in this project and select the sensor for Temperature Sensor.

- **Precision Centigrade Temperature Sensor (LM 35).**

The LM35 is shown in figure 2.1 is precision integrated- circuit temperature sensor. The output voltage is linearly proportional to the Celsius temperature. The LM35 thus has an advantage over 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. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C
at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance,

linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 μA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35 is rated to operate over a −55° to +150°C temperature range, while the LM35C is rated for a −40° to +110°C range (−10°with improved accuracy).

Figure 2.1 : Precision Centigrade Temperature Sensor (LM 35).

2.1.2 Methods of applying sensor

As shown in figure 2.2, LM35 can be applied easily in the same way as other integrated-circuit temperature sensors. It can be glued or cemented to a surface and its temperature will be within about 0.01°C of the surface temperature. This presumes that the ambient air temperature is almost the same as the surface temperature; if the air temperature were much higher or lower than the surface temperature, the actual temperature of the LM35 die would be at an intermediate temperature between the surface temperature and the air temperature.

2.1.3 Sensor Features

- Calibrated directly in ° Celsius (Centigrade)
- Linear + 10.0 mV/°C scale factor
- 0.5°C accuracy guarantee able (at +25°C)
- Rated for full −55° to +150°C range
- Suitable for remote applications

- Low cost due to wafer-level trimming
- Operates from 4 to 30 volts
- Less than 60 µA current drain
- Low self-heating, 0.08°C in still air
- Nonlinearity only ±1⁄4°C typical
- Low impedance output, 0.1 W for 1 mA load

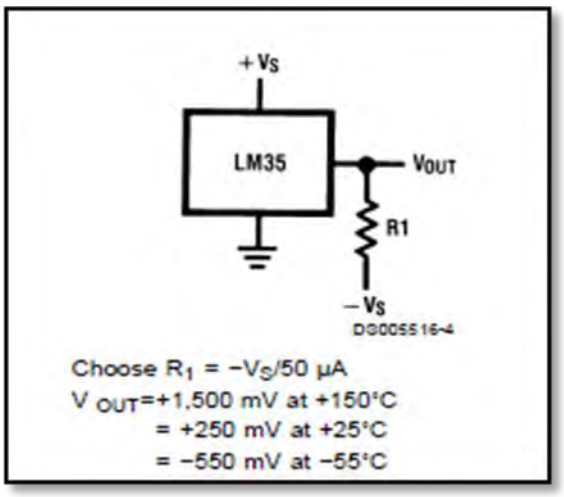

Figure 2.2: Full – Range centigrade Temperature Sensor (LM 35)

2.1.4 The Advantage of Temperature Sensor

- Low cost and power usage, good stability, resolution and speed.
- Easy to integrate with PIC16F877A
- Solid-state units have virtually unlimited, maintenance-free lifespan
- 0.5°C accuracy guarantee able (at +25°C)
- Low volts operation from 4 to 30 volts.
- Low self-heating, 0.08°C in still air