

# HOME CONTROL SYSTEM

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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This report is submitted in partial fulfillment of the requirements for the award of Bachelor of  
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**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

**BORANG PENGESAHAN STATUS LAPORAN**

**PROJEK SARJANA MUDA II**

**Tajuk Projek** : HOME CONTROL SYSTEM

**Sesi Pengajian** : 

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Author : NOOR ASYIKIN BINTI SULAIMAN

Date : 03 May 2011

To my beloved mom and dad.

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## ABSTRACT

This project mainly focuses on controlling of home electrical appliances remotely. This system can be accessed anywhere using Local Area Networking (LAN) or Internet. It will monitor and get the status of any home appliances either in switched ON or OFF when users are away from their home. The electrical appliances will fully be controlled by PC. When commands were given from the web based PC, control circuitry will play it part by turning the electrical appliances such as 'ON' or 'OFF' with help of relays. To ensure the security of this system, user must log in to the page so only permitted user can have access and control the electrical appliances.



## ABSTRAK

Projek ini menfokuskan bagaimana untuk mengawal peralatan elektrik di rumah secara jarak jauh. Sistem ini boleh diakses di mana sahaja sama ada menggunakan rangkaian same iaitu *LAN* atau *Internet*. Sistem ini akan memantau dan mendapat status setiap alat elektrik di rumah sama ada dalam kedudukan ON atau OFF semasa pengguna berada jauh daripada rumah mereka. Peralatan elektrik akan dapat dikawal sepenuhnya dengan menggunakan komputer. Arahan akan diberikan melalui laman web yang berperanan memberi isyarat kepada litar kawalan. Litar ini akan menghidupkan atau mematikan peralatan elektrik dengan menggunakan bantuan *relay*. Untuk memastikan keselamatan sistem ini pengguna perlu memasukkan kata laluan dan hanya pengguna yang dibenarkan boleh mengakses dan mengawal peralatan elektrik mereka.

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## LIST OF ABBREVIATIONS

DTE - Data Terminal Equipment

DCE - Data Circuit-termination Equipment

GUI - Graphical User Interface

HTTP - Hypertext Transfer Protocol

IP - Internet Protocol

ISP - Internet Service Provider

I/O - Input / Output

JSP - Java Server Pages

LAN - Local Area Network

MAN - Metropolitan Area Network

PAN - Personal Area Network

PCB - Printed Circuit Board

PIC - Programmable Integrated Circuit

SQL - Structured Query Language

WAN - Wide Area Network

PC - Personal Computer

UART - Universal asynchronous receiver/transmitter



TTL - Time to live

VPN -Virtual Private Network

USB -Universal Serial Bus

ICSP - In-Circuit Serial Programming

## CHAPTER I

### INTRODUCTION

This chapter will discuss about the introduction, objective, scope and methodology of the project.

#### 1.1 Overview

Internet was developed around 1960, since then it becomes such an important tool for everyone. In 21<sup>st</sup> century internet is integral part of our modern lifestyle. Internet allows people to do important task flawlessly such as online banking, pay bills, sharing files, and business. Thus, is it possible to give access and control the home appliances over the internet.

This project mainly focuses on the controlling of home electrical appliances remotely. This system can be accessed anywhere using Ethernet or Internet. It will monitor and gets the status of any home appliances either in switched ON or OFF when users are away from their home. Electrical appliances will fully be controlled by PC. When commands were given from the web based PC, control circuitry will play it part by turning the light 'ON' or 'OFF' with help of relays. To ensure the security of this system, user must log in to the page so only permitted user can have access and control their electrical appliances.

This project is a new economical solution of home electrical appliances control systems. The system can be used for different sophisticated electrical appliances such as home light, fan, aircond, television, radio and others electrical device. This control system consists of three basic parts such as personal computer, control circuitry and the electrical devices.

## **1.2 Problem Statement**

Current technology of home appliances control system uses main switch for each appliances and requires human to control the appliances directly. Sometimes users have forgotten whether they have switched ON or OFF the appliances such as lamp or fan when they were away from home. This would cause wastage of the electricity and money. Moreover, cases of burglary are increasing especially during festive season such as Hari Raya Puasa, Tahun Baru Cina, where owner will leave their home for several days without ability to know the current status of their home. Burglaries usually target home that are not occupied. By turning the light ON remotely it will make the home look like occupied with peoples.

Nowadays, computer technology has become more advance as well as internet. Internet subscribers are growing rapidly especially in Malaysia. Lots of ISP (internet service provider) comes up with new package to attract as many subscribers as they can. Network protocol such as 3G, HSDPA, 4G and latest UniFI is some of key element that boosts Malaysian to use internet as part of their daily life. The demand of having remote technology using internet has made this area favorable, thus, it is chosen to be studied and discussed extensively in this thesis.

A method of developing a remote control and monitoring system based on distributed data acquisition using the Internet is established. This system is based on client or server system in which the host computer set as a server where static IP address is assigned. For the purpose of controlling and monitoring tasks, the monitoring webpage will display the status of light and aircond. It is a user-friendly system with a

simple web interface (GUI). Internet becomes a medium to be used in remote control system, which provides efficient use of energy in a long distance.

### 1.3 Project Objective

This project attempts:

- i. To develop a system that can monitor the status of home appliances and control it regarding user's need.
- ii. To develop a system that can be accessed anywhere either using Ethernet or internet

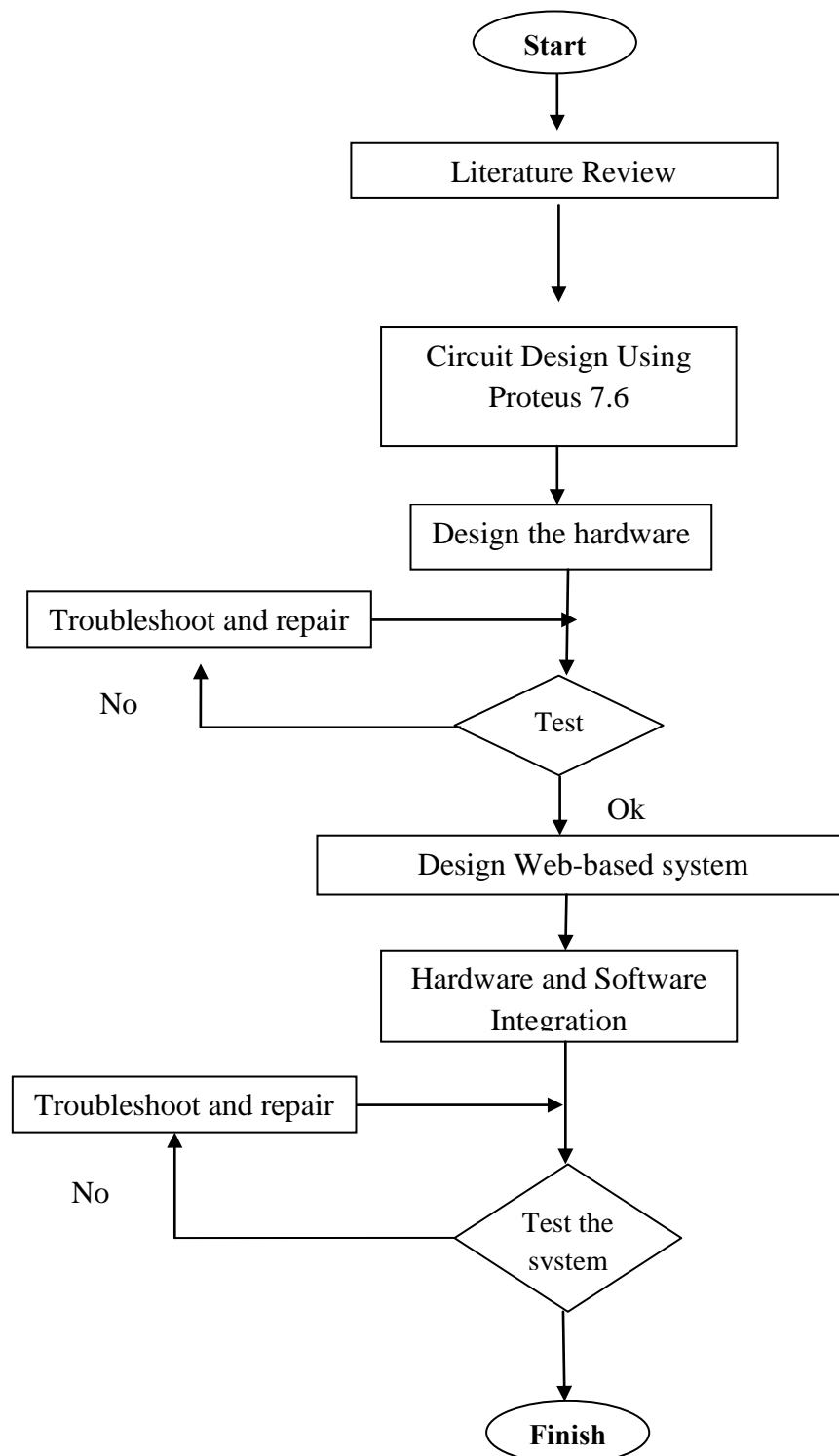
### 1.4 Scope Of Project

- i) System will use LAN or WAN as a communication medium.
- ii) Hardware: Using ISIS Proteus 7.6 for simulation.
  - a) Microcontroller: PIC16F877A combine with SK40C module  
Communicate using USB to UART.
  - b) Trigger Circuit: 3V relay.
  - c) 240Vac Home Light & 13 Amp Socket
- iii) Programming:
  - a) Microcontroller: Program written in C# using PIC Compiler.
  - b) Webpage: written in PHP language and Dreamweaver CS4.
  - c) Adobe Photoshop CS5 for graphics

### 1.5 Methodology

Figure 1.1 depicts the process involved in this project. It started with literature review to gather information. Next, circuit design using Proteus 7.6 and design the draft

hardware. Test the system to ensure it functionalities, and then proceed to designing web-based system. After completed we moved to the final process that is software and hardware integration. Test the system to ensure it working flawlessly and troubleshoot if any problem occurs.



**Figure 1.1**

## 1.6 Report Structure

This thesis contains five chapters. The first chapter is about the introduction of the project. It explains the objectives, scope of the project and the problem statement related to the project.

The second chapter is literature review. All the background study that relates to this project will be discussed here. This chapter explains all the hardware and software use in this project.

The third chapter discussed the methodology of the project. This chapter will explain about the method that used to complete this project. Design step of hardware and software are shown in this chapter.

The fourth chapter explains about the result and discussion of the project. The simulation and tested result are discussed further in this chapter.

The fifth chapter is about conclusion and suggestion of the project. It presents a full summary of the project and the suggestion to enhance and improve the system for the future.

## CHAPTER II

### LITERATURE REVIEW

This chapter will explain and discuss about the source and reference that related to the project.

#### 2.1 Research Projects

Zurina Mohd Hanapi [1] in her thesis state the concept of remote control and monitoring becomes an essential feature in many systems nowadays. Remote control allows clients to control their homes from any places, whereas remote monitoring provides the clients the ability to monitor their home or premises when they are away. The key advantage of this application is client has the ability to control and monitor their home remotely for security and safety reasons.

Fei-Yue Wang [2] proposed an internet application that allows local and remote monitoring and control of a home. The application implemented on a single chip system with network interface. Although the system embedded TCP/IP protocol and can be accessed and controlled over the Internet, due to the hardware limitation of the single chip system, the system is less flexible and scalable.

Yu-Ju Lin, et.al [3] power line communication network infrastructure for the smart home. However, low voltage electrical wiring in homes has largely been dismissed as too noisy and unpredictable to support high-speed communication signals.

Yuta Uesugi, et.al [4] proposes Time Sharing System for In-Home Electric Appliances Using Simple Network Time Protocol. In-home electric appliances obtain the correct time through the Internet by using SNTP. The proposed method was implemented in a verification system with an embedded microprocessor, RTOS and the small resources of 1.8 MB which are assumed to be required for consumer use and was verified. As a result, the correct time was provided with a precision within 1 ms for an SNTP server, and the RTC was able to set it.

Ariff Idris and Anton Satria Prabuwono presented [5] the development of laboratory appliances management system via wireless network for Faculty of Information and Communication Technology-UTeM. The system uses client server communication. The client terminal is used to operate LAMSWi from remote location. It may consist of smart phone, personal digital assistant (PDA), notebook or personal computer (PC) equipped with Bluetooth, WI-Fi or local area network (LAN). The server stores LAMSWi server application and database as well as receiving signal transmitted by client terminal. The experiment result shows the system is able to control electrical appliances from remote location in real time mode via webpage without physically entering specific laboratory. Webpage accessing is done wirelessly via Bluetooth or Wi-Fi. Unfortunately the system is too expensive.

Wireless Home Security System by Logeswaran A/L Arumugam [6] is a design of home security by alarm system. The alarm system should check the status of the transmitter of the system regularly to ensure that the system could function without any failure. The failure of the transmitter will be indicated at the receiver through LEDs and the buzzer beeping sound. The system can be operated through a password secured remote control. The remote can arm and disarm the whole system or each individual zone. The components that the project used are PIC16F877A microcontroller, encoder HT12E, LCD, 4X4 keypad, transmitter and receiver module. There are some limitations in this project is only one transmitter and one receiver is built for this project so the system cannot perform bi-directional