DESIGN CONTROL AND MONITORING TECHNIQUE
FOR DOMESTIC USAGE VIA PC BASED

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"I hereby declare that I have read through this report entitle "Design Control and Monitoring Technique For Domestic Usage via PC Based" and found that it has comply the partial fulfillment for awarding the degree of Bachelor of Electrical Engineering (Industrial Power)"

Signature   :   ………………...

Supervisor's name   :   ……………….

Date   :   ……………….

I declare that this report "Design Control and Monitoring Technique For Domestic Usage via PC Based" is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature :   ....

Name :   ....

Date :   ....

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ABSTRACT

Nowadays, application of computer in control system are increasing due to the development of the information technology. The aim of this paper is to show how the computer technology can use to control and monitor the electrical appliances such as lamp and fan. The studies on existing control and monitoring technique for domestic usage via PC based will be conduct by using visual basic and microcontroller. Switching concept is used for control method to control ON/OFF of domestic application. The visual basic is use to monitor the temperature house. There for the switch fan can controlled automatic based on the temperature that set. For transmit signal to hardware, the XBee RF module is use for this project as an connector between PC and electric appliances. This method is chosen as alternative method other than traditional method because it can solve the common issues occur in domestic usage. This project is find the best solution for common issues like space and cost of domestic usage and try to reduce it.

ABSTRAK

Pada masa kini, penggunaan komputer digunakan dalam sistem kawalan kerana perkembangan teknologi maklumat yang semakin meningkat. Tujuan kertas kerja ini adalah untuk menunjukkan bagaimana teknologi komputer boleh digunakan untuk mengawal dan mengawal penggunaan peralatan elektrik seperti lampu dan kipas. Kajian mengenai kawalan sedia ada dan teknik pemantauan bagi penggunaan domestik melalui PC akan dikawal dengan menggunakan visual basic dan microcontroller. Konsep pensuisan yang digunakan untuk kaedah kawalan untuk mengawal ON / OFF penggunaan domestik. Visual basic juga gunakan untuk memantau suhu rumah. Oleh itu, suis boleh dikawal automatik berdasarkan kepada suhu yang ditetapkan. XBee frekuensi radio penghantaran isyarat digunakan dalam projek ini sebagai antara muka untuk penyambung antara perisian dan perkakasan. Kaedah ini dipilih sebagai kaedah alternatif selain daripada kaedah tradisional kerana ia boleh menyelesaikan isu-isu yang biasa berlaku dalam penggunaan domestik. Projek ini dapat mencari penyelesaian terbaik bagi isu bersama seperti ruang dan kos penggunaan domestik dan cuba untuk mengurangkan.

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LIST OF ABBREVIATIONS

VB	Visual Basic
GUI	Graphical User Interface
IDE	Integrated Development
RAD	Rapid Integrated Development
DAO	Data Access Objects
RDO	Remote Data Objects
ADO	ActiveX Data Objects
VBA	Visual Basic Application
PC	Personal Computer
RF	Radio Frequency
GSM	Global System for Mobile Communications
PIC	Peripheral Interface Controller
ECG	Electrocardiogram
BASIC	Beginner's All-purpose Symbolic Instruction Code
CDMA	Code Division Multiple Access
USART	Universal synchronous/asynchronous receiver/transmitter
PLC	Programmable logic controller
PDA	Personal digital assistance
IO	Input output
MCU	Microcontroller unit
WDT	Watchdog Timer
ICD	In-Circuit Debug
PIC	Peripheral Interface Controller
ECG	Electrocardiogram
SMS	Short message service

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CHAPTER 1

INTRODUCTION

1.1   Project Background

This project design control and monitoring technique for domestic usage via PC based basically use for solve the some problem in the domestic usage. Interface between hardware and computer is call the external controller. Interface between hardware and computer is chosen that call external controller or graphical user interface (GUI). Graphical user interface (GUI) is created and developed by using Visual Basic 2008 as internal controller and monitoring system and the signal from machine language as computer is transmitted to the interface and received data from microcontroller. Besides that, XBee RF module is used as a connector between computer and electrical appliances. The module can communicate with any logic and voltage compatible universal synchronous/asynchronous receiver/transmitter (USART) through this serial port. The wireless communication is applied for transmit signal to hardware in real-time operation.

1.2   Problem Statement

Today, anything want to have a new technology. That why in order to control and monitor technique the graphical user interface (GUI) layout developed in Visual Basic (VB) is represented. This method is a alternative method compare the traditional method. This method is chosen for this project because it can solve the common some issues occur.

Nowadays, domestic usage cost are the common issues. This is because normally people cannot use any software to control and monitor their usage. This application created to control domestic usage automatic via computer. Then the other side, the cost effectiveness that use everyday can reduce. This is because, the usage such as lighting, air-cond and the other usage can setup to turn off direct by use computer. As a result, bill of

monthly usage can be minimized. The wireless communication is use to solve the problem for wire communication. The wire communication can increase the cost of maintenance but when use wireless communication the problem can solve.

This project also to reduce space of PLC that use for control. So for this project PIC microcontroller is choose to replace PLC.. The size and cost of interface also can reduce because PLC expensive and size is large compare PIC microcontroller interface.

Based on this project, the temperature can control loads such as fan automatic based on the temperature that set. When the loads can control automatic, the cost of TNB tariff bill can minimize.

1.3   Objective

Generally, this purpose is to control and monitoring domestic usage by using PC based. The domestic usage are represented by prototype of the domestic usage. The specific objective of this project are:

i.   To study about Visual Basic and GUI system.
ii. To design a GUI for controlling and monitoring by using Visual Basic and PIC.
iii. To verify and analyze GUI on control and monitoring technique for the domestic usage application.

1.4   Scope

The scope of this project is essential as a guideline in order to achieve the objective. Therefore, there are several scopes of project that need to focus. The project limit will focus primarily on controlling and monitoring the domestic usage application by using Visual Basic 2008. The computer is connected by using Visual Basic 2008 as a GUI and XBee RF module as a wireless. The microcontroller that use is the PIC microcontroller (16F877A). The domestic usage applications are represented by four loads by use DC supply that are cooler fan, ceiling fan and two lamp (12V) and sensor is temperature sensor (LM35).

CHAPTER 2

LITERATURE REVIEW

2.1   Introduction

When to start this project some research must have to do in order to make this project successful. For this chapter, sources such as books, articles, journals and internet as use for get some information for do this project. This research are very useful as a guide in doing this project. In this chapter, The anything research that have related with this project must be record and discussed. In order to project successful, understanding of the concept about the design control and monitoring technique for domestic usage via PC based are very important.

2.2   Control and Monitor

The main program basically control and monitor by used computer. A computer act as a brain of the system and a main controller designed to sequentially and automatically carry out a sequence of arithmetic or logical operations. For control and monitor electrical appliances, a computer must link with some interface such as wireless to operate system. To run the interface, GUI such as Visual Basic use as program. The wireless is use for alternative solution for control electric appliances in domestic usage.

The concept of control and monitoring system is operation use the computer as the main and monitor the program of the process project. The system use the XBee RF module to transmitter and receiver signal. The signal that transmitted to microcontroller use to control relay for turn ON or OFF electrical appliances.

For control and monitoring system, divide system to three parts:-

i.   Visual Basic (GUI)

ii.   Peripheral Interface Controller (PIC)

iii.   XBee RF module

2.3   Visual Basic

The programming that use for this project is Visual Basic 2008 Express Edition. For information, the third-generation event-driven programming language like visual basic language and integrated development (IDE) are develop by Microsoft. The easy programming language such as visual basic is suitable. That is because visual basic is a graphical development features and Beginner's All-purpose Symbolic Instruction Code (BASIC) heritage.

Many functions and application can developed use Visual Basic 2008. The application such as the rapid application development (RAD) of graphical user interface (GUI) applications, access to databases using Data Access Objects (DAO), Remote Data Objects (RDO), or ActiveX Data Objects (ADO) and creation of ActiveX controls and objects are familiar with visual basic (VB) software. The databases is use for control and monitoring systems. VB is connect the interface can use parallel port or USB hub.

Visual basic software has been chosen as the control and monitor system between hardware like electrical appliances and computer. Visual basic (VB) provides not only neat interface but also a simple programming to communicate with the rest of the component block [1].

Visual basic is an ideal language for developing Window-based, Database and Internet applications developed by Microsoft. It provides internet applications like web page programming support and interactive graphical user interface (GUI). Some application of visual basic can use for control and monitoring technique especially in domestic usage.

2.3.1   Example of Graphical User Interface (GUI)

The graphical user interface is very useful for this project as a system for control and monitor system. GUI can developed by use computer for transfusion data, monitors and interconnection mechanisms. A Graphical User Interface (GUI) is developed in Visual Basic , which analyses the infusion history of the system [2]. Figure 2.1 show the Graphical user interface layout.

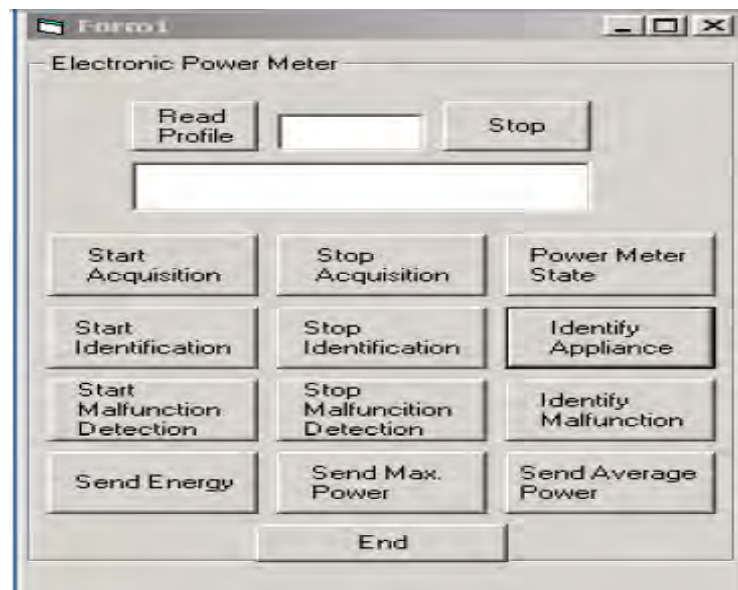Figure 2.1: User interface running on PC [3]

The graphical user interface (GUI) is developed in Visual Basic 2008 use to control and monitor that easy to handle. GUI use to send the data to microcontroller and display data that receiver from microcontroller.

2.4   Wireless Communication

Basically have two type of wireless communication that research in this project

i.   Xbee RF module

ii. Bluetooth

2.4.1   XBee RF Module

XBee radio frequency (RF) module is a wireless device acts as interface between host devices integrated with microcontroller and range of the radio frequency or rate of oscillation within the range is depend on the properties of the XBee module. The range of XBee RF module is depend on the frequency of alternating current electrical signal that used for transfer data to another device. This system is use alternating current electric signals for produce and detect radio waves. The range of the frequency must low than the vibration rate that most mechanical systems can respond to radio frequency. When higher than vibration rate usually the frequency refer to oscillation in electrical circuits or electromagnetic radiation.

The system includes a computer as the main controller, radio frequency transmitter and receiver in order to send the signal from user to a electrical appliances [1]. XBee RF module act as an identification method. XBee use the radio waves, relying on storing and remotely retrieving data form the sensor. Figure 2.2 show the system diagram of XBee RF transmitter and receiver. The XBee transmit ting information to remote station within range of 100 meters. However the range can be increase as per equipment of a real time system and the cost of system[4]
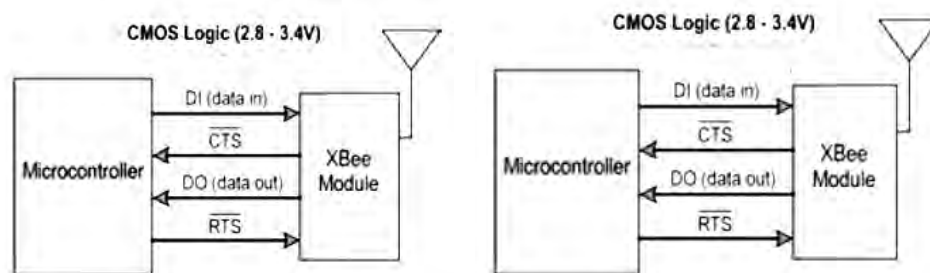

Figure 2.2: The system diagram of XBee RF transmitter and receiver [6]

2.4.2   Bluetooth

Bluetooth is function like XBee RF module that another way of transmitting signals from one device to another without using wires. It also the wireless alternative to send data compare use RS232 data cables. When use Bluetooth, it can connect several devices, overcoming problems of synchronization. The benefit of the short-range device design, networking is the interference from devices belonging to others who are in close proximity.

Bluetooth is a technology standard for exchanging data over short distances using short wavelength radio transmissions from mobile devices. The Bluetooth standard defines 79 channel with the frequency width of 1MHz in the ISM band [7]. Basic Bluetooth system

i.   Radio transmitter (2.4 GHz Bluetooth radio)

ii. Link controller-controls the transmitter.

iii. Link manager and I/O - takes care of the communication among I/O circuit and provides terminal interface for users concerning Bluetooth   operated data transmission.

The Bluetooth modules can be either built into electronic devices or used as an adaptor. In order to transmit data, it can create in computer as a computer card or externally attached via the USB port.
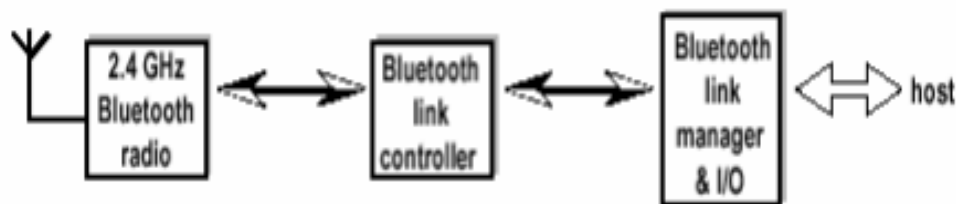

Figure 2.3: Different functional blocks in the Bluetooth system

2.5   Universal Asynchronous Receiver Transmitter (UART)

Universal Asynchronous Receiver Transmitter (UART) are serial chips on your computer motherboard. Function of UART is to link hardware with computer. On older computer, the chips were on the disk IO controller card. However older computer still have a serial boards.

When computer all had parallel bus architecture, the UART"s purpose was to convert bytes from the computer bus to serial bit-stream. Only one wire had for each direction of flow and the cable going out of the serial port was serial. It transmit 9600 to 38400bps for transmitting data bit [8].In order to send and receiver data, the device deal with data in byte sized pieces such as ASCII characters. The computer only read the

parallel bytes, so the bit stream of UART"s that enters the serial port via the external cable must converted to parallel bytes.
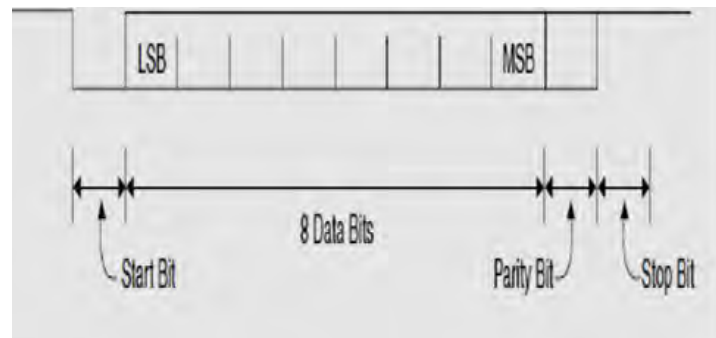

Figure 2.4: UART Frame Format [8]

The UART does some other things as a byproduct (side effect) of its primary task when it converting between serial and parallel. The voltage must be used to represent bits to converted data. When the computer parallel bus inside is high, the flow rate out the UART on the serial port side of it is much lower.

2.6   Control Technique

Today, various advantages such as ease of convenient management and low cost installation cause network technologies have been spreading widely in control engineering and applications of control system. Visual basic software, fuzzy logic and the other software are used for controllers in order to monitor and control the system.

Programming for domestic usage can create by use the fuzzy logic controller that use the JAVA language. Control of the process of the system can used fuzzy controller. When use the fuzzy, a wizard guides in the fuzzy controller is used for setup the controller. Fuzzy Toolbox is an easy-to-use visual tool for designing and implementing fuzzy logic controllers.

Furthermore The JAVA implementation conceptually permits a portable and remote measurement and control approach for any domestic process. Control system architecture for a software controller implemented in JAVA that can be monitored and controlled at any geographical location and on any computing platform. [9].