

# HOME APPLIANCES SMS CONTROLLER

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**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**  
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To my beloved father, mother, and to all my siblings and friends.

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## ABSTRACT

This project focuses on how to control electrical switch for house appliances (eg fans, air-conditioners, lights, etc) automatically by using a mobile phone that connected to a simple microcontroller circuit. The process begins by sending a simple SMS to the recipient; the mobile phone that has been connected to the microcontroller circuit placed at the corner of your home or office. Receiver is a mobile phone (Nokia 3315) that can be used to send or receive SMS. If a user sends an SMS to find out the status of electrical equipment either ON or OFF, mobile phones will respond by telling that there is appliances that has not been closed and where it is installed. When the status is known, the user can do what they want, for example. If users want to switch the room lights ON, he only needs to send a SMS with the keyword 'ON' to the receiver, and immediately, the micro controller circuit will encode the keywords and send instructions to trigger the microcontroller circuit to switch on the light. The same thing also happens when users want to control other electrical equipment. This system can be used anywhere, as long as it in the range of phone network provide by the operators.

## ABSTRAK

Projek ini memfokuskan tentang bagaimana untuk mengawal suis peralatan elektrik rumah (contohnya kipas, penghawa dingin, lampu, dan sebagainya) secara automatik dengan hanya menggunakan telefon bimbit yang disambungkan ke litar pengawal mikro. Proses bermula dengan menghantar satu SMS ringkas kepada penerima, iaitu telefon bimbit yang telah disambungkan dengan litar PIC yang diletakkan di sudut rumah atau pejabat. Penerima adalah sebuah telefon bimbit (Nokia 3315) yang boleh digunakan untuk menghantar atau menerima SMS. Jika pengguna menghantar SMS untuk mengetahui status peralatan elektrik itu samada hidup (ON) ataupun tidak (OFF), telefon bimbit akan membalas dengan memberitahu bahawa ada peralatan yang masih belum ditutup dan dibahagian mana ia terpasang. Apabila status sudah diketahui, pengguna boleh membuat apa yang di inginkan, sebagai contoh. Jika pengguna mahu menghidupkan lampu bilik kerana hari sudah gelap, beliau hanya perlu menghantar SMS dengan katakunci 'ON' kepada penerima. Dan dengan serta-merta, litar mikro pengawal akan mengkodkan kata kunci tersebut dan menghantar arahan kepada litar pemicu supaya suis lampu dihidupkan. Perkara yang sama juga berlaku apabila pengguna mahu menutup peralatan elektrik yang lain. Sistem ini boleh digunakan dimana sahaja, selagi berada di dalam kawasan liputan talian telefon.



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## LIST OF ABBREVIATION

DIY	-	Do It Yourself
EEPROM	-	Electrically Erasable Programmable Read-Only Memory
GUI	-	Graphical User Interface
GSM	-	Global System for Mobile Communications
PC	-	Personal Computer
PIC	-	Programmable Integrated Circuit
PSM	-	Projek Sarjana Muda
RAM	-	Read Only Memory
SIM	-	Subscriber Identity Module
SMS	-	Short Messaging Service
VB	-	Visual Basic

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## **CHAPTER I**

### **INTRODUCTION**

This chapter 1 is contains about the introduction of the project where it involve of the objectives, problem statements, scope, and report structure.

#### **1.1 Introduction of Project**

This project is almost the same as Smart Home project, which is the different is this project uses SMS as the medium to control the appliances. It allows the entire home appliances to be automated and therefore provide ease and convenience to everyday activities in the home. Automated control, entertainment features, communication features and smart appliances, all contribute to the ease and convenience a smart home permits, and remote access to these features through telephone or internet makes it even more convenient.

Home Appliances SMS Controller Project is a project that uses mobile phones as a tool that will control the switches of home electrical appliances such as lights, air-conditioned, television, radio, and more. For example, if a user sends a message that states that users want to turn on lights. 'Receiver / mobile' will receive the message and implement the programs to turn on lights as specified in the PIC.

This system can be used anywhere as long as there is coverage of the phone line that already exists such as Digi, Maxis or Celcom. In addition, the system is guaranteed because the number and the keyword used is known only by the user.

## **1.2 Objectives**

The main objective of this project is to:

- (a) To resolve the problem of energy wastage that occurs because of our carelessness.
- (b) To provide a system that easily maintained
- (c) To use SMS as a medium of communication between users with the system.

## **1.3 Problem statement**

Almost all people in this country waste their electricity bill by not turning off the light and other electrical appliances in the house, by using this Home Appliances SMS Controller system; user can save a lot of their electricity bill by just sending a simple message. The main objective of this system is to give less electricity bill by not wasting the energy on the electric appliance that is not been used by just turning off the electrical appliance automatically by user from anywhere.

Current technology on this same project requires human to control home appliances in a very short range. Some systems are vendor dependent and cost too much in maintenance support. Current home control system concept is not flexible and not adaptable to new standard lifestyle. These could deliver the system to the fullest efficiency and it is not applicable for users to control their appliances all the time. In some cases, their home appliances need to be maintained or controlled even when users not around their home. This is when Home Appliances SMS Controller system is needed to play its vital role. Table below shows the current future trends of smart home concepts.

Table 1.1: Current and future smart home.

Current Smart Home Appliances	Future Smart Home appliances
• Affordable by high-end homes	• Standard features in every home
• Vendor dependant	• Open standards and DIY concept
• Very expensive maintenance	• Zero maintenance
• Proprietary and stand-alone	• Integrated solution
• Not flexible to new lifestyle	• Modular and expandable

## 1.4 Scope

This project is subjected to several scope and limitations that are narrowed down to the study. There are few scopes and guidelines listed to ensure the project is conducted within its intended boundary. This is to ensure the project is heading in the right direction to achieve its intended objectives. The scopes of this project are divided into two parts:

Hardware:

- (a) **PIC circuit** that is used to store programs and to control the process of sending message and also to connect the phone and the PIC circuit.
- (b) **Phone** that is used to send SMS
- (c) **Circuit Driver** as a connector for controlling switches from DC to AC 240V.

Software:

- (a) **PIC compiler** to build program for PIC.

## 1.5 Summary of Methodology

This system starts when a user sends SMS to the receiver (mobile phone) with keywords that have been set in the program. When the recipient receives SMS, it will read the messages and then just store the message into memory that has been

set in the program. Next, the PIC will process the program and perform the tasks at the output that have been set in the program.

## **1.6 Report structure**

This report of Home Appliances SMS Controller contains five chapters that explain detail about the project. The first chapter is the introduction of the project that included the objectives, scope, and problem statement of the project.

The second chapter is the literature review about the hardware and the software that will be used in this project and study of FBus Protocol for sending and receiving SMS.

The third chapter is about the methodology of the project and also PSM 1 and PSM 2 flowcharts.

Chapter four consist of the result and application of Home Appliances SMS Controller. It includes the circuit designing and development and also the simulation.

Finally, the last chapter is to conclude the overall development process and the system.

## **CHAPTER II**

### **LITERATURE REVIEW**

This chapter is discussing about the hardware and the software that will be using in the project.

#### **2.1 Research Projects**

##### **2.1.1 Design and Development of Activation and Monitoring of Home Automation System via SMS through Microcontroller**

Home appliance control system based on GSM network technology for transmission of SMS from sender to receiver. SMS sending and receiving is used for universal access of appliances and allowing breach control at home. Appliance control subsystem enables the user to control home appliances remotely. The system is capable enough to give feed back to user about the condition of the home appliance according to the user's needs and requirements. The home appliance control system consists of the following components [1]: -

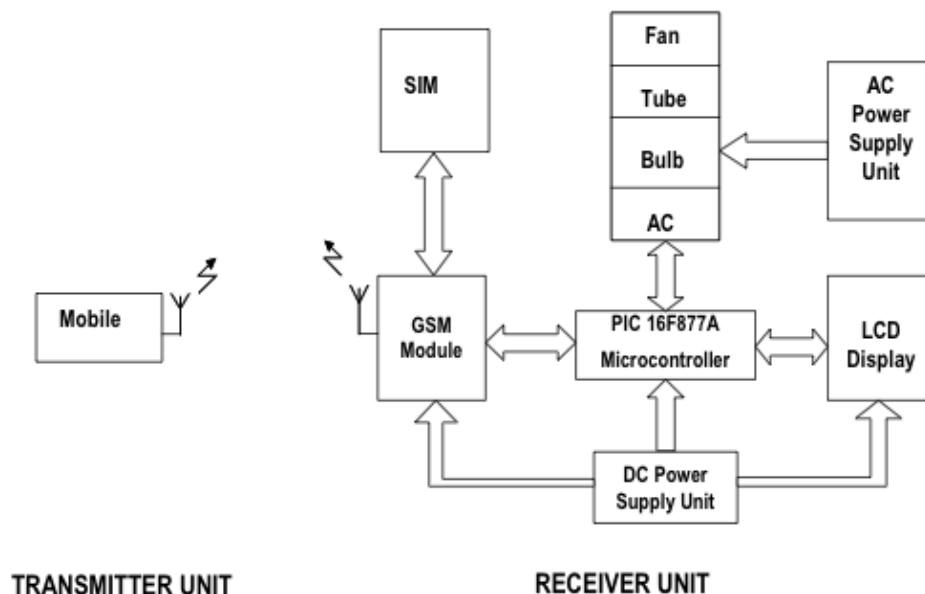


Figure 2.1: Diagram of Home Appliances Control System.

**Microcontroller:** Microcontroller being the main module it control the appliances system. This systems work on GSM technology for transmission from sender to receiver.

**GSM Module:** GSM module is a plug and play device and is attached to the Microcontroller, which then communicates with the Microcontroller via port. GSM module is a medium to understand and encode the SMS receives or sends.

**Cell Phone:** Device to communicate with the GSM. Cell phone has a SIM card and a GSM subscription. User transmits instructions via SMS and the system takes action against those instructions.

The different on the journal project and the home appliances project is that, it uses a GSM module to control the home appliances and the GSM module used an AT command to communicate with the microcontroller.

For Home Appliances SMS Controller, the method use is the FBus protocol to control the hardware to operate the system. This protocol is different from the AT command, and it also need to be encode manually.

### 2.1.2 A MOBILE-BASED HOME AUTOMATION SYSTEM

The journal is focusing on the mobile-based remote control system for controlling and monitoring of machine and devices at any time from anywhere within the coverage of cellular mobile networks. Home automation allows the controlling and monitoring of various home appliances by a single system.

The mobile-based home automation system is shown in Figure 2.2. The system consists of a Java-enabled mobile phone, a cellular modem, and a controller board incorporating a microcontroller. The mobile phone serves as a remote control through which a user can interact with the home automation system. User-friendly graphical user interface is provided on the mobile phone through applications developed in Java programming language. The controller board resides at home and works as a home server, which carries out the task of operating and monitoring home appliances. The home server communicates with the remote control via the cellular modem [2].

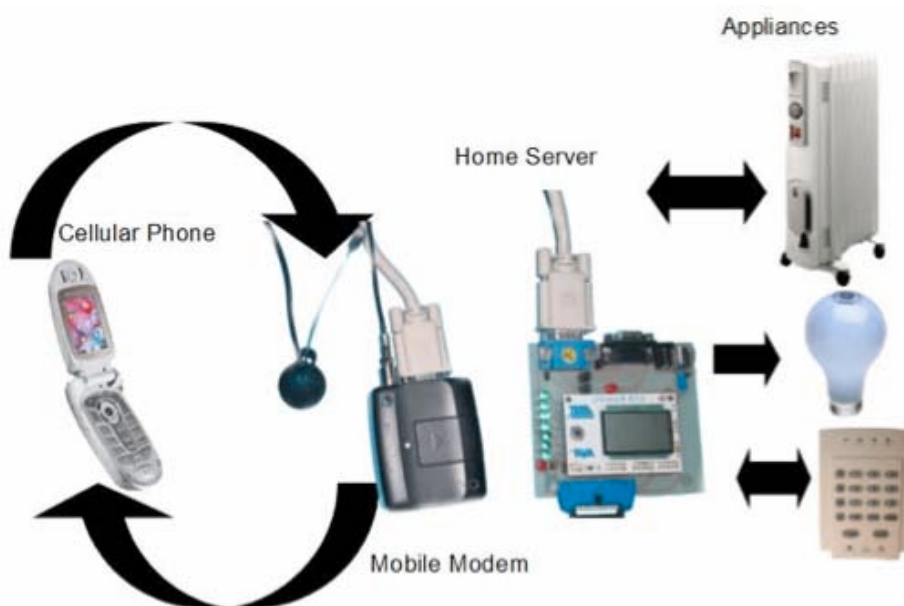


Figure 2.2: Overview of a mobile-based home automation system.

Figure 2.3 shows the GUI running the developed Java application which provides a user interface on the mobile phone for user to input commands for turning on or off home appliances. The user inputs are processed by the Java application and

then sent to the home server via SMS. The interface allows a user to specify phone number of the cellular modem, user name, password, and the state (on or off) that each home appliance should be set to. When the “send” button is pressed, all the data is put into a text string and sent via SMS to the cellular modem. On the reverse, feedback from the home server can be sent via the cellular modem to the mobile phone using SMS [2].



Figure 2.3: Cellular phone emulator running Java application.

The home server design is based on a microcontroller, an Atmel Butterfly. The requirements for the microcontroller are: a RS232 serial port, I/O (input/output), and a reasonable speed. In addition a reasonable amount of EEPROM is needed to store the home server software, appliance status, user name, and password [2].

From the journal, the system used a mobile modem for the connection between mobile phone to control the appliances. It also used java interface so that the interface can be user-friendly and easy to use. The microcontroller used is Atmel Butterfly.

Different from the Home Appliances SMS Controller, it does not use any java program to view the graphical interface but only used a simple text message command as the key word to interact with the system. The different also on the hardware, which is the microcontroller, it use an Atmel and Home Appliances SMS