

HOME SECURITY USING SMS

MEOR AHMAD SALAHUDDIN BIN AZMI

This report is submitted in partial fulfillment of the requirements for the award of Bachelor of Electronic Engineering (Computer Engineering) With Honours

**Faculty of Electronics Engineering and Computer Engineering
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ZUL ATFY FAUZAN BIN MOHAMMED NAPIAH
Pensyarah

Fakulti Kejuruteraan Elektronik Dan Kejuruteraan Komputer
Universiti Teknikal Malaysia Melaka (UTeM)
Karung Berkunci No 1752
Pejabat Pos Durian Tunggal
76109 Durian Tunggal, Melaka.

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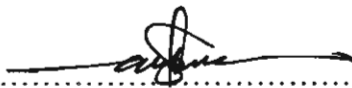
Signature : 

Author : MEOR AHMAO SALAHUDDIN BIN AZMI

Date : 30/4/2010

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Signature



.....

Supervisor's Name

..... **ZUL ATFY FAUZAN BIN MOHAMMED NAPIAH**

Date

..... **Pensyarah**

Fakulti Kejuruteraan Elektronik Dan Kejuruteraan Komputer
Universiti Teknikal Malaysia Melaka (UTeM)
Karung Berkunci No 1752
Pejabat Pos Durian Tunggal
76109 Durian Tunggal, Melaka.

30/4/2010

I would like to dedicate this report to my family and my friends, whose has gave encouragement and support to me in completing this report.

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ABSTRACT

The aim of this project is to build a security system that uses Short Message Service (SMS) as a medium to communicate with the users. SMS is used as a medium to tell the users if their premise has been intruded. This system is use a mobile phone as a modem to send SMS. When the sensor is activate, the microcontroller will receive the signal and after 30 second, it will send signal to the outputs. The outputs of this system are DC motor, siren and sending SMS through mobile phone. The siren will activate and the motor will operate. The motor will pull the sliding door to close it. In the same time, SMS will be sending to the users. So, the users will know what is going on at their premise. The main objective of this project is to make a low cost security system with efficiency features. It also can send and receive SMS as a communication medium with the users.

ABSTRAK

Tujuan projek ini adalah untuk membina sebuah sistem kawalan rumah yang menggunakan Sistem Pesanan Ringkas (SMS) sebagai medium perhubungan dengan pengguna. SMS digunakan sebagai medium untuk memberitahu kepada pengguna jika premis mereka telah diceroboh. Sistem ini menggunakan telefon bimbit sebagai modem untuk menghantar SMS. Apabila pengesan berfungsi, mikropengawal akan menerima isyarat dan selepas tempoh 30 saat, ia akan menghantar isyarat kepada keluaran. Keluaran sistem ini adalah DC motor, siren dan penghantaran SMS melalui telefon bimbit. Siren akan berfungsi dan motor akan beroperasi. Motor akan menarik pintu gelongsor untuk ditutup. Pada masa yang sama, SMS akan dihantar kepada pengguna. Jadi, pengguna akan mengetahui apa yang telah berlaku di premis mereka. Objektif utama projek ini adalah untuk menghasilkan satu sistem kawalan rumah yang berkos rendah dengan ciri-ciri yang efisien. Ia juga boleh menghantar dan menerima SMS sebagai medium perhubungan dengan pengguna.

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CHAPTER I

INTRODUCTION

1.1 Overview

Nowadays, robbery often occurs in our country neither at houses or offices, thus, I would like to suggest a very effective alarm system so that this problem can be prevent. Alarm system had been long existed and it was used widely in Malaysia. However, this system still can be escaped cause of the ineffectiveness of the system.

So, I want to propose a project that can give more effective security system. Where, it use PIC circuit to control all activity that occurred and the output of it is SMS that would be send to owners that include information of the robbery besides the activation of alarm and also the movement of doors or windows that close automatically.

The synopsis of this project is like this; when robbers enter the house or office, neither through door or window, sensor will detect incoming presence of the robber. PIC will send signals to a phone for it to send SMS and the SMS will be sending to the house owner mobile phone for him to activate the siren and make the doors and windows close automatically.

SMS that has been sent, have notification about which part of the house had been entered. So, the house owner would know from which part the robbers entered the house. Meanwhile, users also can control the siren, door and window by using SMS which, users can send SMS to the system for shut down the siren and open the door and window.

1.2 Objectives

To prevent the problems of current alarm system, I had stated a few objectives of my project. The objectives of Home Security Using SMS are :

- (a) To provide a low cost alarm system and it can be owned by everyone.
- (b) To provide an alarm system that can be managed easily.
- (c) This system will use SMS as communication medium between users with the system.

1.3 Problems Statement

Problems statement will describes about the problems of the current alarm system. The problems of current alarm system are :

- (a) The cost for installation alarm system is expensive.
- (b) The cost for maintenance alarm system is expensive.

1.4 Scope of Project

This project scope is dividing into two part which are hardware and software. The hardware parts that include in this project are PIC 16F877A circuit, sensor circuit with magnetic sensor, motor circuit (H-Bridge) with motor, handpone (modem) and siren. The software that been used in this project are PIC compiler and

handphone software. The software is used to control the hardware, while the hardware is used to implement the software.

1.5 Overview of Project Methodology

When sensor operates, it will send signals to PIC. PIC will process the data to be delivered into a phone. The phone will send SMS to the owner and on the same time, the PIC will instruct the siren to activate and the doors and windows close automatically. House owner also will receive notification about any intrusion that occurs. Other than that, users also can instruct this system to stop by using SMS, where, the activated siren will stop while, doors and windows will open.

1.6 Report Structure

This report contains of five chapters which are introduction, literature review, methodology, results and conclusion. In chapter I, it will briefly describe about the overview and the definition of the project such as introduction, problems statement, objectives and scope of the project. In this chapter, there will be summary of the project progress.

In chapter II, it will discuss about research and information which are related to this project. Every facts and information are gained from different resources. So that, the best method and techniques can be implement on this project. Those are based on the literature review and information of the project. Facts and information that are found through journals or other references will be compared and the better methods had been chosen for this project.

In chapter III, it will discuss about the methodology used in this project such as data acquisition module, a pre-processing module, normalization and re-sampling module, a feature extraction module, a classifier module and a decision module. All these methodology should be followed for a better performance.

Chapter IV mainly focuses on the result and analysis done for this project. This chapter will figure out a few tests that had been conducted in a several times and stages to successful rate of the project. The purpose of test, expected result, procedures, result, discussion, and conclusion for each test will be detailed out in this chapter. All testing and verification result are attached with the aid of figure and table.

In the final chapter, which is chapter V, it will conclude the whole procedures of this project that including project finding, achievement analysis and conclusion of the research implementation that had been used. This chapter also discussed about the project suggestion for enhancement.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

Basically this chapter will reveal the knowledge pertaining this field of project in which it is gained through a lot of resources such as reference book, papers, journal, articles, conferences articles and documentations regarding applications and research work.

This shows how the theory and the concept have been implemented in order to solve project problem. The theory understanding is crucial as guidance to start any project. The result of the project cannot be assessed if it is not compared to the theory.

2.2 Project Researches

In this part, it will discuss about the researches of this project methods that it will be used. Every theory that has been found will be compare among it and the best will be selected and used for this project.

2.2.1 Nokia 3310 as Modem

Most Nokia phones have F-Bus and M-Bus connections that can be used to connect a phone to a PC or in our case a microcontroller. The connection can be used for controlling just about all functions of the phone, as well as uploading new firmware. This bus will allow us to send and receive SMS messages [1].

The very popular Nokia 3310 or 3315 has the F or M Bus connection under the battery holder. This is a bit of a pain to get to and requires a special cable to make the connection. This phone has 4 gold pads used for the F and M Bus which are M-bus pin, ground pin, transmit pin and receive pin [1].

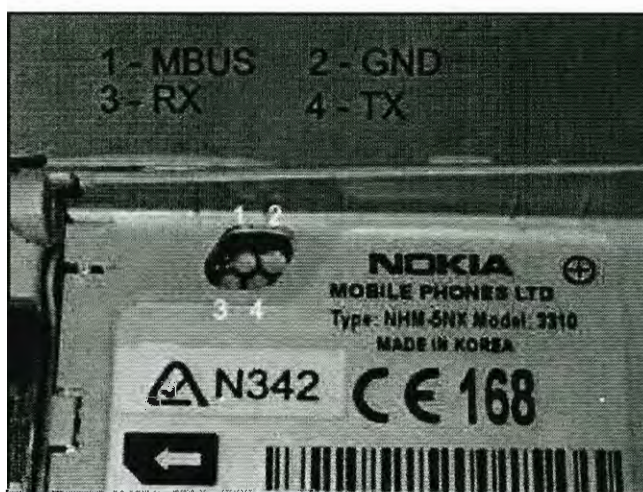


Figure 2.1: F-bus pins

2.2.1.1 The Differences between M-Bus and F-Bus

M-Bus is a one pin bi-directional bus for both transmitting and receiving data from the phone. It is slow (9600bps) and only half-duplex. Only two pins on the phone are used, one ground and one data. M-Bus runs at 9600bps, 8 data bits, odd parity and one stop bit. The data terminal ready (DTR) pin must be cleared with the request to send (RTS). This powers the electronics in the cable and I think it sets it for M-Bus operation [1].

F-Bus is the later high-speed full-duplex bus. It uses one pin for transmitting data and one pin for receiving data plus the ground pin. Very much like a standard serial port. It is fast 115,200bps, 8 data bits, no parity and one stop bit. For F-Bus the data terminal ready (DTR) pin must be set and the request to send (RTS) pin cleared [1].

2.2.1.2 The F-Bus Protocol and Command

The F-Bus is bi-directional serial type bus running at 115,200bps, 8 data bits. The serial cable contains electronics for level conversion and therefore requires power. The first thing to do is supply power to the cable electronics and this is done by setting the DTR (Data Terminal Ready) pin and clearing the RTS (Request to Send) pin [1].

The DTR pin is connected to a +3 to 12 Volt supply and RTS to a -3 to -12Volt supply. The easy way to achieve this is by using a Max232 or similar transceiver for the RS232 TX and RX pins and then connecting the DTR pin on the serial cable to the V+ pin on the Max232. Do the same for the RTS, however connect it to the V- pin on the Max232. The V+ and V- pins are derived from internal charge pumps that double the input voltage. Example, for a 5V Max232, the V+ will +10V and the V- will be -10V [1].

The next step is to synchronize the UART in the phone with your PC or microcontroller. This is done by sending a string of 0x55 or 'U' 128 times [1].

Sample frame sent to Nokia 3310 (showed as a Hex dump)

```
Byte: 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15
Data: 1E 00 0C D1 00 07 00 01 00 03 00 01 60 00 72 D5
```

This sample frame is used to get the hardware and software version from a Nokia phone. It is a good starting point to test if the implementation of the protocol is working [1].

Byte 0: All frames sent by cable will start with the character 0x1E first. This is the F-Bus Frame ID. Cable is 0x1E and InfraRed is 0x1C [1].

Byte 1: This is the destination address. When sending data, it's the phone's device ID byte. In our case it's always 00 for the phone [1].

Byte 2: This is the source address. When sending data, it's the PC's device ID byte. In our case it's always 0x0C (Terminal) [1].

Byte 3: This is the message type or 'command'. 0xD1 is Get HW & SW version. [1]

Byte 4 & 5: Byte 4 & 5 is the message length. In our case it is 7 bytes long. Byte 4 is the MSB and byte 5 is the LSB [1].

Byte 6: The data segment starts here and goes for 7 bytes in our case. As The Nokia is a 16 bit phone and therefore requires an even number of bytes. As ours is odd the last byte will be a padding byte and the message will end at location 13 [1].

The last byte in the data segment (Byte 12 above) is the sequence number. The last 3 bits of this byte increment from 0 to 7 for each frame. This part needs to be sent back to the phone in the acknowledge frame [1].

Bytes 14 & 15: The second to last byte is always the odd checksum byte and the last byte is the even checksum byte. The checksum is calculated by XORing all the odd bytes and placing the result in the odd Checksum location and then XORing the even bytes and then placing the result in the even byte [1].

2.2.2 Data Cable

Electronic data communications between elements will generally fall into two broad categories: single-ended and differential. RS232 (single-ended) was introduced

in 1962, and despite rumors for its early demise, has remained widely used through the industry [2].

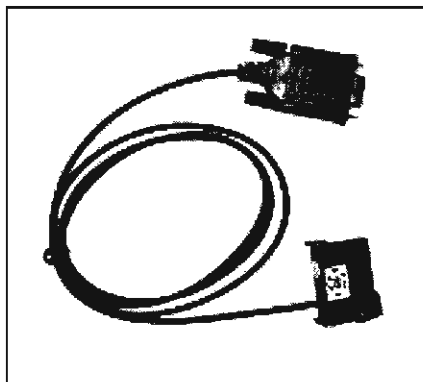


Figure 2.2: Nokia 3310 data cable

Independent channels are established for two-way (full-duplex) communications. The RS232 signals are represented by voltage levels with respect to a system common (power / logic ground). The "idle" state (MARK) has the signal level negative with respect to common, and the "active" state (SPACE) has the signal level positive with respect to common. RS232 has numerous handshaking lines (primarily used with modems), and also specifies a communications protocol [2].

The RS-232 interface presupposes a common ground between the DTE and DCE. This is a reasonable assumption when a short cable connects the DTE to the DCE, but with longer lines and connections between devices that may be on different electrical busses with different grounds, this may not be true [3].

RS232 data is bi-polar. The +3 TO +12 volts indicate an "ON or 0-state (SPACE) condition", while the -3 to -12 volts indicates an "OFF" 1-state (MARK) condition. Modern computer equipment ignores the negative level and accepts a zero voltage level as the "OFF" state. In fact, the "ON" state may be achieved with lesser positive potential. This means circuits powered by 5 VDC are capable of driving RS232 circuits directly. However, the overall range that the RS232 signal may be transmitted/received may be dramatically reduced [3].

The output signal level usually swings between +12V and -12V. The "dead area" between +3v and -3v is designed to absorb line noise. In the various RS-232-like definitions this dead area may vary. For instance, the definition for V.10 has a dead area from +0.3v to -0.3v. Many receivers designed for RS-232 are sensitive to differentials of 1v or less [3].

This can cause problems when using pin powered widgets - line drivers, converters, modems etc. These types of units need enough voltage & current to power them self's up. Typical URART (the RS-232 I/O chip) allows up to 50mA per output pin. So, if the device needs 70mA to run, we would need to use at least 2 pins for power. Some devices are very efficient and only require one pin (some times the Transmit or DTR pin) to be high in the "SPACE" state while idle [3].

An RS-232 port can supply only limited power to another device. The number of output lines, the type of interface driver IC, and the state of the output lines are important considerations [3].

The types of driver ICs used in serial ports can be divided into three general categories :

- Drivers which require plus (+) and minus (-) voltage power supplies such as the 1488 series of interface integrated circuits. (Most desktop and tower PCs use this type of driver.)
- Low power drivers which require one +5 volt power supply. This type of driver has an internal charge pump for voltage conversion. (Many industrial microprocessor controls use this type of driver.)
- Low voltage (3.3 v) and low power drivers which meet the EIA-562 Standard. (Used on notebooks and laptops.)[3]