DEVELOP OF SMART DIGITAL NOTICE BOARD USING GSM CONCEPT

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This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Electronics Engineering Technology (Telecommunications) (Hons.)

by

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I hereby, declared this report entitled "Develop of Smart Digital Notice Board Using GSM Concept" is the results of my own research except as cited in references.

Signature	:	…….
Author's Name	:	Badrul Muhaimin Bin Abdul Ghani
Date	:	22 December 2014

APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Telecommunications) (Hons.). The members of the supervisory committee are as follow:

……

(Md Ashadi Bin Md Johari)

……

(Raeihah Binti Mohd Zain)

ABSTRAK

Papan kenyataan berasaskan GSM ini menerangkan cara untuk membangunkan komunikasi yang cekap dan boleh dipercayai antara telefon mudah alih dan mikropengawal menggunakan modem GSM. Papan kenyataan digunakan secara meluas di mana-mana institusi/organisasi atau tempat kemudahan awam seperti stesen kereta api, stesen bas, tempat pengiklanan awam, dan sektor pendidikan. Dalam projek ini, modem GSM akan digunakan dengan gabungan bersama mikropengawal PIC16F877A di tengah-tengah sistem. Kertas kerja ini memainkan peranan penting dalam membangunkan produk yang cekap dan benar-benar mudah alih.

ABSTRACT

In this technical paper based GSM notice board explain how to develop an efficient and reliable communication between a mobile phone and a microcontroller using GSM modem. Notice board is widely used thing in any institution/organization or public utility places such as railway station, bus station, public advertisement, and educational sector. In this project, GSM modem will be used with combination of microcontroller PIC16F877A at the middle of the system. This technical paper plays a major role in developing an efficiently designed and truly mobile project.

DEDICATION

To my beloved parents

ACKNOWLEDGEMENT

I would like to thank to my supervisor Mr. Md Ashadi Bin Md Johari, lecturer of Faculty Technology Engineering and my co-supervisor Mrs. Raeihah Binti Mohd Zain for giving me a full cooperation and supervision during the making of this final year project report. Not to be forgotten, I would like to thank my family, sibling and my friends for contributing their ideas and give me a moral support in completing this project. Lastly, I would also like to appreciate for those who are directly or indirectly involved during this project and completion of this report. All of your kindnesses are very much appreciated.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

GSM	-	Global System for Mobile
1G	-	First generation technology
2G	-	Second generation technology
3G	-	Third generation technology
LCD	-	Liquid Crystal Display
AC	-	Alternate Current
DC	-	Direct Current
ETSI	-	European Telecommunication Standards Institute
SMG	-	Special Mobile Group
ISDN	-	Integrated Services Digital Network
ITU	-	International Telegraph Union
POTS	-	Plain Old Telephone Service
SMS	-	Short Message Service
SIM	-	Subscriber Identity Module
MS	-	Mobile Station
BSS	-	Base Station Subsystem
ME	-	Mobile Equipment
IMSI	-	International Mobile Subscriber Identity
IMEI	-	International Mobile Equipment Identity
BSC	-	Base Station Controller
BTS	-	Base Transceiver Station
MSC	-	Mobile Switching Center
HLR	-	Home Location Register
VLR	-	Visitor Location Register
AuC	-	Authentication Center
EIR	-	Equipment Identity Register
TDMA	-	Time Division Multiplexing Division
LPC	-	Linear Predictive Coding

EFR	-	Enhanced Full Rate
RAM	-	Random Access Memory
ROM	-	Read-Only Memory
CMOS	-	Complementary Metal Oxide semiconductor
PEROM	-	Programmable and Erasable Read Only Memory
CPU	-	Central Processing Unit
ALE	-	Address Latch Enable
PSEN	-	Program Store Enable
EA	-	External Access Enable

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CHAPTER 1
INTRODUCTION

1.1 Introduction

World is going mobile when wireless communication announced its arrival on big stage. Now, we do not have to move an inch to control everything. The use of embedded system in electronic notice board has opened up opportunity to many interesting applications that ensure comfort and safety to human life. Global System for Mobile Communication (GSM) is accessed by more than 212 countries and territories globally and is optimized for duplex voice telephony.

Moreover, GSM was developed for the replacement of first generation (1G) technology at first, now it is upgraded for second generation (2G) technology and third generation (3G) technology. GSM modem can be further used for some innovative application with combination of microcontroller such as GSM based voting machine, GSM based robot control, GSM based home security system and others.

Besides that, with embedded system that has grown greatly in recent years, the gadgets are increasingly becoming intelligent and autonomous. Mobile phones, refrigerators, automobiles and others are some examples of devise with built in intelligence which function based on operating and environmental parameters. The intelligence of smart device lies in embedded system. An embedded system, in general, in co-operates hardware, operating systems, low-level software binding the operating system and peripheral devices, and communication software to enable the device to perform the pre-defined functions. An embedded system performs a single, well-defined task, is tightly constrained, is reactive and computes results in real time.

1.2 Problem statement

The big shops and shopping centers are using the digital moving displays now. In railway station and bus stands, everything that is ticket information, platform number and others is displaying in digital moving display. But in these displays, if they want to change the message or style, they have to go there and connect the display to PC or laptop.

1.3 Objectives

The objectives of the project are:

(a) To understand the GSM architecture

(b) To receive mobile signal using GSM Modem

(c) To provide led driver circuit for LCD display board

1.4 Scope of Project

Before designing, we need to list down on what are going to be done and all its steps. This is to avoid wastage in money, items and time. The scope of this research project:

(a) Study on the GSM architecture.

(b) Designing the specifications of the receiver and transmitter.

(c) Designing the structure, material, parameter, and the process of the project.

(d) Simulates by using software.

(e) Fabricating process is being done.

(f) The result is obtained.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

The analysis of literature review is a significant part in this project. Literature review gives provide more details and evidence of the project. The materials used for literature review are from the book, internet and the journal. The aim is to identify the scope of the study or project.

2.2 Background of GSM

Text In the beginning of the 1980s several contrasting systems for mobile communications were advanced in Europe. The urgency for a typical system that granted roaming between countries was early identified. In 1982 a number of European countries constructed a new standardization organization called “Groupe Speciale Mobil” (GSM). The mandate of this group was to establish a standard to be accepted for the countries that designed it. In 1988 the GSM was included in the European Telecommunication Standards Institute (ETSI), and the standards created by GSM thus turn into standards for all telecommunication administrations in Europe. (Willassen, 1998)

The main work with the GSM took place from 1988 - 1990 and resulted in 12 series of specifications that in extreme detail specified the inner workings of GSM. In 1990, when phase 1 of the specifications was done, there were three dominating automatic systems for mobile communications in the world:

- American AMPS from 1984, with networks in the US.
- British TACS from 1985, with network in Britain.
- Nordic NMT from 1981, with networks in the Nordic countries.

The term GSM has been chosen as a trademark for the system, meaning "Global System for Mobile communications", whereas the group within ETSI working with the standards has been renamed SMG (Special Mobile Group). Unlike these systems, the GSM is a fully digital system, allowing both speech and data services and allowing roaming across networks and countries. Today GSM is the largest system for mobile communications in the world, and exist on all continents.

2.3 Services Provided by GSM

From the beginning, the planners of GSM wanted ISDN compatibility in terms of the services offered and the control signaling used. However, radio transmission limitations, in terms of bandwidth and cost, do not allow the standard ISDN B-channel bit rate of 64 kbps to be practically achieved. Using the ITU-T definitions, telecommunication services can be divided into bearer services, teleservices, and supplementary services. The most basic teleservice supported by GSM is telephony. As with all other communications, speech is digitally encoded and transmitted through the GSM network as a digital stream. There is also an emergency service, where the nearest emergency-service provider is notified by dialing three digits. (S.P.Gaikward, 2013)

A variety of data services is offered. GSM users can send and receive data, at rates up to 9600 bps, to users on POTS (Plain Old Telephone Service), ISDN, Packet Switched Public Data Networks, and Circuit Switched Public Data Networks using a variety of access methods and protocols, such as X.25 or X.32. Since GSM is a digital network, a modem is not required between the user and GSM network, although an audio modem is required inside the GSM network to interwork with POTS. Other data services include Group 3 facsimile, as described in ITU-T recommendation T.30, which is supported by use of an appropriate fax adaptor. A unique feature of GSM, not found in older analog systems, is the Short Message Service (SMS). SMS is a bidirectional service for short alphanumeric (up to 160 bytes) messages. Messages are transported in a store-and-forward fashion. For point-to-point SMS, a message can be sent to another subscriber to the service, and an acknowledgement of receipt is provided to the sender. SMS can also be used in a cell-broadcast mode, for sending messages such as traffic updates or news updates. Messages can also be stored in the SIM card for later retrieving.

2.4 GSM Architecture

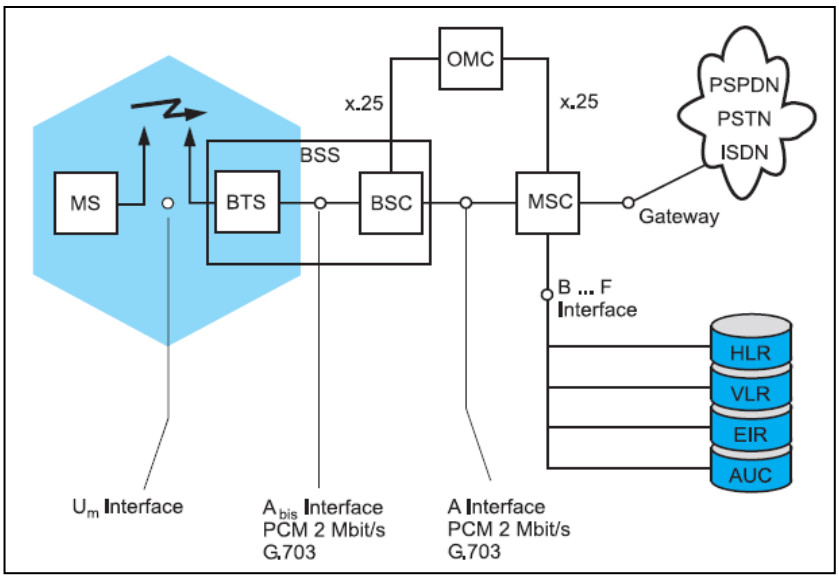

Figure 2.1: GSM architecture

The best way to create a manageable communications system is to divide it into various subgroups that are interconnected using standardized interfaces. A GSM network can be divided into three groups; the mobile station (MS), the base station subsystem (BSS) and the network subsystem. (Marc, 2000) They are characterized as follows:

2.4.1 The Mobile Station (MS)

A mobile station may be referred to as a handset, a mobile, a portable terminal or mobile equipment (ME) which also includes a subscriber identity module (SIM) that is normally removable and comes in two sizes. Each SIM card has a unique identification number called IMSI (international mobile subscriber identity). In addition, each MS is assigned a unique hardware identification called IMEI (international mobile equipment identity).

In some of the newer applications (data communications in particular), an MS can also be a terminal that acts as a GSM interface, e.g. for a laptop computer. In this new application the MS does not look like a normal GSM telephone.

The seemingly low price of a mobile phone can give the (false) impression that the product is not of high quality. Besides providing a transceiver (TRX) for transmission and reception of voice and data, the mobile also performs a number of very demanding tasks such as authentication, handover, encoding and channel encoding.

2.4.2 The Base Station Subsystem (BSS)

The base station subsystem (BSS) is made up of the base station controller (BSC) and the base transceiver station (BTS).

1. The **Base Transceiver Station (BTS):** GSM uses a series of radio transmitters called BTSs to connect the mobiles to a cellular network. Their tasks include channel coding/decoding and encryption/decryption. A BTS is comprised of radio transmitters and receivers, antennas, the interface to the PCM facility, etc. The BTS may contain one or more transceivers to provide the required call handling capacity. A cell site may be omnidirectional or split into typically three directional cells.
2. The **Base Station Controller (BSC):** A group of BTSs are connected to a particular BSC which manages the radio resources for them. Today's new and intelligent BTSs have taken over many tasks that were previously handled by the BSCs. The primary function of the BSC is call maintenance. The mobile stations normally send a report of their received signal strength to the BSC every 480 ms. With this information the BSC decides to initiate handovers to other cells, change the BTS transmitter power, etc.