LOW COST LANDSLIDE ALERT VIA SMS

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Sesi Pengajian : 0 9 / 1 0

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Date :

For my lovely mum and dad, thanks for your sacrifice towards my success.

For my supervisor, Mr. Ridza Azri Bin Ramlee, thanks for all your supports.To my friends who’s helped me lots, I’ll appreciate very much

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Abstrak

Laporan ini dihasilkan oleh pelajar dengan inisiatif dan kreativiti mereka sendiri untuk memastikan laporan yang sempurna dan lengkap dengan semua keputusan projek. Kandungan Laporan ini hasil daripada kajian oleh pelajar untuk memastikan projek dapat disiapkan dalam masa yang ditetapkan. Semua kandungan yang berasal dari rekabentuk projek. Penerangan dari buku lain juga dibenarkan untuk yang digunakan sebagai maklumat tambahan bagi menyelesaikan projek ini.

Projek ini direka bersama satu sistem pengesan yang akan memberikan maklumat dengan cepat kepada pengguna untuk mengelakkan kemalangan yang berlaku semasa tanah runtuh. Projek/sistem ini merupakan alat untuk mengesan pergerakan tanah dan akan menghantar isyarat kepada litar utama yang akan mengawal segala tindakbalas. Projek ini merupakan salah satu cara awal untuk mengesan tanah runtuh dan mengelakkan daripada berlakunya kemalangan semasa kejadian tanah runtuh akibat daripada kelewatan mendapat maklumat berkenaan kejadian tersebut oleh pengguna dan penghuni di dalam rumah.

Antara litar yang digunakan untuk pengesan tanah runtuh ini adalah, litar pengesan, pengawal arus, pengawal mikro 16F877A. litar penggera, dan litar telefon mudah alih. Semua keluaran dibina dan diteliti menggunakan perisian ‘Protel’ dan ‘Proteus’. Keputusan simulasi dan keputusan praktikal yang dihasilkan mestilah sama untuk memastikan ketepaatan ujian tersebut. Kelebihan dari projek ini adalah bahawa kita mampu mencegah kecederaan berlaku semasa kejadian tanah runtuh dan litar utama akan menghantar maklumat dalam masa 25 saat selepas litar sensor mengesan pergerakan tanah. Kami juga menghasilkan satu sistem yang murah dan mampu dimiliki oleh sesiapa sahaja. Kami juga menghasilkan satu sistem amaran awal tanah runtuh mudah alih melalui sistem SMS kepada pengguna yang tinggaldi kawasan berbukit.

Abstract

The report that produce by the student by their own initiative and own creativity to make sure the report are perfect and complete with all the result of the project. This report contents all the study by student to make sure the project finish on time. All the content is come from the design of the project. The content form the another engineering book also allowed to which are use to finish the project.

This project are design a system that going to be a fastest alert to prevent the accident occur by landslide. This system/project is a device that will detect the ground movement and will transmit the signal to the main board. This project is mainly intended to prevent the landslide accident and prevent the late information to the owner and household.

The circuits that use for this landslide alert system are sensor circuit, voltage controlled oscillator, PIC 16f877a microcontroller; siren circuit and hand phone circuit. All the circuit output are constructed and observed using the Protel and Proteus Program. The simulation result and practical result are found to be approbatory equal. The gain of the project is that we are able to prevent the injured occur during the landslide and will sent the information within 25 second after the sensor detect the ground movement. We are also able produce the cheap system and portable landslide alert system via SMS to all resident who live beside or at hill side.

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CHAPTER I

INTRODUCTION

1.1 Project Overview

A landslide (or landslip) is a geological phenomenon which includes a wide range of ground movement, such as rock falls, deep failure of slopes and shallow debris flows, which can occur in offshore, coastal and onshore environments. Although the action of gravity is the primary driving force for a landslide to occur, there are other contributing factors affecting the original slope stability. Landslide disaster is the serious issue especially when related to human live (e.g. Highland Tower Tragedy and the latest one at Bukit Antarabangsa). Most of the case happens without of human awareness. The objective of this project is to design the application for security prevention of Landslide. This system equipped with land slide sensor together with integrated SMS Alert System, and be able to inform quickly to the user and to the responsible authority if the sensor sense any movement of soil structure.

1.2 Problem Statements

1. Lately many landslides incident occurred in Malaysia. In fact it causes to the resident especially loss a lot of wealth and life. This situation affected to the residents living nearby with the hillside. By using this new method, resident will be vigilant with each warning which gave by this system.

2. Nowadays, almost the incident of landslide only realized when it happened, because there is no early-warning given to the public or resident nearest the landslide area. Otherwise through this method, users would be simple get early signal through their mobile phone.

3. The local authority could not do their task nicely because the delay of the information about the incident. Through this method, the local authority will know this incident very fast because this system is communicated further with public emergency hotline.

1.3 Project objective

In order to ensure that the project objectives are met, one should:

1. Be able to design the application for security prevention of Landslide.
2. Be able to provide an early warning to the related party or community.
3. Be able to minimize an effect of the landslides occurrence if it happens.
4. Be able to execute appropriate measures (such as closing the road or issues evacuation order).

1.4 Scope of Wok

This project especially use to different thing together, which is software and hardware:

1. These projects are using **PIC 16F877A** as microcontrollers to control the emergency signal from the sensor were located in the hillside or late old landslide area to send signal to the resident on that area. This microcontroller will affected when the sensor sense the movement of slope forming material include rock, soil and others.

2. The hardware have three different type:
   - **Sensor:**
     This sensor will be located or plant in the hillside to detect the movement of hillside and send the signal to the microcontroller.
   - **Microcontroller circuit:**
     This circuit will program to send the emergency signal to the telephone circuit. By using this microcontroller, it will programmed auto detect and send the emergency signal.
   - **Mobile phone circuit:**
     This circuit actually response or activated when the microcontroller detect the signal from sensor and this circuit will send the text message to the emergency hotline (**999**).

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

Literature review is a chapter that will explain in detail about the research that has been done to obtain information about the concept of this project. .This is because by understanding of the process, it will help in preparing this project. For implementation of this project, several components have been employed and need to be understood thoroughly. This chapter covers study the working of Short message service (sms) System, PIC 16f877A, General packet radio services (GPRS) module, vibrator sensor and Infra Red (IR) sensor. All processes will be done through the resources available from books, journals, technical reports, forums, websites and others. Its main purpose is to acquire knowledge and ideas about topics that have been issued and unaware of the weakness and strength of a field study that.

2.2 Short Message Service (SMS)

Short Message Service (SMS) is a communication service standardized in the GSM mobile communication system, using standardized communications protocols allowing the interchange of short text messages between mobile telephone devices. SMS text messaging is the most widely used data application on the planet, with 2.4 billion active users, or 74% of all mobile phone subscribers sending and receiving text messages on their phones. The SMS technology has facilitated the development and growth of text messaging. The connection between the phenomenon of text messaging and the underlying technology is so great that in parts of the world the term "SMS" is used as a synonym for a text message or the act of sending a text message, even when a different protocol is being used.

"SMS as used on modern handsets was originally defined as part of the GSM series of standards in 1985 as a means of sending messages of up to 160 characters (including spaces) to and from GSM mobile handsets." [2, 7]

Since then, support for the service has expanded to include other mobile technologies such as ANSI CDMA networks and Digital AMPS, as well as satellite and landline networks. Most SMS messages are mobile-to-mobile text messages, though the standard supports other types of broadcast messaging as well.

2.2.1 Message size

Transmission of short messages between the SMSC and the handset is done whenever using the Mobile Application Part (MAP) of the SS7 protocol. Messages are sent with the MAP mo- and mt-ForwardSM operations, whose payload length is limited by the constraints of the signaling protocol to precisely 140 octets (140 octets = 140 * 8 bits = 1120 bits). Short messages can be

encoded using a variety of alphabets: the default GSM 7-bit alphabet (see GSM 03.38 for details), the 8-bit data alphabet, and the 16-bit UTF-16 alphabet. [**3]**

Depending on which alphabet the subscriber has configured in the handset, this leads to the maximum individual Short Message sizes of 160 7-bit characters, 140 8-bit characters, or 70 16-bit characters (including spaces). Support of the GSM 7-bit alphabet is mandatory for GSM handsets and network elements,[28] but characters in languages such as Arabic, Chinese, Korean, Japanese or Cyrillic alphabet languages (e.g. Russian, Serbian, Bulgarian, etc) must be encoded using the 16-bit UTF-16 character encoding (see Unicode). Routing data and other metadata is additional to the payload size. [3]

Larger content (Concatenated SMS, multipart or segmented SMS or "long sms") can be sent using multiple messages, in which case each message will start with a user data header (UDH) containing segmentation information. Since UDH is inside the payload, the number of characters per segment is lower: 153 for 7-bit encoding, 133 for 8-bit encoding and 67 for 16-bit encoding. The receiving handset is then responsible for reassembling the message and presenting it to the user as one long message. While the standard theoretically permits up to 255 segments,[29] 6 to 8 segment messages are the practical maximum, and long messages are often billed as equivalent to multiple SMS messages. See Concatenated SMS for more information. Some providers have offered length-oriented pricing schemes for SMSs; however, the phenomenon is disappearing. [4]

2.2.2 Short message service technical realization (SMSC)

The Short Message Service – Point to Point (SMS-PP) is defined in GSM recommendation 03.40,GSM 03.41 defines the Short Message Service - Cell Broadcast (SMS-CB) which allows messages (advertising, public information, etc.) to be broadcast to all mobile users in a specified geographical area.

Messages are sent to a Short Message Service Centre (SMSC) which provides a store-and-forward mechanism. It attempts to send messages to their recipients. If a recipient is not reachable, the SMSC queues the message for later retry. Some SMSCs also provide a "forward and forget" option where transmission is tried only once. Both Mobile Terminated (MT), for messages sent to a mobile handset, and Mobile Originating (MO), for those that are sent from the mobile handset, operations are supported. Message delivery is best effort, so there are no guarantees that a message will actually be delivered to its recipient and delay or complete loss of a message is not uncommon, particularly when sending between networks. Users may request delivery reports to confirm that messages reach the intended recipients, either via the SMS settings of most modern phones, or by prefixing each message with *0# or *N#. [5]

2.2.3 **Interconnectivity with other networks**

Message Service Centres communicate with the Public Land Mobile Network (PLMN) or PSTN via Interworking and Gateway MSCs.Subscriber-originated messages are transported from a handset to a Service Centre, and may be destined for mobile users, subscribers on a fixed network, or Value-Added Service Providers (VASPs), also known as application-terminated.

A subscriber-terminated message are transported from the Service Centre to the destination handset, and may originate from mobile users, from fixed network subscribers, or from other sources such as VASPs.It is also possible, on some carriers, for non-subscribers to send messages to a subscriber's phone using an E-Mail to SMS gateway. Additionally, many carriers, including AT&T, T-Mobile, Sprint, and Verizon Wireless, offer the ability to do this through their respective websites.

Sending a message this way is free but subject to the normal length limit. Text enabled fixed-line handsets are required to receive messages in text format. However, messages can be delivered to non-enabled phones using conversion. Short messages can also be used to send binary content such as ringtones or

logos, as well as Over-the-air programming (OTA) or configuration data. Such uses are a vendor-specific extension of the GSM specification and there are multiple competing standards, although Nokia's Smart Messaging is by far the most common

An alternative way for sending such binary content is EMS messaging which is standardised and not dependent on vendors. Today, SMS is also used for M2M (Machine to Machine) communication. For instance, there is an LED display machine controlled by SMS, and some vehicle tracking companies use SMS for their data transport or telemetry needs. SMS usage for these purposes is slowly being superseded by GPRS services due to their lower overall costs. GPRS is also offered by some smaller Telco players as a route of sending SMS text to help reduce the cost of SMS texting internationally. [6]

2.3 Microcontroller

In order to design the circuit, a PIC 16F877A is used in this project. It features 200 ns instruction execution, 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, a synchronous serial port that can be configured as either 3-wire SPI or 2-wire I2C bus, a USART, and a Parallel Slave Port. PIC 16F877A is very popular because it is very cheap and it is also very easy to be assembled. Additional components that you need to make this IC work are just a 5V power supply adapter, a 20MHz crystal oscillator and 2 units of 22pF capacitors. The advantage of this IC is it can be reprogrammed and erased up to 10,000 times. Therefore it is very good for new product development phase. See Appendix 1

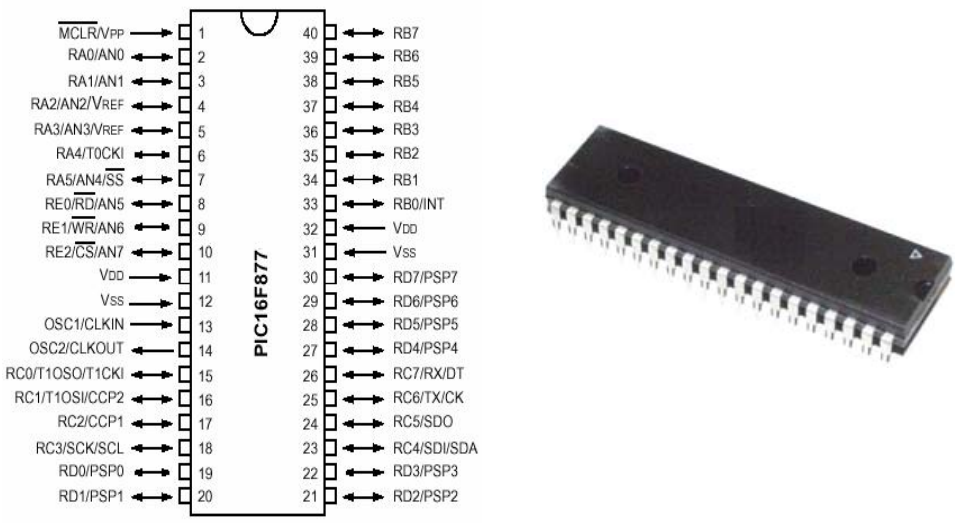

Figure 2.1: Microcontroller PIC 16F877

Device	Program FLASH	Data Memory	Data EEPROM
PIC16F874	4K	192 Bytes	128 Bytes
PIC16F877	8K	368 Bytes	256 Bytes

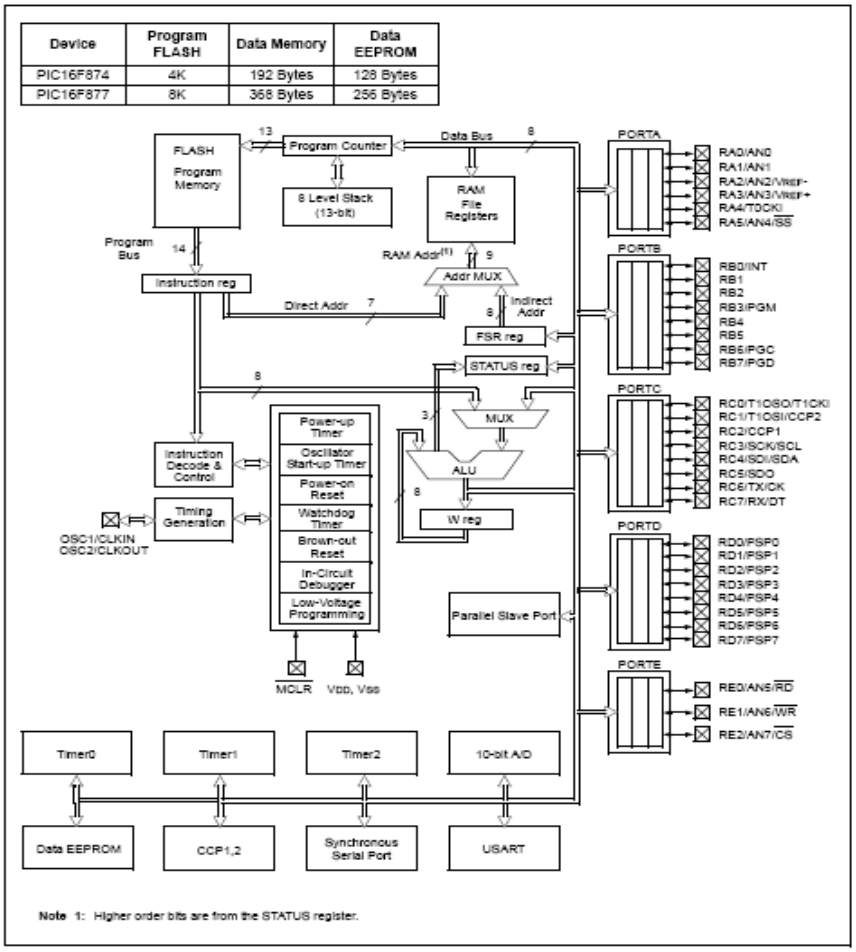

Figure2.2: Block diagram for PIC 16F877