# GSM & GPS BASED SCHOOL KIDS TRACKING SYSTEM

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**BORANG PENGESAHAN STATUS LAPORAN**

**PROJEK SARJANA MUDA II**

**Tajuk Projek** : GSM & GPS BASED SCHOOLS KIDS TRACKING SYSTEM
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**Sesi Pengajian** :

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Supervisor's Name     : MDM. SITI HUZAIMAH BINTI HUSIN

Date                    :

Dedicated with deepest love to my beloved parents for their devoted caring, understanding and support, and my beloved brothers, sis-in-law, nephew and friend for their encouragement and unlimited love.

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# ABSTRACT

This project converses about the child tracking system via GPS (Global Positioning System) and using GSM (Global System for Mobile Communication). In this application, the GPS is a radio navigation system that is uses to determine the exact location (longitude and latitude) of a child and to track the child in a particular area. Then, the information of the position will be delivers to hand phone via GSM modem. The GSM modem is programmed to enable two way communications between the modem and child to determine the child's position. The main function of this system is to ensure that the user will be inform or know the child's whereabouts in any time. This tracker will place with child, once the child is out the specified area, the tracker will be triggered and then send message to the user. The tracker can be triggered using a Short Messaging System (SMS) where the user is able to communicate remotely to the GSM using a hand phone. This tracker will help the school authority very significantly and thus reduce the criminals' cases can be reduced and meet the slogan of "safety come first".

# ABSTRAK

Projek ini membincangkan secara terperinci tentang penjejakan kanak-kanak melalui system GPS (Global Positioning System) dan menggunakan GSM (Global System for Mobile Communication). Dalam aplikasi ini, GPS merupakan satu system kedudukan sejagat yang digunakan untuk menentukan lokasi sebenar (longitud dan latitud) seseorang kanak-kanak dan untuk mengesan kanak-kanak salam suatu kawasan tertentu. Justeru itu, maklumat atau lokasi kedudukan kanak-kanak tersebut akan disampaikan kepada pengguna telefon bimbit melalui modem GSM. Modem GSM diprogramkan untuk membolehkan dua komunikasi hala antara modem dan kanak-kanak untuk menentukan kedudukan kanak-kanak. Fungsi utama system ini adalah untuk memastikan bahawa pengguna akan diberitahu tentang kedudukan beradanya kanak-kanak pada semasa ke semasa. Tracker ini akan dilekatkan pada kanak-kanak. Sekali kanak-kanak tersebut terkeluar dari kawasan yang ditentukan, tracker akan dicetuskan dan kemudian menghantar mesej kepada pengguna. Tracker boleh dicetuskan menggunakan Sistem Pesan Ringkas (SMS) di mana pengguna mampu untuk berkomunikasi jarak jauh kepada GSM dengan mengunakan telefon bimbit. Tracker ini akan membantu pihak berkenaan dengan ketara, di samping mengurangkan kes penjenayah dapat dibanteraskan dengan memenuhi slogan "Keselamatan Diutamakan".

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# CHAPTER I

## INTRODUCTION

In this project, the tracking system will used GPS (Global Positioning System) and GSM (Global System for Mobile Communications) as the tracking system tools. GPS is a radio navigation system that allows us to determine the exact location (longitude and latitude) by calculating the time difference for signals from different satellites to reach the receiver.

GSM is a leading digital cellular system, which digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot.

The purpose of this project is to keep track of the kids when they are at school area. This small, lightweight device is a simple and can be carried or attached to child's clothing, belt, or smart cards.

At the end of this project, a device which is convenient to the school authority to guard the kids will be produced.

## 1.1    Objective

The objectives of this project are:
- To monitor and track the School Kids at school area by using the tracking system.
- To ensure the safety of the school kids in kinder garden /school area.

## 1.2    Problem Statement

This project was carried out due to the criminal such as kidnapped, child missing that happens frequently nowadays at school area. Most of the time, the kidnapping occur due to the primary school's kid like to play not only inside of the school area but also outside of the school area. Therefore, the school authority could not guard the entire student at the same time and lead to this criminal occurred. One of the examples that show the kidnapping case occurred on school kid shown in Figure 1.0.



**Police puzzled over reports on abduction**

SHAH ALAM, Wed. — Police are puzzled over media reports on the purported abduction of a girl in Taman Melawati in Hulu Klang yesterday because of the absence of any victim.

"Until this afternoon, no schoolgirl has been reported missing; and no missing person report has been filed in the area," said State Criminal Investigation Department chief Senior Assistant Commissioner (II) Khoo Ah See.

The purported abduction was frontpaged by two Bahasa Malaysia tabloid newspapers today.

Khoo confirmed that a nine-year-old girl had lodged a police report about another girl being abducted by three men in Taman Melawati yesterday.

"In the report, the girl claimed she was leaving her school together with another girl at noon when three men in a blue Proton Saga car tried to abduct them.

"The girl, who is a pupil of Sekolah Kebangsaan Taman Melawati, claimed she

escaped by biting the hand of the man who tried to grab her, but the other girl was bundled into the car," said Khoo.

The girl told police she did not know the other girl's name and address, but believed that she was a Standard Three pupil.

Police had earlier classified the case as kidnapping but a check with the school showed all absentee pupils were accounted for and no missing person report had been lodged.

"Only Standard Two and Three pupils attended school in the afternoon session at the school and there were four absentees yesterday," said Khoo.

Khoo urged the Press to refrain from carrying reports on kidnappings without verifying with the police.

"We want to avoid panic among parents with school-going children. Moreover, premature reporting of kidnappings could cost the victims their lives," he reminded the media.

Figure 1.0  One of the abduction cases from newspaper

Based on the latest statistic that published by The New Straits Times, it show that the abduction cases is increasing again in 2011. The data was collect until September, 2011, thus the abduction or missing child cases will keep on happen. Unfortunately, there are 5 cases were solved only among the 15 cases. This show that how serious of our country on the abduction or missing child cases. The statistic of missing child from 2009 year to 2011 year (until September) as shown in Figure 1.1.
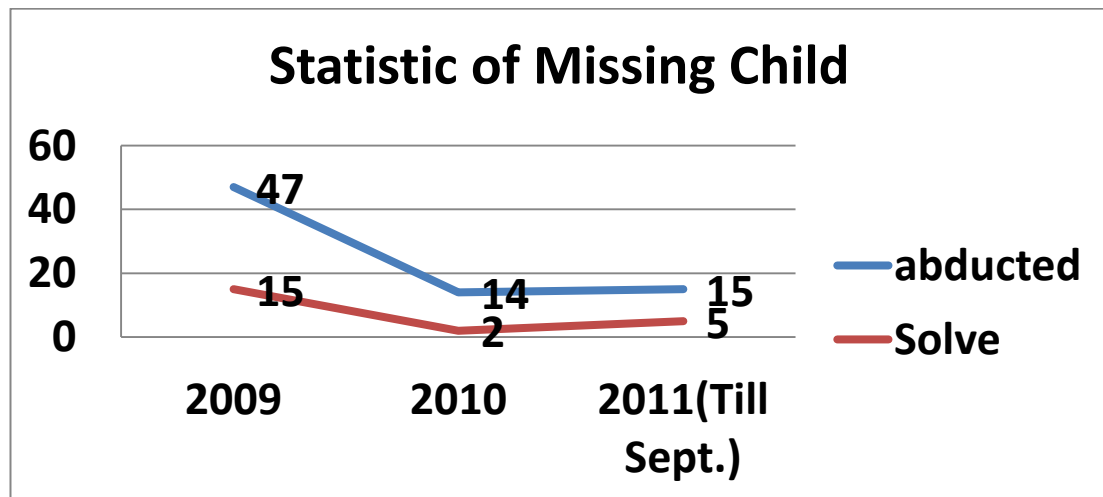


**SOURCE: BUKIT AMAN POLICE HEADQUARTERS**
**by THE NEW STRAITS TIMES,21<sup>st</sup> DEC 2011**

Figure 1.1  The statistic of missing child from 2009 until 2011 (Sept)

**Interview**

DATE : 19.12.2011
TIME: 8.00AM
LOCATION : TASKA KASIH SAYANG EMAS, MALACCA
INTERVIEWEE: MADAM SARA

The Taska Kasih Sayang Emas is located in Bukit Beruang, Malacca. There are 3 classes and 20 kids in a class. Their age is 4, 5 and 6 years old. Besides that, 7 teachers worked in this kinder garden. An interview session with the person in

charge, Madam Sara has been conducted on 19th December 2011. Madam Sara is 53 years old and very experience teacher and taska trainer in kinder garden, who have join in early educational field for 18 years. This teacher realized that the safety is very important for a kid because there are too much sadness case of missing child occurs. After a short introduction regarding the project of GPS and GSM based school kids tracking system and this kinder garden owner seems that very interested on it. Lastly, this teacher believed that this tracking system will enhance the security in the kinder garden area. There is front view of the Taska Kasih Sayang Emas as shown in Figure 1.2.



Figure 1.2  The front view of Taska Kasih Sayang Emas, Malacca

During the interview session with Madam Sara, the photo was taken down as shown in Figure 1.3.

Figure 1.3  The interview with Madam Sara (Person in charge)

## 1.3    Scope

Along this project, the major items that will be used are GPS, GSM and as the brain PIC 18F2550. The GM 862-GPS is a device which combination with GPS and GSM will be used for this project. The GSM is programmed by using the AT commands. And then, the PIC 18F2550 microcontroller plays an important role that is making a connection between the GPS and GSM. So, data that received by the GPS will directly send to GSM and then the GSM modem send the data / information to the Personal Computer (PC) and send short message service (SMS) to mobile phone. The microcontroller will be programmed to segregate the information that obtained from the GPS, only the values of the latitude and longitude of a point will be collected as shown as in Figure 1.4.
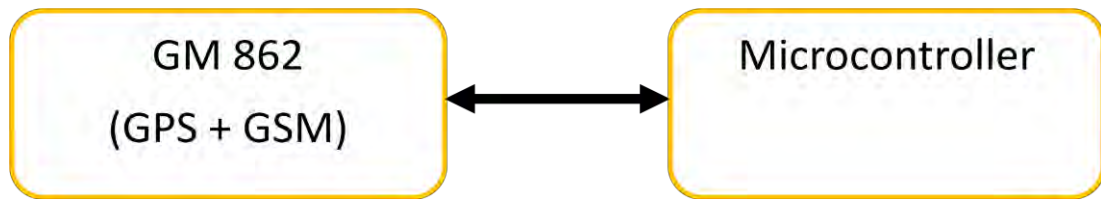
Figure 1.4 Structure of GPS and GSM tracking system

## 1.4    Project methodology

Along this project, this system is designed with GPS antenna, GPS receiver, Microcontroller, Mobile or GSM modem and personal computer or cellular phone. The overall of this system will be divided into two parts, which are the transmitting side and receiving side. Block diagram in Figure 1.5 below is showing how the system operations.
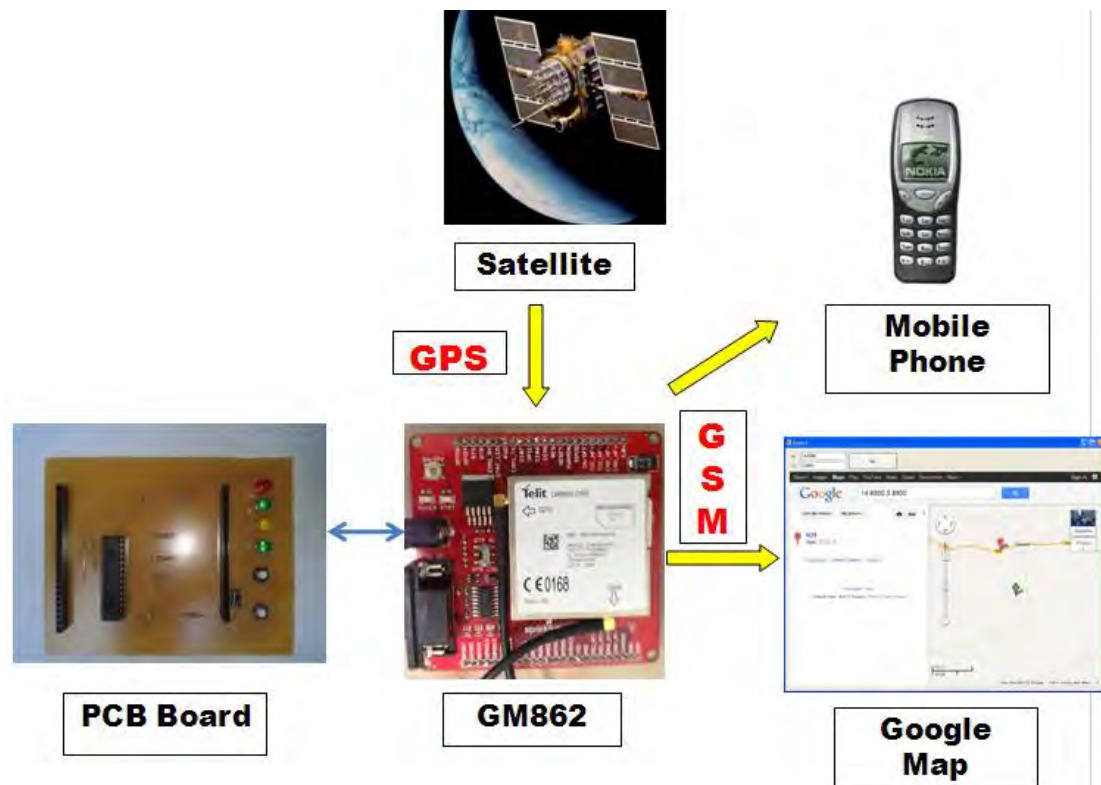


Figure 1.5 The architecture of the system

## 1.5    Report Structure

This report consists of five chapters which are introduction, literature review, methodology, result and conclusion.

In chapter I, it will introduce the brief idea of the project. It detailed the background of the project; clarify the objective, the problem statement and scope of the project.

In chapter II, the project's background is discussed. The research and information of the project method and theory was discussed from different resources such as newspaper, journal or reference book. Besides that, the best device will be chose after the comparison and the system and device will be explained detailed in this chapter.

In chapter III, it will discuss about the methodology or procedure that taken throughout the project. This chapter includes schedule or steps that the project must be completed on time, detailed reports of studies done to achieve the objectives. This methodology chapter have three main parts, which are architecture project, flow chart of the project and the Gantt chart.

In chapter IV, all the results such as simulations, data collection and analysis that are obtained were discussed in detailed. It figured out tests that had been conducted and stages to successful rate of the project.

In chapter V, this is the last chapter that the conclusion is detailed out by including the project finding, analysis achievement and conclusion of the research implementation. This chapter also discussed the project enhancement.

# CHAPTER II

# LITERATURE REVIEW

In this chapter, the method and theory will be discussed regarding to this project which reveals the knowledge that gained via resources such as reference book, newspaper, journal, articles and documentations regarding application and research work. The study is very essential in order to get more understanding in embedded system, GPS tracking system, PIC (Peripheral Intelligent controller), GSM modem and GPS modem. Besides that, the theory understanding is very vital which lead to this project and the project would relate into research and available theory and application.

## 2.1 Project Researches

In this part, the research about method and the devices of this project will be discussed. Every theory and devices that will be compared among it and the best and most suitable will be selected which will use in this project.

### 2.1.1 Embedded System

Embedded system is the real-time computing constraint where the real-time programs must guarantee response within strict time constraints. It is the embedded system that complete with hardware and mechanical parts. In general, it has two categories in embedded processors: microprocessors ($\mu$P) and micro controllers ($\mu$C). There are different tasks in embedded systems which are depending on programming.

The purpose of using embedded system is to reduce size; cost of product; increase the reliability and the performance.

An Embedded System is a microprocessor based system that is embedded as a subsystem in a larger system. On the other hands, a general purpose computer such as a personal computer (PC) is designed to be flexible and to meet a wide range of end-user needs. Embedded systems control many devices in common used nowadays. [1] The characteristic for embedded systems are designed to do some specific task, rather than general purpose computer can do multiple tasks. Some embedded system has the real time performance constraints which met with the safety and usability reason. Embedded system allowing the system hardware to be simplified to reduce the cost even there is low or no performance requirements. Besides that, embedded system is not always standalone devices because it consists of small, computerized parts within a larger device that have more general purpose.

In general, the embedded system has microprocessor (Pentium or Athlon), memory (DRAM DIMM module and onboard SRAM), input or output interface (keyboard, mouse etc.), image, audio or video, peripheral communication interfaces and busses (USB, CAN etc.) as shown in Figure 2.0. Since the embedded system are designed to do some specific task, rather than be a general-purpose computer for multiple tasks. Thus, the program instructions for embedded system that have been written are stored in ROM (Read-only Memory) or flash memory chips. It runs with limited computer hardware resources with little memory, small or non-existent keyboard or screen. Besides that, embedded system controls have many portable devices such as digital watches and MP4 players. Nowadays, there have larger portable installation devices like traffic light, factory machine controllers and so on. With a single microcontrollers chip, the complexity varies from low to very high with multiple units, peripherals and networks.
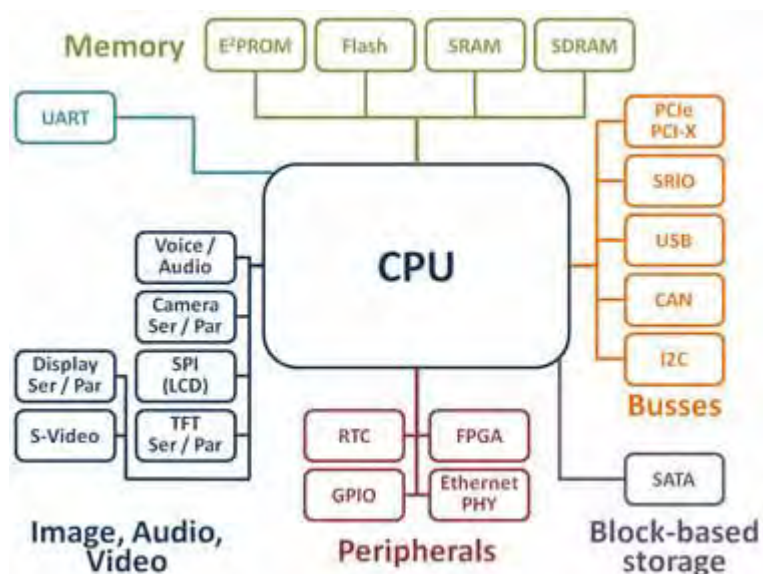
Figure 2.0 A typical embedded system block diagram

### 2.1.1.1    Microcontroller

Firstly, a microcontroller can be defined as a microcomputer which is a variation of a microprocessor. In general, a microprocessor which is combines the processor core (CPU), some memory, and I/O (Input/output) lines, all in a chip. The microcontroller nowadays not only widely used in electrical or electronic engineering, but in technician area too. This is because of its versatility and enormous application. The earlier version microcontrollers just have memory and digital input and output, but the device family becomes more advanced. The microcontroller getting more power efficient and more features.

For many microcontrollers, the programming can be built at low price; even they built in to the final application circuit eliminating the need for a separate circuit. This requirement can be simplified is the availability of microcontrollers with the SRAM (Static Random-Access Memory) and EEPROM (Electrically Erasable Programmable Read-Only Memory) for control store, which allow program still can be developed without have to remove the microcontroller for the application circuit. Microcontroller is a single silicon chip that can be viewed as a set of digital logic integrated circuit. This chip has the specific application only.