



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**DEVELOPMENT OF REMOTE CHILD TRACKING  
SYSTEM THROUGH GPRS NETWORK**

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronic Engineering Technology (Telecommunication) with Honours.

By

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## **DECLARATION**

I hereby, declared this report entitled “Development of Remote Child Tracking System through GPRS Network” is the results of my own research except as cited in references.

Signature :  
Author`s Name : Halimatun Saa`diah bt Saifuddin  
Date :

## **APPROVAL**

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of UTeM as a partial fulfilment of the requirements for the degree of Bachelor of Electronic Engineering Technology (Telecommunications) with Honours. The member of the supervisory as follow:

.....

(Ts. Zahariah binti Manap)

## ABSTRAK

Selepas melihat dan meneliti banyak cerita mengenai kanak-kanak yang diculik atau tidak sampai ke rumah dengan selamat. Kebanyakan kisah-kisah itu mempunyai pengakhiran tragis. GPRS merupakan satu teknologi yang digunakan dalam sistem penjejakan kanak-kanak. Projek ini menyediakan satu penyelesaian yang efektif dengan menggunakan teknologi GPRS berkenaan isu pengawasan ibu bapa terhadap anak-anak. Dengan menggunakan sistem ini ibu bapa dapat mengesan dimana anak-anak mereka berada. Sistem pengesanan kanak-kanak ini terdiri daripada satu sistem tanpa wayar yang boleh dipakaikan kepada kanak-kanak. Terdapat tiga perkara yang penting dalam menjalankan projek ini. Pertama adalah pemilihan modul GPRS yang sesuai. GPRS yang sesuai perlu dipilih dalam usaha untuk mencapai spesifikasi yang dikehendaki, Kedua ialah pelaksanaan perisian untuk mengintegrasikan Sistem Pengesanan Kanak-Kanak menggunakan Arduino UNO mikropengawal untuk berhubung GPRS modul untuk mengawal sistem.. Terakhir, pilihan modul GPS yang sesuai untuk mencapai spesifikasi yang diperlukan. Sistem penjejakan kanak-kanak menggunakan teknologi GPRS diantara ibu bapa (penerima) dan kanak-kanak (penghantar) dalam penghantaran data. GPRS modul akan berfungsi dengan menghantar maklumat untuk mencari kanak kanak tersebut melalui aplikasi Android kepada ibu bapa. Dengan menggunakan aplikasi Android maklumat kanak kanak dihantar dengan lebih efektif. Selain itu, dengan menggunakan aplikasi Android dapat menjimatkan kos. Ia juga merupakan satu sistem tanpa wayar yang selamat. Dari analisis, luar bangunan dengan cuaca yang baik adalah lebih baik daripada dalam bangunan dengan cuaca yang baik kerana ketepatan peranti GPS kurang daripada 26m dan 65m untuk 50% dan 90% masa masing-masing. Sementara itu, dalam bangunan dengan cuaca buruk dan luar bangunan dengan cuaca buruk, ketepatan peranti GPS kurang daripada 57m dan 117m untuk 50% dan 90% masa masing-masing.

## **ABSTRACT**

After seen and perused numerous stories about children who are kidnapped or not reaching homes safe. Most of the stories have had tragic endings. Then, with child tracking system using GPRS is basically to assist parent to keep an eye on the children by using GPRS technology. GPRS is a technology that used in child tracking system. Using this system parents can track where their children are located. In this project, a wearable child module of the tracking system is developed. Moreover, the location of the child location also can track with help of a GPS module. Then, the location of child is display in an Android application. This child tracking system is made up of a wireless that can be applied to children. There are three important things in carrying out this project. First is the selection of the appropriate GPRS module. The appropriate GPRS should be selected in order the needed specification. The second one is the software implementation to integrate the child tracking system using Arduino UNO microcontroller to enable GPRS to control the system. Lastly, the appropriate GPS module selection to achieve the required specifications. Child tracking systems use GPRS technology between parents (recipients) and children (senders) in data transmission. GPRS modules will work by sending information to find the child through the Android application to parents. By using the Android application child's information can have delivered more effectively. Additionally, using the Android application can save cost. It allows for a secure and wireless connection. From analysis, the outdoor building in good weather is better than indoor building in good weather, the accuracy of GPS devices to less than 26m and 65m for 50% and 90% of the time respectively. Meanwhile, indoor building in bad weather and outdoor building in bad weather, is the accuracy of GPS devices to less than 57m and 117m for 50% and 90% of the time respectively.

# **DEDICATION**

To my beloved parents,

(Mr Saifuddin Bin Saroni and Mrs Rosnahniah Binti Yaacob)

## **ACKNOWLEDGEMENT**

First of all, I would like to express my gratitude to the Al-Mighty, ALLAH S.W.T for the blessing, my parents and family members for their priceless support, encouragement, constant love, valuable advices and their understanding in completing this project.

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# **LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE**

- FCC - Federal Communication Commision
- GPS - Global Positioning System
- GSM - Global System for Mobile Communication
- GPRS - General Packet Radio Service
- MIT - Massachuesetts Institue of Technology

# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

Child tracking system is broadly utilized all over the world to pledge parents that their children are sheltered from doubts activities. The proposed system includes with emergency button. When the child press the emergency button the location information their kid is sent to parent's smartphone through Android application. Parent smartphone must have internet. The expanding prevalence of children meandering has many parents extremely concerned. We have seen and perused numerous stories about children who are kidnapped or not reaching homes. Most of the stories have had tragic endings.

To overcome this problem, an application called development of child tracking system through General Packet Radio Service (GPRS) network is developed. GPRS network is a packet-based wireless communication service that provides data rates and consistent association with the internet for smartphone. The child module includes Arduino UNO module, Global Positioning System (GPS), GPRS, and sim card. SKM53-GPS is used to get the kids location information and the GSM/GPRS has been used to transmit the location to the parent smartphone via the portable system. Other than that, the Arduino UNO system also used in this system to operate two modules and to give an effectively versatile stage to any required application. Thus, SKM53 GPS module is used to get kids coordinate and GSM/GPRS used for transmitting the location information to the parent smartphone via mobile system. These future tracking devices can be worn as wrist watches or anklets.

## 1.2 Problem Statement

Childs missing issue has caused worries in the worldwide after the murder of Nurlin Jazlin in 2007 (Theage.com.au, 2016). However, the missing case, especially in Malaysia, is still predominance especially in Johor, Selangor and Kedah which are the states with the highest number of missing children case. There are a total number of 2015 child reported missing in 2014, 1782 cases reported in 2015 and 140 cases was reported just on January of this year. (Rahim, 2016). Those figures have shown the seriousness of missing case in Malaysia that needs parent concerns regarding to the cases. Parents hardly to keep a watch on their child without the utilization of technology, especially when the child is in the outdoor. The parent even cannot avoid the negligence that will make by us in the future day.

The proposed a system is useful to track children's location information for security purpose. The proposed remote child tracking system consists of a wearable safety device a which is equipped with a emergency button that children's can used when them is not safe environment then sends location information to parent's smartphone via GPRS network. When child is press the emergency button module triggers the device immediately. The location of the child module is tracked with the help of GPS. GPS can trace the coordinate and send to the parent smartphone. This system can make better use of Arduino UNO microcontroller. Among of existing tracking system are different with the proposed device. It uses real time which is satellite will update the positioning of target for every movement. The disadvantages of the real time tracking system are high usage network, high billing, uses large storage and update the information.



### **1.3 Objectives**

The aim of this project to develop a child tracking system through GPRS network. The objective of this project are:

- i. To develop a wearable child module of the tracking system.
- ii. To track the location of the child module with the help of a GPS module.
- iii. To display the location of the tracked child module on an Android application

### **1.4 Scope**

The system will be targeted for the parent with child at the age range of 5 to 9 years old. Besides that, in this project GPRS are used as communication module between child module with parent's smartphone but GPRS coverage in one location can drop because of the distance factor is very limited. The farther away from a base station, the more GPRS performance drops. Then, GPRS also developed for enabled mobile phone to communicate with child module by using internet. Other than that, GPS module also used in this project. Moreover, with the emergency button as a input can make this module efficient to children's. GPS module are used to track the child location and provide longitude and latitude, but GPS just only work in a good view of the sky. It cannot work at underground or in a well-shielded building away from openings. When child press the emergency button, the emergency alert can directly send to parent's smartphone via Blynk server then the location of tracked child's displayed in Android application.

# **CHAPTER 2**

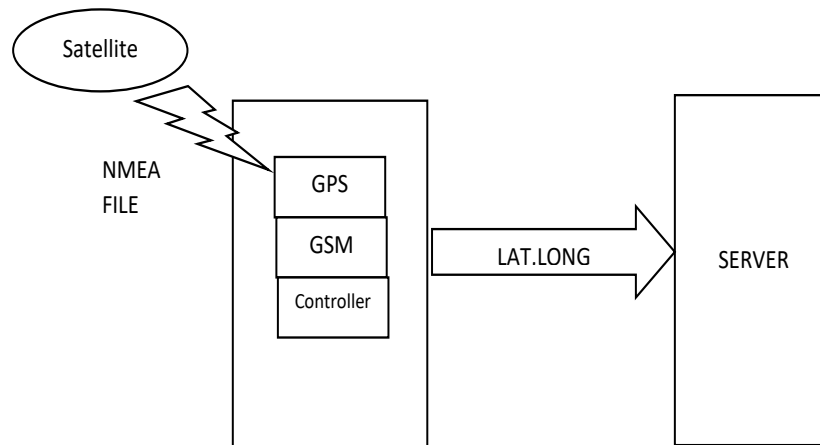
## **LITERATURE REVIEW**

### **2.1 Introduction**

The lack of supervision from the parent had increased the number of missing child. These days, there are many cases of lost occurred at the public area such as at the mall, amusement park and even at the playground. In such crowded area, parents are unable to constantly control the whereabouts of their attention which may lead them being for away from their parents and get lost. Parents are frequently worried about their child moving out of their intentional location like school, playground etc. At that point, with child monitoring it can assist parent to supervise the child when they are out of sight, but the parent has no idea whether the child is still wearing the module, or it is left somewhere behind. Parents will be unable to keep their children in sight all times, but with the accompanying developments empowers enables them to track their area wherever. Numerous emerging products focus on children. With either existing tracking technology or that which one day may discover onto the retail shelves.

### **2.2 Overview of Child Tracking**

A few types of monitoring and tracking system exist depending upon its resolution. The author in (Shree, 2016) states that the most common application of tracking system are monitoring the behaviour of person, things or data space and time. The author also said based on IOT (Internet of Things) digital technology an Android based resolution can be used to help parents to tracks their children in real time. The essential component of this application is to get the child location without its communication in the process with direct and practical strategy, done by utilization of GSM and SMS. The proposed solution takes the benefit of the location services on providing by GSM however by using GPRS a server is made which will gather everyone the data information produced and send to the same server. Figure 2.1 shows that how the system of child tracking process in this article.



**Figure 2.1:** The system of Child Tracking

The author in (Xaviour, 2014) developed an effective and enhanced environmental resource tracking solution and keep significant mobile resources by progressively adjusting the tracking structure by methods for setting mindful customized course learning techniques. This system utilizes Android based mobile phones for the software. Child Tracking System is an android application that assistance parents to monitor their child's mobile phone activities. Other than that, child tracking system application also can enable parents to repossess the details of incoming or outgoing calls and messages of their children at the same time when they send or receive it. Despite the fact child can delete all the call log and SMS details manually however this application stores all the deleted data information in the server. Furthermore, by using GPS technology is one of the efficient method use to child tracking system. The Global Positioning System (GPS) is a space- based satellite navigation system that provides location and time data in every single weather conditions, anyplace on or near the Earth.

## **2.3 Technology in Child Tracking System**

Location tracking isn't focus one technology only. Rather, to create the system that track inventory, livestock or vehicle tracking by using a few other technologies. Comparable systems can be created to deliver location-based services to wireless devices. The technologies that commonly used in location tracking are Global Positioning System (GPS), Radio Frequency Identification (RFID) and Wireless Local Area Network (WLAN)

### **2.3.1 Global System for Mobile Communication (GSM)**

In (Omer & Abdullah, 2013; Punetha & Mehta, 2014; Satish, Nandlal, & Sandip, 2015; ShubhangiP.Mangkar, MonaliPawar, 2016) the authors proposed a system a SMS created solution using GPS system to aid parents to track their children location information in real time. They used a technology based on GSM system is which is related to network services. When the smart phone does not support internet connectivity, so SMS service can be used to get the data information. Longitude and latitude of the child location can be providing by the GPS then child side and the parents side also can communicate through the SMS (Short Message Service). Meanwhile, Punetha et all (2014) not only proposed the tracking system for child but can use to track pets, elderly, disabled and vehicles. Furthermore, the authors also said this tracking system can give a minor shock to the carrier and alarm indicating the crossing of the side-line. Then, any objects can be tracked and the exact location on remote area also can be provide by using this device.

The author in (Katore, Ghogare, Shinde, Ghule, & Tamhane, 2015) presented a mobile application-based solution that can help parents to track the real time location of the children. Then, this application used GPS and SMS found in Android phones. Other than that, by using this application parents also can to see the browsing history of the children. To get the location of child, parent's device can send a request location SMS to child device. Once upon the parent's device request the location of child so the function of child device is to reply the GPS position through SMS. On the child devices no need of internet services connectivity.

In (Kumar, Ravi, Balachandran, Reshma, & Suresh, 2016) proposed system includes monitoring of the child's movement to and from school. The data information that missing child is sent to their parents directly when anything bad happen however not only the information about the child missing can be sent. Other than that, this system can trigger the child is crying and sent directly to parent's Android mobile phone through SMS. The technology that they used is ARM7 microcontroller, Global positioning system (GPS), Global system for mobile communication (GSM) and voice playback circuit. Therefore, to detect the child position this system used the GSM module and GPS module provide the longitude and latitude of the child and send directly to parent's mobile phone. Whenever, the child presses the point switch, so parents can receive the message directly if the point child cry matches with cry voice in voice recognition module.

The author in (Loganathan, 2017) proposed this tracking system includes a geo fencing campus, a child device and a parents. The location and the child movements can be track by using the geo fencing campus. Parents device can receive a message when the child is out of the campus. The authors also presented a sender to detect the child emotions. (Loganathan, 2017) used technology Raspberry Pi which transmit data with Bluetooth.

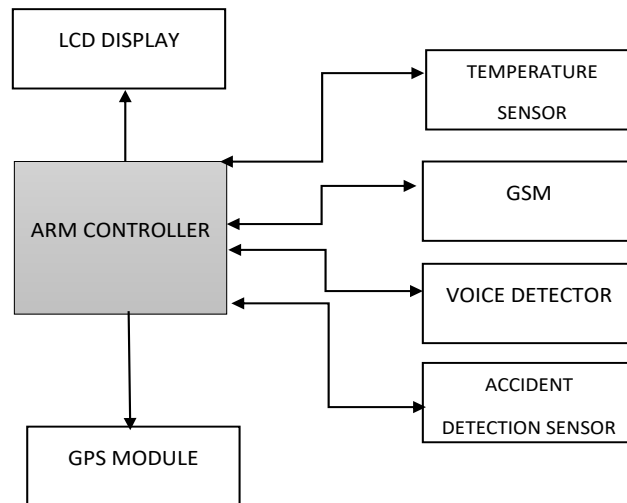
To composed GSM must be starting with a complete system, including air interface, network architecture, interfaces and services. In addition, no similarity with existing analog system to design the GSM. The primary reason is that GSM is the establishment of various further developed innovations, for example, the General Packet Radio Services (GPRS). A comprehension of GSM is important to understand those technologies.

The authors in (Omer & Abdullah, 2013; Satish et al., 2015; ShubhangiP.Mangkar, MonaliPawar, 2016) proposed a solution for parents to track their children location in real time based on SMS and using GPS system. To track the location of child isn't only used GPS but also used a GSM module. Parents enable to get their child's location on a real time map. Parents can monitor their child by using this tracking application with help of smart phones GPS and SMS. The authors

in(Omer & Abdullah, 2013; Satish et al., 2015) used a same method and technique to implement a child tracking system. The latitude and longitude location of child is provided by the GPS. Other than that, parent side and child side can communicate through the SMS (Short Message Service). SMS service used while smart phones does not support internet connectivity. When parent demand to check the child location, so the system able to send the child location to the parent’s smart phone. By refer the Figure 2.2 it shows the architecture of system. Meanwhile, (ShubhangiP.Mangkar, MonaliPawar, 2016) use the same system with the previous article. Besides that, the author also used ARM7 has the data information to give AT commands to start and send the child information message to mobile phone through GSM modem. The body temperature, incidental conditions also measured by using the child module and to give an alert message when any injuries occur to the child. Figure 2.3 show the transmitting module in this child tracking system.



**Figure 2.2 :** System of child tracking using Android phone



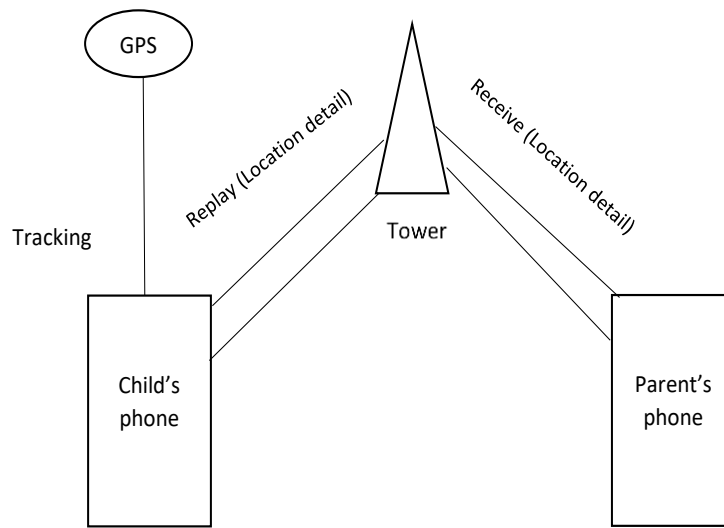
**Figure 2.3:** Transmitting Module

The author in (Punetha & Mehta, 2014) discuss about the purpose, designing and functioning of tracking system in detail. To decreasing the overall cost is of the aims in this article which is involved in tracking. Other than that, pets, children, elderly, disabled and vehicles also can be tracked by using this tracking system. GSM network and GPS satellites exist in this system. Furthermore, to alert the user by emergency calling system is using GSM module. However, this module isn't a low-cost device, which consisting a SIM card. AT commands it used to GSM module system. A SMS service is related with AT commands specify the GSM technology. Besides that, this system also gives a mild shock to the carrier and units off an alarm indicating the crossing of the periphery.

(Katore et al., 2015) presented a mobile application-based solution to aid parents to track the real time location of the children. Nowadays, most of kids mostly used smartphone because smartphones provide more facility of location service. The application of GPS and SMS service is commonly used in Android phones. Then, their child location can be tracked on Google maps by their parents, meanwhile parents also can get their browsing history

Every time the mobile phone updates the user location within the server, it requests the current region of the user from the GPS. From the GPS, the co-ordinates can be determined and sends to the mobile phone. SMS is used between parents and

child to communicate. Based on the Figure 2.4 shows that the system applied a simple and basic idea in tracking system



**Figure 2.4:** Proposed System

### 2.3.2 Bluetooth

(Opoku, 2012) proposed another method for tracking the movement of indoor objects based on Bluetooth communication technology principles of signal. The author analysed these devices usually require line-of-sight operations, limited coverage and low-level programming for accessing Bluetooth signal strength. With the range of personal devices using Bluetooth, the possibility arises to locate and track the movement of object. The authors analysed comparison between Bluetooth technology and other tracking technology which is GPS, GSM and RFID technology.

The common specification of Bluetooth technology refers to empower short-range wireless voice and data communication anyplace around the world. There are numerous occasions of short-range digital communications among computing and communication device. With Bluetooth technology, the forms basis for understanding the Bluetooth design which is in the lower layers centres around wireless RF communication in the 2.4 GHz spectrum, enhanced for short-range communication and low power consumption.