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GLOBAL POSITION SYSTEM (GPS) MOBILE TRACKING

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Bachelor of Mechatronics Engineering

2009

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DEVELOPMENT OF A **GLOBAL POSITION SYSTEM (GPS) MOBILE TRACKING**

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This Report Is Submitted In Partial Fulfillment of Requirements For
The Degree of Bachelor in Electrical Engineering (Mechatronic)

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"I hereby declared that this report is a result of my own work except for the excerpts that has been cited clearly in the references."

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Dedicated to my beloved mother, my siblings

and all my friends

for their love and sacrifice.

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ABSTRACT

This project basically is an application of global position system which applies in tracking moving object. Basic idea of this project is to develop an embedded controller for sending and retrieving GPS data. The purpose of developing embedded GPS system is to perform an integrated system tracking which can be implement in many field such safety system and etc. These project will consist both software and hardware part. Hardware will consist of two parts. It is Transmitter and receiver. Software part is used for control the operation of GPS system. System also including interface part which able to communicate with mobile phone. In the end of the project, generally this system build should be able to function as a tracking system to detect and transmit current position of object tracking to the user in short time.

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ABSTRAK

Projek ini secara asasnya akan mengaplikasikan teknologi Global Position System (GPS) yang mana boleh berfungsi sebagai system pengesan posisi terbaru objek yang kekal ataupun bergerak. Secara amnya projek ini akan cuba menghasilkan perkakasan litar bersepadu yang boleh berfungsi sebagai pengawal yang berupaya untuk berkomunikasi dengan satelit, menerima data dari satelit dan menghantar data tersebut kepada litar penerima. Tujuan utama perkakasan ini dibina ialah untuk menghasilkan perkakasan yang mampu berfungsi sebagai sistem pengesan yang mana berupaya mengesan posisi terbaru objek yang boleh di aplikasikan sebagai satu sistem keselamatan dan sebagainya. Projek ini terbahagi kepada dua bahagian utama iaitu perkakasan dan perisian. Bahagian perkakasan pula terbahagi kepada dua bahagian iaitu sebagai penerima dan penghantar data manakala perisian pula digunakan sebagai pengawal kepada GPS sistem. Secara gambarannya projek ini sepatutnya boleh berfungsi sebagai satu system pengesan posisi terbaru sesuatu objek dan menghantar posisi objek tersebut kepada litar penerima dan kemudian dipaparkan dalam telifon bimbit pada masa yang singkat

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LIST OF SYMBOLS AND ABBREVIATIONS

LCD	Liquid Crytal Display
USB	Universal Serial Bus
RF	Radio Frequency
I/O	Input/Output
TX	Transmitter
RX	Receiver
GND	Ground
PC	Personal Computer
GPS	Global Position System
GNSS	Global Navigation Satellite System
e.g	Example
LED	Light Emitting Diode
SMS	Short Message Service
GSM	Global System for Mobile communications

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CHAPTER 1

INTRODUCTION
AND
LITERATURE REVIEW

1.1 Project Introduction

Global Position System (GPS) Mobile Tracking is an application of Global Position System (GPS). This project basically will make the research and develop an embedded controller for sending and retrieving GPS data. This project consist of two part of hardware which the first part as a receiver and the second parts as a receiver and transmitter. The second part of hardware will communicate with satellite to retrieve data since then first part will act as receiver to receive and display data from transmitter at Mobile phone.

Generally the Global Positioning System (GPS) is the only fully functional Global Navigation Satellite System (GNSS) in the world. GPS and inertial sensors have complementary characteristics, which have been exploited in the design of integrated GPS-inertial navigation and guidance systems. The GPS is made up of three parts, it is satellites orbiting the Earth, control and monitoring stations on Earth. The GPS uses a constellation of between 24 and 32 Medium Earth Orbit satellites that transmit precise microwave signals, that enable GPS receivers to determine their current location, the time, and their velocity (including direction).

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1.2 Objective of Project

Every project was proposed normally have their own objective or what they aim for. In this GPS project there are three objectives as below:

- To study about GPS theory and application, investigate their structure and understand concept of GPS system to create useful application base of sending and retrieving GPS data.
- To develop a device with ability to detect location of an object using embedded controller GPS system
- To develop a device with ability to find current location of moving objects and pass that current location to user.

1.3 Problem Statement

Some products already available in the market today have their own ability and weakness. In this Global Position System (GPS) Mobile Tracking, below are three problems statement can be carried out in this project:

- Lack of security system. For example, alarm safety system just detects the thief but do not have a system to overcome the problem such as prevent thief start the car and etc.
- Current product available cannot trace where current position of vehicle if the car stole. Thus, lost car is hard to find if stole.
- Wireless system controller application available now commonly used in limited distance, if it out of range, the device can not used even we need it.

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1.4 Scope of Project

This project scope is an application of Global Position Systems (GPS). This project consist of two part, that's parts are hardware and software part.

- Hardware part will consist of two main parts.
  - First part is transmitter and receiver, and the second part as a receiver.
- Software part used in this project is mikroC, proteus, MiniGPS_1.32, and Win PIC.
- This project should be able to operate in wide area distance. As long as coverage is available, this GPS should be able to operate properly.
- The capability of these systems is should be able to track, and transmitted current location of object in format latitude and longitude to receiver when receiver retrieve that data using SMS instruction.

1.5 Literature Review

Literature review has been conducted prior to undertaking this project to obtain the information of the technology available and the methodologies that used by the other researchers on the same topic around the world. This chapter provides the summary of literature reviews on key topics related to the Global Position System (GPS) Mobile Tracking.

Recently, there are various types of Global Position System (GPS) mobile Tracking in the market. These types of product appeared with much kind of features and character, but with the same task that is to unfamiliar with us especially in Malaysia. This chapter part will discuss about the Global Position System (GPS) Tracking that exist in the market, their specifications and how it functions and previously related research will be reviewed. The hardware, system features and control method of GPS system will be analyzed.

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1.5.1 GPS Tracking Device

This is some sample of device use GPS technology to create GPS Tracking System.

1.5.1.1 WorldTracker GPRS

TrackingTheWorld.com's latest service enables users to monitor their trackers location update using any Mobile Internet enabled Cell Phone. The phone displays a full graphical map with the trackers current location highlighted. These maps are fully zoomable and you can go right down to street level. The phone will also provide the nearest physically address [1].

Figure 1.1: WorldTracker GPRS

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WorldTracker GPRS Vehicle Tracker Features:

- Self contained device fits in the palm of your hand. No external antennae needed, just plug-& play.
- Location information is reported using a direct GPRS data connection.
- Mapping for the entire world using the latest cutting edge 3D maps from Google and Microsoft.
- Real-time location reports every 15 seconds.
- Geofence feature sends alert if the target moves from pre-defined area.
- Durable, lightweight, water-resistant housing.
- Tri-band GSM 850/1800/1900 MHz for worldwide coverage.
- Can be hooked up to 12 volt DC for permanent hardwire connection
- Price $569.00

Maps used with WorldTracker GPRS Vehicle Tracking System:

- Microsoft Virtual Earth
    - NEW Birds Eye View
    - Ariel Satellite View
    - Standard Map View

1.5.1.2 Benefits of This Product to the Project.

Product above show us how advance other country then our country. Even that, we still and should take the advantage from other country technology in order to upgrade our current technology. Benefits of the above products to this project are to give an idea about the feature can be implementing to the GPS Mobile Tracking. To create the valuable GPS Mobile Tracking, the feature of product should been beyond above product. Generally product should be able give the precise location, look interesting and reasonable price.

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1.5.2 Thesis of GPS

This is some of thesis related about Global Position System Mobile Tracking project which all of thesis provide valuable information on the technology available and the methodologies that used by the other researchers to create GPS Tracking Systems.

1.5.2.1 Tracking of White-Tailed Deer Migration by Global Positioning System

This thesis wrote by Michael E. Nelson. This discuss in [3] about GPS Tracking of deer. They used global positioning system (GPS) radio collars on female white-tailed deer (Odocoileus virginianus) to document details rates of travel and distances traveled by 8 deer with radio telemetry, knowledge about timing, duration, and route of migration became possible. This thesis wrote by Michael E. Nelson for Biological Resources Division, U.S.

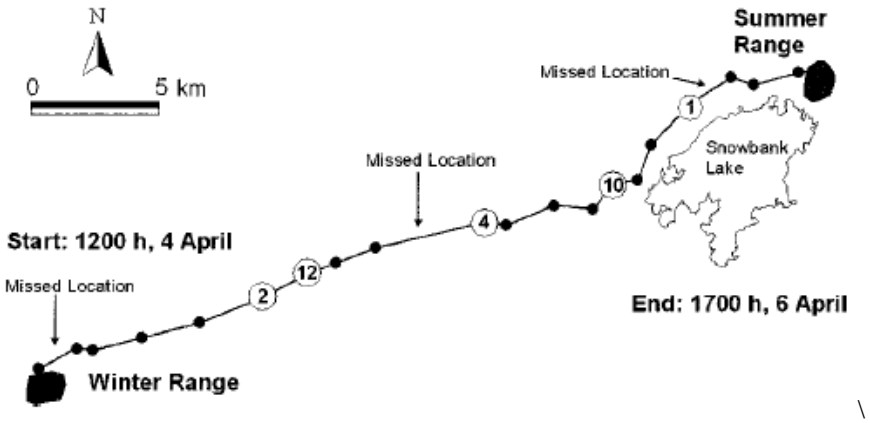

Figure 1.2: Location Track

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1.5.2.1.1 Data loggers

A GPS logger simply logs the position of the device at regular intervals in its internal memory. Modern GPS loggers in [4] have either a memory card slot, or internal flash memory and a USB port. Some act as a USB flash drive. This allows downloading of the data for further analysis in a computer. Position accuracy state by Michael E. Nelson in [3] can be improved by using the higher-chiprate P(Y) signal.

1.5.2.1.2 Data pullers

Contrary to a data pusher, that sends the position of the device at regular intervals (push technology), these devices are always-on and can be queried as often as required. Data Pullers in [4] are coming into more common usage in the form of devices containing a GPS receiver and a cell phone which, when sent a special SMS message reply to the message with their location. This technology is not in widespread use, but an example of this kind of device is a computer connected to the Internet and running GPSD.

1.5.2.1.3 Error Sources

The position calculated by a GPS receiver requires the current time, the position of the satellite and the measured delay of the received signal. The position accuracy is primarily dependent on the satellite position and signal delay. To measure the delay, the receiver compares the bit sequence received from the satellite with an internally generated

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