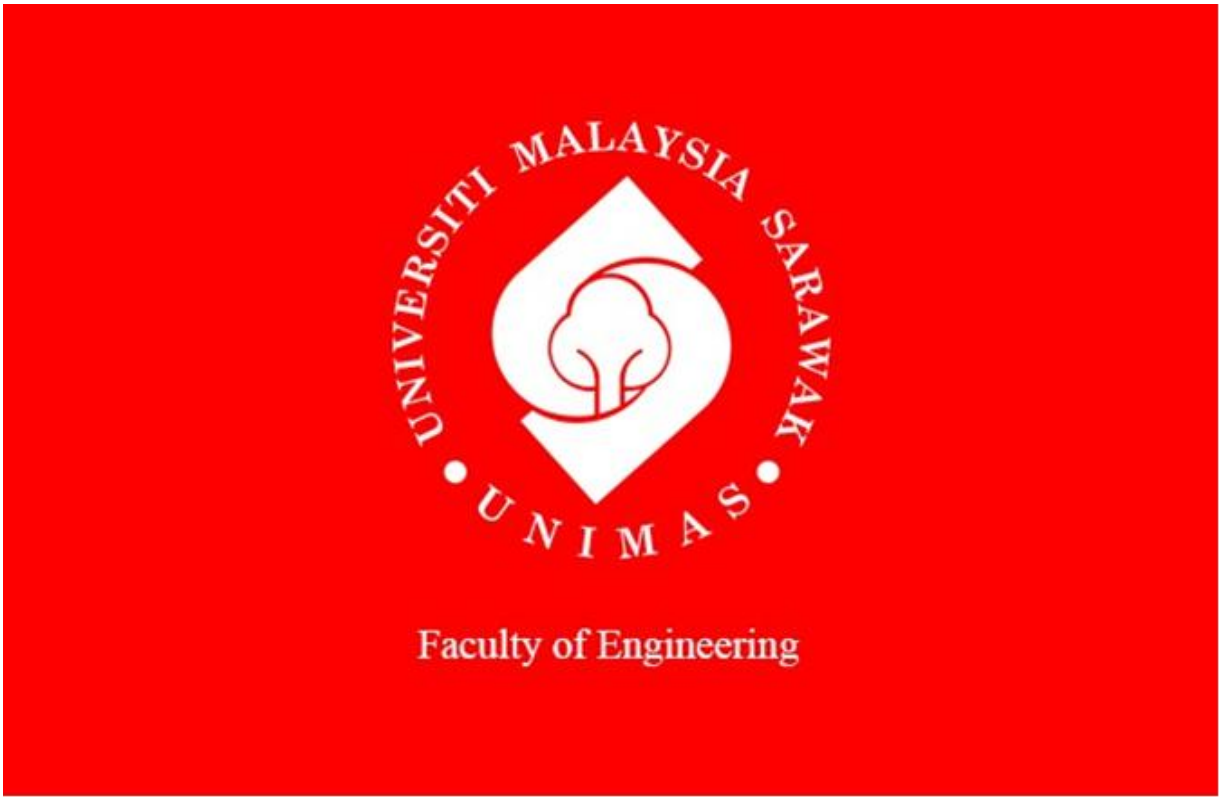

RASPBERRY PI ASSET LOCATION TRACKER

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Bachelor of Engineering (Hons) in Electronics

(Telecommunications)

2017

UNIVERSITI MALAYSIA SARAWAK

Grade: _____

Please tick (√)
Final Year Project Report ☑
Masters ☐
PhD ☐

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RASPBERRY PI ASSET LOCATION TRACKER

MOHD FAIZ BIN SAHLAN

A dissertation submitted in partial fulfillment
of the requirement for the degree of
Bachelor of Engineering (Hons) in Electronics
(Telecommunications)

Faculty of Engineering
University Malaysia Sarawak

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Thank You Allah, All praises to Him,

Special thanks to our dedicated lecturer Dr Martin Anyi for guidance and advice regarding our final year project II, thank you Dr.

Dedicated to my beloved parents and family. I love your soul.

To the people of Levant, every hardship comes ease. ..

Dear beloved khadee'ja, when the love for the sake of Him, it doesn't end.. .

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ABSTRACT

This project is to design the tracking system using the Raspberry Pi platform where it is utilize the available hardware and the software. The basic method of this project is using the concept of the Internet of Things (IoT). In order to implement the concept, the application of SSH PuTTY and Dweet.io are applied in this project as well as the weaved.com as a Rasbian OS server. Furthermore, it is using the Python language, ConnectBot, Google Play, Screen Recorder, Google Web Browser and Sakis3G to support the implementation of the system. As the software is complete setup, the hardware requirement for this project are the microcontroller where the project using the Raspberry Pi model B+, Huawei ZTE modem MF 190, BU-353 GPS, SIM card and Android Smartphone. As result, the system is successfully tracking the asset as desired. Hence, the implementation of the system is success and for the future scope is suggested to implement with local database as well as applied a hidden camera and VOIP to enhance the capability of the system.

ABSTRAK

Projek ini adalah untuk mereka bentuk sistem pengesanan menggunakan platform Raspberry Pi di mana ia menggunakan perkakasan dan perisian yang sedia ada. Kaedah asas projek ini menggunakan konsep Internet untuk Semua Perkara *(IOT)*. Dalam usaha untuk melaksanakan konsep ini, penggunaan *SSH PuTTY* dan *Dweet.io* digunakan dalam projek ini dan juga *weaved.com* dalam sistem operasi *Rasbian*. Tambahan pula, ia menggunakan perisian bahasa *Python, ConnectBot, Google Play, Screen Recorder,* Pelayar Web *Google* dan *Sakis3G* untuk menyokong pelaksanaan sistem. Perisian adalah persediaan lengkap untuk keperluan perkakasan untuk projek ini dan pengawal mikro itu adalah menggunakan *Raspberry Pi model B +, Huawei ZTE modem MF- 190, BU-353 GPS,* kad *SIM* dan telefon pintar *Android*. Hasilnya, sistem ini berjaya mengesan aset seperti yang dikehendaki. Oleh itu, pelaksanaan sistem ini telah berjaya, dan untuk skop masa akan datang dicadangkan untuk melaksanakan dengan pangkalan data tempatan, kamera tersembunyi untuk meningkatkan keupayaan system dan komunikasi atas talian mengunakan *VOIP*.

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LIST OF ABBREVIATIONS

GPS	-	Global Positioning System
GSM	-	Global System Mobile
GPRS	-	General Packet Radio Services
SMS	-	Short Messaging
SIM	-	Subscriber Identity Module
NMEA	-	National Marine Electronics Association
FPGA	-	Field Programmable Gates Array
AVL	-	Advanced Vehicles Locator
USB	-	Universal Serial Buses
UI	-	User Interface
SSH	-	Secure Socket Shell
IoT	-	Internet of Things
GPIO	-	General Purposes Input Output
RPI	-	Raspberry Pi
IDE	-	Interface of Development Environment
Diot	-	Dweet IoT
API	-	Application Program Interface

CHAPTER 1

INTRODUCTION

1.1 Introduction

In these section, will be presented the background of the project, the problem statements of the project, the objectives of the project, the scope of works for the project and the project outlines.

1.2 Background of the Project

This project is focus on the Raspberry Pi Asset Location Tracker where it using the Raspberry Pi (RPi) model B as a main micro-controller platform, the Global Positioning System (GPS) as a signal location tracker module which is the BU353 GPS model, HUWEI ZTE MF190 model for the Global System for Mobile communication (GSM) modem, 5 voltage (5V) power bank as the RPi Asset Location Tracker power supply and the liquid crystal display (LCD) for the users to interact with the system such as mobile or personal computer (PC). Furthermore, the software are using the Linux family operating system (OS) such as Raspbian, Python as the command language between the system and the Secure Shell (SSH) as a cryptographic network protocol for the operating network services securely over an unsecured network such as online server. The online server that this project been used is the Weaved.com online server where it remote the system through internet.

RPi Asset Location Tracker is about a system that capable to track the location of a moving asset. For example, the asset for this project is the commercial vehicle such as VIVA from Perodua manufacturer. The location of the asset traced from the GPS module where the GSM modem as the communication media for the RPi and the PC. Basically, the project started with reviewing the previous study that has been done. There are 9 selective journals that have been reviewed for the understanding of the system cognition as a tracking platform, hardware and software that been used, the result of the studies been done and most important is the problem statement that yet be done. Last but not least, to compare the capability of the previous study with the current technology as well as the methodology been used.

1.3 Problem Statements of the Project

Vehicle theft is a major problem that Malaysian faced nowadays. Based on the statistic from the General Association of Malaysia (2016) (refer to Appendix E), an average of 60 vehicles gets stolen every day from over the countries. Although, the vehicles fully equip with the advance security system but the cases increased and Malaysia said to be ranked as one of the top 10 countries in the world with the highest number of vehicle theft. Based on Sarawak Borneo post, number of vehicle stolen in Sibu increased (refer to Appendix E). Toyota Hilux always became a target for thief. Sibu is not safe for vehicles such as Toyota Hilux even it is equipped with sophisticated car security system. So this kind of matter could be solved by using tracking devices which resides inside the car to be traced.

Therefore, the system should be separated from the main system which is the vehicle and develop the backup system which is tracking device. Furthermore, RPi Asset Location Tracker is a stand-alone system that yet been done in Malaysia, especially. As it is a stand-alone system, it considered as a personal asset security system and one of the innovative solution to overcome the vehicle theft as well as to get back the stolen vehicle easily due to the location tracker reside in the user vehicle.

1.4 Objectives of the Project

The project is presented in the Final Year Project II (FYP II) where it is aimed to design the tracking system using RPi platform in order to access the location of the vehicles. The application of 'Internet of Things' is useful so that the RPi could be accessed around the world, as long as the internet coverage is connected. Furthermore, the communication between the users and the system is using the Python programming interface. Hence, to utilize the hardware and the software interfaces which are the GPS module, GSM modem, RPi power bank, and the software are the Raspbian OS, Python, online server application, Sakis3G as well as the SSH application (PuTTY).

The objectives of this project are as followed:

- To design the tracking system using the RPi platform.
- To utilize the hardware and the software interfaces which are the hardware are the GPS module, GSM modem, RPi power bank, and the software are the Linux OS, Python, online server application, as well as the SSH application.
- To apply the concept of Internet of Things.
- To detect the location of the asset (Vehicle) using RPi.

1.5 Scope of Works for the Project

My scope of work for this project is going to design the tracking system using the RPi as a main microcontroller for the system. In order to make the system working, hardware such as the USB GPS module, USB power bank, and the USB GSM modem as the sub-core for the system. Next is to develop the communication platform between the systems with the users by using the software. The software is worked to frame the architecture of the system where it utilized the computer language which this project used is the Python programming. These technologies assembled and deployed the users' location on the terminal command of SSH.

Hence, the scope of work that this project focus on are to design the tracking system using the RPi platform, to utilize the hardware as well as the software applications, to apply the concept of the Internet of Things and most important to detect the asset location. As go through the project, it will illustrate the differences of this project from another project that has been done where in each projects measured by the differences of used the software and the hardware as stated in this chapter.

1.6 Project Outlines

As summary for the Chapter 1, the project outlines are divided into 5 chapters which are introduction, literature review, methodology, result and discussion, and the conclusion as well as recommendation.

Chapter 1: Introduction

This chapter provides the general overview of the Raspberry Pi Asset Location Tracker, where it included the objectives of the project, the problem statement, scope of work and the project outlines.

Chapter 2: Literature Review

This chapter explain the details about the preliminary study and the basic understanding of the tracking system. This chapter also followed by some example of the existing applied system which having the same concept with the proposed system.

Chapter 3: Methodology

This chapter discussed the methods used to develop the Raspberry Pi (Rpi) Asset Location Tracker system. This section explain more details on development process, software and the components that being used in order to complete the project. At this point also illustrate bench-testing and programming of the system.

Chapter 4: Result and Discussion

This chapter will cover the result of the project and the discussion from the findings as well as previous finding.

Chapter 5: Conclusion and Recommendation

In this chapter, it is the summary and the conclusion of the project where it included the limitation of the project as well as the recommendation for future scope of the applied research.