



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DEVELOPMENT OF SMART LUGGAGE TRACKING
SYSTEM FOR TRAVELLERS BY USING ARDUINO**

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



MUHAMMAD FAHMI BIN MOHD YUNOS

B071710234

950719125285

FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING
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YUNOS


DR. A.K.M. ZAKIR HOSSAIN

Alamat Tetap:

اونيورسيٲيٲيكل ماليسيا ملاك
Cop Rasmi Penyelia

No. 12, Jalan Jelok Impian 7,

Taman Jelok Impian,

43000, Kajang,

Selangor.

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Author : MUHAMMAD FAHMI BIN MOHD
YUNOS

Date: 15/ 2/ 2021



APPROVAL

This report is submitted to the Faculty of Mechanical and Manufacturing Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Mechanical Engineering Technology (Telecommunication) with Honours. The member of the supervisory is as follow:

 Signature:
Supervisor: DR. A.K.M. ZAKIR HOSSAIN

 *Zakir Hossain*

 *Nurulhalim*
UNIVERSITI TEKNIKAL MALAYSIA MELAKA
Signature:
Co-supervisor: NURULHALIM BIN HASSIM

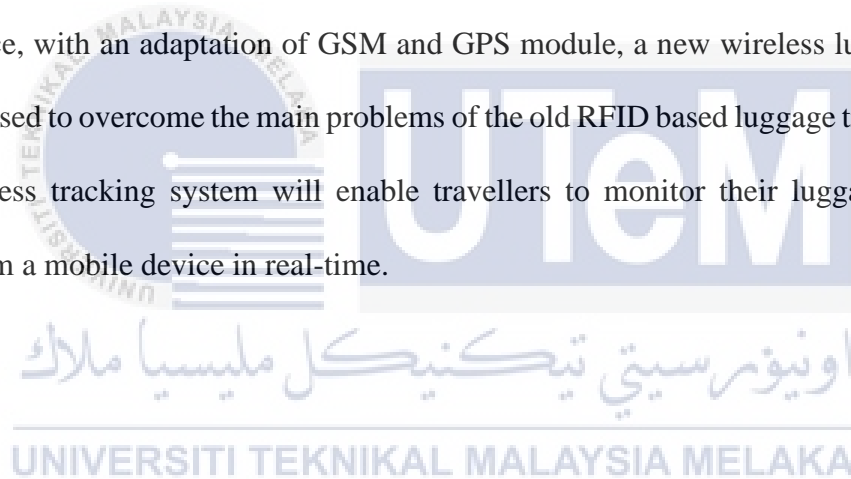
ABSTRAK

Kehilangan bagasi dikalangan pengembara telah menjadi masalah utama dan memerlukan solusi yang pantas dan berguna. Kehilangan bagasi bukan sahaja membawa kerugian kepada pengembara, malahan ianya turut membawa kerugian kepada syarikat pengangkutan komersial. Sebuah sistem pengesan bagasi yang berasaskan teknologi RFID telah dicipta untuk mengatasi masalah ini. Namun begitu, sistem tersebut tidak sesuai untuk digunakan oleh sesetengah pengembara disebabkan sistem tersebut hanya boleh digunakan di sesetengah tempat pengangkutan yang berpusat dan moden dan pengesanan bagasi dalam masa sebenar (real-time) tidak dapat dilakukan. Oleh itu, dengan penggunaan GSM dan GPS modul, sebuah alat pengesan bagasi baru tanpa wayar telah dicadangkan untuk mengatasi masalah penting yang dihadapi oleh alat pengesan bagasi yang lama yang berlandaskan sistem RFID. Alat pengesan tanpa wayar ini membolehkan pelancong untuk mengesan bagasi mereka dalam masa sebenar (real-time) melalui applikasi di peranti mudah alih.

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ABSTRACT

Lost luggage among travellers has become the most common problems and in need of instant useful solution. The lost luggage has not only brought losses to the travellers, but also to the commercial transportation company as compensation need to be paid to the travellers. A tracking system for luggage which based on RFID technology were created to overcome this problem. However, the system was not compatible with most travellers as the system only works at certain centralized and modern transportation medium and the tracking of the luggage cannot be done in real-time. Hence, with an adaptation of GSM and GPS module, a new wireless luggage tracking system is proposed to overcome the main problems of the old RFID based luggage tracking system. The new wireless tracking system will enable travellers to monitor their luggage through an application from a mobile device in real-time.



DEDICATION

To all my family, friends, teachers, lecturers, this thesis is dedicated especially to you. All of you have helped me in so many different aspects of life which directly and indirectly have also helped in writing this special thesis. Thank you.



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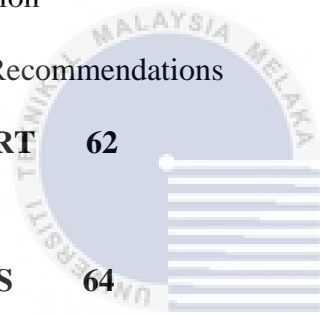


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LIST OF SYMBOLS

cm	-	centimeter
dB	-	decibel
G	-	Generation
kB	-	kilobyte
kHz	-	kilohertz
km	-	kilometer
m	-	meter
Mbps	-	Megabits per second
MHz	-	Megahertz
V	-	Volt



LIST OF ABBREVIATIONS

EDI	Electronic Data Interchange
GEO	Geostationary Earth Orbit
GPS	Global Positioning System
GSM	Global System for Mobile communication
HES	Hub Earth Station
IDE	Integrated Development Environment
IoT	Internet of Things
LAN	Local Area Network
LAT	Latitude
LCD	Liquid Crystal Display
LEO	Low Earth Orbit
LONG	Longitude
MEO	Middle Earth Orbit
OEM	Original Equipment Manufacturer
PC	Personal Computer
PES	Personal Earth Station
PWM	Pulse Width Modulation
RF	Radio Frequency

RFID	Radio Frequency Identification
RX	Receiver
SDN. BHD	Sendirian Berhad
SMS	Short Message Service
SMT	Surface-mount Technology
TX	Transmitter
WI-FI	Wireless Fidelity
WWAN	Wireless Wide Area Network



LIST OF PUBLICATIONS



CHAPTER 1

INTRODUCTION

1.1 Background

Smart Luggage Tracking System for Travelers is developed to minimize the lost or mishandling luggage among travelers. It has been reported that in 2014, 7.3 luggage per 1000 passengers were not perfectly arrived to the owners (Shehieb *et al.*, 2017). 7.3 luggage per 1000 passengers is definitely not a small number as every commercial airport received thousands of passengers per day.

According to (Chaturvedi *et al.*, 2018), the current RFID based luggage tracking system has been used on every commercial airport to overcome the unwanted scenario. However, the RFID tags have numbers of disadvantages that have to be avoided in order to have full control towards the missing luggage problem. The RFID system is unable to provide a real-time monitoring and cost-inefficient as the system requires numbers of hardware to be developed.

Therefore, the Design and Development of Smart Luggage Tracking System for Travelers is an initiative to overcome the arising problem of missing luggage with more cost effective and most importantly, it is a real time tracking device (Chaturvedi *et al.*, 2018). This system will allow users to monitor their luggage in real time with the help of GPS and GSM module as the module will provide the GPS coordinate of the luggage and send the data to user through SMS or android application. According to (Kumar *et al.*, 2016), the used of this new system of tracking will definitely bring a lot of convenience to every users as it can provide a faster and more reliable tracking system compared to the old RFID tracking system.

This report is divided into five chapters. The first chapter is the introduction, which includes the background, problem statement, objectives and scope of this project. The second chapter is the Literature Review, which discusses the studies which are found from the previous related paper. The third chapter is the Methodology. The Methodology discusses the steps of the process to achieve the objectives of this project. The fourth chapter is where the results and discussion are presented. The fifth and the last chapter is the conclusion and future recommendations.

1.2 Problem Statement

Smart luggage tracking system using GPS and GSM module is used to overcome the old RFID tracking system (Chaturvedi *et al.*, 2018). The old RFID tracking system is a device in the form of paper tag that will be tagged to a luggage. According to (Shehieb *et al.*, 2017), the RFID tags contain with barcodes which to be scanned in every checkpoint where the luggage passes and the system in the airport will send an SMS to the owners of the scanned luggage to inform the luggage whereabouts. The system seems like an ideal tracking system to have in every airport. However, if the luggage is robbed or mishandled to an inappropriate place, the luggage will not be able to be traced as the luggage is out of the route of every designated checkpoint. Hence, a tracking device that can work freely without any bind with another system would definitely overcome the unwanted scenario.

The RFID tags system as a luggage tracking system can be very helpful if and only if it is being used in a centralized and modern transportation medium. In this century, there are a lot of people that love to do backpacking traveling. Based on previous research which done by (Dayour, Adongo and Taale, 2016), backpackers are tend to choose cheaper transportation and are more

motivated to negotiate the price. This is a very great example of case that the group of travelers will need a more flexible luggage tracking system that can be used not only in a centralized and modern transportation medium but at any place in the world. According to (Kolaskar *et al.*, 2016)(Hegarty, 2017), a GPS system determines the distance by measuring the time taken of signals from the sender at a satellite to the receiver. Hence, a tracking system that uses GPS module can be said to be useful almost around the world.

A tracking device that can allow the users to constantly be updated of the luggage can be a very peace of mind to the users. Unfortunately, with the RFID tag, a constant monitoring of the luggage will be impossible as the users can only be updated once the RFID tag get scanned at the designated checkpoint. However, it is a very different case for a tracking device that uses GPS and GSM modules. According to (Gupta *et al.*, 2017), a tracking device with the usage of GPS and GSM technology will allow users to do a constant real time monitoring of luggage.

1.3 Objectives

There are three objectives that need to be achieved in this research:

1. To design and develop luggage tracking device for travellers.
2. To Experiment the device in the real environment.
3. To Benchmark the device with other existing work.

1.4 Scope

The design and development of this Smart Luggage Tracking System will be mainly focused for every traveller's convenient. This system should be able to overcome the mishandling and lost luggage of every travellers during travelling. Next, this system will be Internet based as