



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**DEVELOPMENT OF SMART DOOR NOTIFICATION**

**SYSTEM USING RASPBERRY PI**

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.

by

**GAN HUI SHAN**

**B071610448**

**960224105230**

FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING  
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RASPBERRY PI

Sesi Pengajian: 2019

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Disahkan oleh penyelia:

.....

GAN HUI SHAN

Alamat Tetap:

No. 26, LORONG 1, SITE C,

45400 SEKINCHAN,

SELANGOR DARUL EHSAN

Tarikh: 13<sup>rd</sup> DECEMBER 2019

.....

TS. MOHD FAIZAL BIN ZULKIFLI

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## **DECLARATION**

I hereby, declared this report entitled DEVELOPMENT OF SMART DOOR NOTIFICATION SYSTEM USING RASPBERRY PI is the results of my own research except as cited in references.

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Date: 13<sup>th</sup> DECEMBER 2019

## **APPROVAL**

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

Signature: .....

Supervisor :       TS. MOHD FAIZAL BIN ZULKIFLI

Signature: .....

Co-supervisor:     FAREES EZWAN BIN MOHD SANI @  
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## **ABSTARK**

*Sistem pengawasan masa nyata memainkan peranan penting dalam sistem keselamatan rumah untuk memastikan keselamatan rumah dan keluarga terjamin. Sistem yang dicadangkan adalah peranti keselamatan rumah Internet yang disambungkan secara wayarles, yang menggabungkan gerakan luar Raspberry Pi, kamera dan tekan butang. Pemberitahuan pintu pintar dilengkapi dengan Raspberry Pi yang sebagai medium untuk menyampaikan mesej atau panggilan ke telefon pintar pemilik rumah melalui aplikasi Telegram jika gerakan dikesan di pintu masuk rumah. Sistem ini juga akan mula dirakam apabila gerakan dikesan oleh sensor ultrasonik. Hasil yang diharapkan daripada projek ini adalah untuk membolehkan pemilik rumah menerima panggilan apabila tekan butang ditekan. Pemilik rumah juga dapat menerima pemberitahuan walaupun tanpa menekan bel pintu apabila gerakan mencurigakan dikesan di pintu. Sistem ini dapat menjamin harta benda dan membantu keluarga mengamankan rumah mereka dari pelawat yang tidak diingini serta mengesan gerakan luar.*

## **ABSTRACT**

Real-time surveillance system plays a crucial role in home security system to ensure a secured home and family's safety. The system proposed is a wireless Internet connected home security device, which incorporate outdoor motion based Raspberry Pi, camera and push button. The smart door notification equipped with Raspberry Pi, which as a medium to deliver a message or call to the homeowner's smart phone through Telegram application if motion detected at the entrance of the home. This system will also record a video whenever a motion is detected. The expected outcome of this project is to allow the owner receives call when the push button is pressed. The homeowner is also able to receive a notification even without pressing the push button when suspicious motion is detected at the door. Hence the system is expected to be able to secure property and help family secure their home from unwanted visitors.

## **DEDICATION**

This thesis is dedicated to my parents and family members who always gives me support and taught me that even the largest task can be accomplished if it is done one step at a time.



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## LIST OF SYMBOLS

V	-	Voltage
$\Omega$	-	Ohm
A	-	Ampere
$^{\circ}$	-	Unit of degree
m/s	-	Meter per second
Hz	-	Hertz
R	-	Resistor
V <sub>out</sub>	-	Output Voltage
V <sub>in</sub>	-	Input Voltage
GB	-	Gigabyte
cm	-	Centimetre
s	-	Second

## LIST OF ABBREVIATIONS

HD	High Definition
CCTV	Closed-Circuit Television
WHO	World Health Organisation
IoT	Internet of Things
GUI	Graphical User Interface
HTTP	HyperText Transfer Protocol
OpenCV	Open Source Computer Vision
GSM	Global System for Mobile Communication
SMS	Short Message Services
LAN	Local Area Network
FTP	File Transfer Protocol
SFTP	Secure Shell File Transfer Protocol
GSM	Global System for Mobile Communication
VGA	Video Graphics Array
SoC	System on a chip
HDM	Human Identification Module
ID	Identity Document
USB	Universal Serial Bus
OTG	On The Go
PIR	Passive Infrared
GPIO	General-purpose input / output

RAM	Random Access Memory
SD	Secure Digital
CSI	Camera Serial Interface
Wi-Fi	Wireless Fidelity
HDMI	High Definition Multimedia Interface
FPS	Frame per second

# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

A development of smart door notification system is proposed by incorporating the smart phone and home network service. The system embedded with a video camera, motion detection sensors and Raspberry Pi. This system is interfacing with a credit-card size computer that known as Raspberry Pi to provide real-time video processing over wireless Internet to smart phone. In addition, Raspberry Pi is able to support HD video and send it to Telegram Bot if there was a motion detected by ultrasonic sensors at the door of the home. A notification will be delivered to the homeowner so that the homeowner is able to response promptly when intrusion happened. This system is able to present a criminal evidence for police investigation by retrieving the video that had been stored in cloud storage. The Pi camera will start to capture images and record video if motion is detected at the door. This system helps homeowner to identify visitors even if they are absent in the home. Therefore, this intelligent door notification brings convenience, monitoring and security to the most valuable asset, which is home.

### 1.2 Problem Statement

Nowadays, there are many burglary cases occurred in the residence area. This heinous crime is still failing to abide in the presence of the Closed-Circuit Television (CCTV) surveillance systems. According to the FBI burglar rates of homes declared that a burglary happens in every 13 seconds (Yolanda, 2019). This shocking home burglary

statistics proved that it is important to install a home security system in residence area. However, there are several defects in existing security system to monitor the inspection area. For example, the existing monitoring security system designed to keep an eye at the target area and record the video only. The homeowners can only know their home condition by retrieving video from the storage.

The traditional monitoring system does not design with providing a warning message to deliver to smart phone of the homeowner when suspicious activity is detected. It was only depending on the doorbell alarm system instead of delivering an automatic calling to the homeowner. This will cause the homeowner failed to do report promptly to the nearby police station when home burglary occurred. Moreover, a hearing impaired individual who failed to hear the alarm will miss out the visitors or parcel delivery. According to the World Health Organisation (WHO), it stated 30% of the 3.8 million senior citizens suffer hearing-loss partially. This finding revealed that the traditional system having poor preventable burglary as the traditional doorbell system does not support text-based alert system to notify the hearing impaired individual. Due to this issue, as a result, the homeowner failed to respond earlier to catch the invader red handed when trespass happened.

Considering this, it is important for every home installed an intelligent surveillance system to avoid become the next target for criminal. A smart door notification system is designed and implemented to bring convenience, monitoring and security of the residence area as it allows the user to monitor and identify the visitor at the entrance of their home even if they are not around at home.

### **1.3 Objective**

The objectives of doing this project are:

1. To study the specification and method used in door notification system
2. To develop a smart door notification system using Raspberry Pi
3. To analyze the outcome of the smart door notification system

### **1.4 Scope of Work**

This project primarily focuses on the ability to perform high definition video that can be implemented by a motherboard, which is Raspberry Pi. This home security system is a wireless Internet connection security device that can be remotely monitored. An ultrasonic sensor is equipped with this system to detect the suspicious motion and trigger the Raspberry Pi to record the video for police investigation when an unpleasant event occurred. The owner will receive a warning notification from the door notification system to arrest the burglar.

### **1.5 Expected Results**

The door notification system will start to record video when a suspicious motion is detected by the ultrasonic sensor. The system will be activating and starting to record the video until no motion is detected by the motion detection sensor and send it to the Telegram Bot. The homeowner will receive a call from the system if the push button is pressed by the visitor. Hence, the homeowners are able to identify the visitor and purpose that intend to present in their home.