



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

SMART HOME PATROLLING DEVICE WITH SAFETY

SYSTEM USING IOT

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

by

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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 Electronic Engineering Technology (Telecommunications) with Honours. The member of the supervisory is as follow:

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Supervisor : GLORIA RAYMOND TANNY

ABSTRAK

Dalam dunia berteknologi tinggi ini, telefon pintar sedang digunakan dalam kebanyakan tugas harian dan sistem keselamatan Laman Utama kebanyakannya diperuntukkan di tempat statik. Sistem automasi rumah ini membantu kami untuk memeriksa di rumah kami melalui lokasi terpencil yang membawa ketenangan fikiran. Sesetengah sistem akan membolehkan kami berinteraksi dengan sistem keselamatan rumah, yang menyediakan keupayaan untuk melengkapkan dan melucuti rumah kami dari jauh. Beberapa sistem automasi rumah yang lengkap akan memaklumkan kami melalui telefon, teks atau e-mel jika terdapat pergerakan yang tidak biasa di dalam rumah kami. Dengan menggunakan kamera murah mudah dan sensor yang berbeza telah menjadikan alat pemantauan rumah jauh lebih efektif di mana ia membolehkan kita mengakses melalui telefon bimbit. Dalam makalah ini, kami membentangkan reka bentuk dan pelaksanaan sistem keselamatan rumah untuk mengesan kebocoran gas, suhu tinggi, gerakan rakyat yang tidak diiktiraf, dengan alat rondaan melalui telefon pintar kami. Peranti rondaan ini adalah peranti pelbagai sensor dengan sensor seperti sensor suhu (DHT11), sensor Kualiti Udara / Asap (MQ-135), dan lapisan IR berikut sensor yang dikawal oleh Node MCU ESP 12, dan mempunyai perisai Motor bersama-sama dalam MCU NODE untuk pergerakan peranti dan lebih banyak kebolehan untuk menjaga rumah dengan selamat. Sistem ini akan menghantar mesej kepada orang yang berdaftar. Pada masa yang sama, kami boleh mengklonkan aplikasi Blynk ke stesen yang diberi kuasa terdekat untuk memastikan rumah itu dijamin. Peranti rondaan ini boleh merakam video atau gambar snap yang akan disimpan ke dalam memori untuk kegunaan kemudian.

ABSTRACT

In this high-tech world, smart phones are being used in most of the daily tasks and Home security system are mostly allocated in a static place. This home-based robotics structure helps us to ensure our house through an IoT Technology which makes life easy. Some systems will allow cooperate with the household safety system, by giving the talent to organise our home remotely. Some complete house automatic systems will alert us by mobile, text or email if there is any unusual activities within our home. By using simple cheap camera and different sensor have made remote for home monitoring structure which is more effective where it enable to access through smartphone. In this project (PSM1 & PSM2), presented the design and prototype of home safety and security system to detect gas leakage, high temperature, unrecognised peoples motion, by a patrolling device through our smart phone. This patrolling device is a multi-sensor device with sensors like temperature sensor (DHT11), Air Quality/Smoke sensor (MQ-135), and IR lining following sensor controlled by Node MCU ESP 12, and having Motor shield together in NODE MCU for the movement of the device and more assibilate to keep the home safely. This system will communicate to the registered person. At the same time, we can clone the Blynk app to the nearest authorised station to make sure the house is secured. This patrolling device can record the video or snap pictures which will be save into the memory for later use.

DEDICATION

To my beloved parents Mr Balasubramaniam Shanmugam & Pavayee Deavi,
Mr Arasu & Sivapackiam,
My Supportive supervisor Miss Gloria,
My Faithful Panels, Lecturers, and FTK staffs,
My BEET Cohorts 6 Classmates & Friends,
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LIST OF SYMBOLS & ABBREVIATIONS

IoT	-	Internet of Things
API	-	Application Programming Interface
GPS	-	Global Positioning System
GSM	-	Global System for Mobile
GUI	-	Graphical User Interface
USB	-	Universal Serial Bus
LED	-	Light Emitting Diode
VDC	-	Volts Direct Current
ADC	-	Analog to Digital
IP	-	Internet Protocol
Wi-Fi	-	Wireless Fidelity
TDMA	-	Time Division Multiple Access
LPG	-	Liquidified Petroleum
MCU	-	Micro-Controller Unit
TCP	-	Transmission Control Protocol
CMOS	-	Complementary Metal Oxide Semiconductor
ISPD	-	International Social for Prenatal Diagnosis
EPROM	-	Erasable Programmable Read-Only Memory
PIC	-	Peripheral Interface Controller

CHAPTER 1

INTRODUCTION

1.1 Background

Crime in housing area, fire accidents, gas leakage have been complained almost every day in the social media not only in newspaper but getting viral in Whatsapp, Facebook and Instagram. This issues has no time limit or duration to occur or simply say it may happen anytime to anyone. Home safety has been the main concern of all human being these days to protect their belongings and valuable items. In the current situation many robots are developed to improve the safety issues for home security patrolling system.

For a smart patrol device to provide a wide area of applications, which eventually compatible with high level autonomy and adaption to the changing environment. This device a build with various sensors to gather information of the surrounding based on an internal model for the environment and make decision for the problem faced.

Sometimes, this device need more capability such monitoring system to ensure the security system of the house.

The alerting system through IoT Technology become more convenient to everyone in this current wold. By just using the Wi-Fi component one can convert information to user very easily in split second. Yet, the person should be concern on it. If the owner is not concern on it the security and rescue team are always there if the message delivered to them. So the current problem is the device should capable work at a real time to make sure the safety of the home. In this project a device that able to adapt all situation via sensor with monitoring system and able to send message to owner or rescue team was

build up. By this, we can improve the home safety issues and security of the house all the time.

1.2 Problem Statement

Home Safety Patrolling device requires information transmission security immediate for getting information and precise at a particular separation, with the goal that proprietors can put device uninhibitedly at significant areas for the data display receiver. Furthermore, this system should be compact as well as easy to use. The display of this structure is demonstrated to be clear and frank. The system should not be hacked by anyone, regardless of in different ways including on info source control, the substance of information transmission, the substance of accepting information and area of security sensor device's primary processor is gathered. The structure should likewise contain qualities, for example, resistant to water, high temperature resistant and strong enough, so the process of transmitting data and receiving data will not fail. There are some limitations on the use of sensor devices in many other security systems and also in the mobility of the device. These issues will be an outcome in the constraints of the security system. Anyhow, unavoidable that a retreat system needs wide utilization of sensors for the system to effort productively plus can identify problems in each y area of the house. As shown in Figure 1.1 the statistic shows the fire incident by premise type in 2016. Most of them are in the residential area which should be considered very carefully. The benefit of the sensor devices is also vital in security systems where figure 1.2 has declared the crime index in Malaysia from 2015 to 2017. Although the crime index is decreased yet the property losses is still in huge number.

Sensors should be delicate to human movement. Sensors must work at right range, which is not too near and too far away to detect movement and should be accordance with human nature.

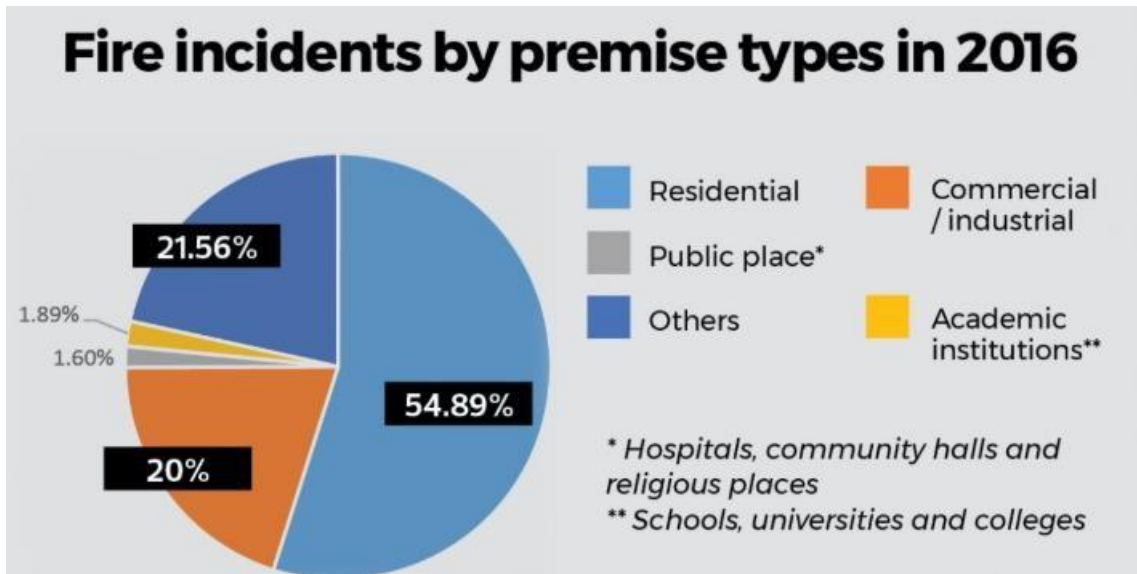


Figure 1.1: Percentage on Fire accidents by premises type in 2016

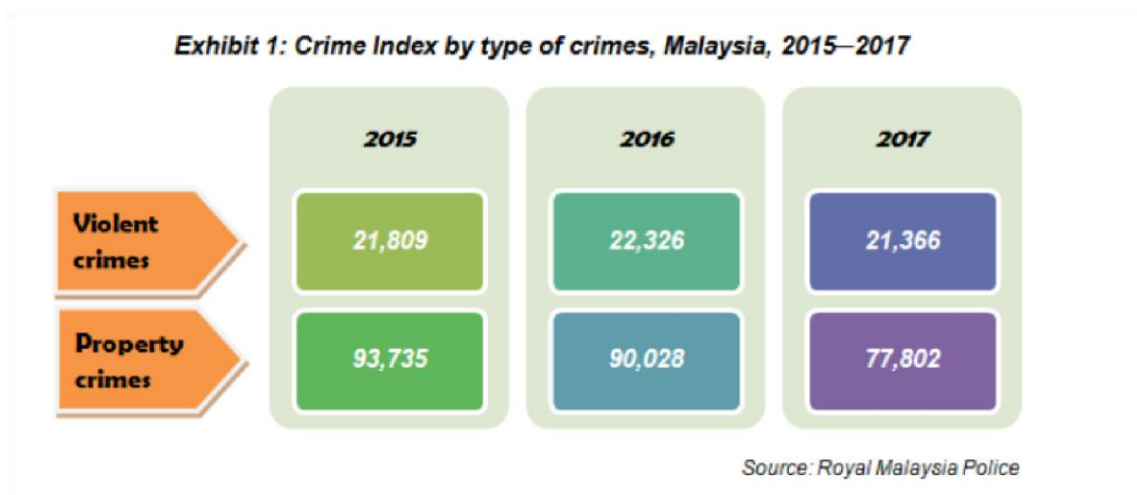


Figure 1.2: Crime Index by type of crime in Malaysia from 2015 to 2017

1.3 Objective

The Project Objective are:

1. To design a smart home patrolling device with safety features by recognising gas leakage, high temperature and unauthorized peoples motion.
2. To develop an automated patrolling device that can secure the safety of the house using IoT technology.
3. To monitor and ensure the safety of the house while the owner is not at home.

1.4 Scope of Effort

The scope of effort for the project include the following area:

This project is designed to ensure the safety purpose of the house against gas leakage or high temperature and also detects unusual motions when the owner is away. This project will alert the user by call and SMS through IoT system. Through this, the owner can take an immediate action against the incident that occurring in the house. A part of it, if there is no response from the user, the nearest fire station or police station also can take action if we clone the application to them.

For this project, it will use Node microcontroller unit (NODE MCU 12) to which is perfect board that demonstrate the basic on sensors and actuators. Various sensors are

used to develop this project such as temperature sensor (DHT11), smoke gas sensor (MQ-135), and passive infrared sensor (HC-SR501). The functions of those sensors are simplified and described below:

1. DHT-11 - a coordinated simple temperature sensor whose electrical yield is relative to Degree Centigrade. DHT-11 Sensor does not involve any outer adjustment or cutting to give common exactitudes.
2. MQ-135 - high sensitivity to Liquefied Petroleum Gas (LPG), propane, smoke and hydrogen, additionally could be utilized for methane and other flammable steam, and appropriate for various application. The device can work at temperatures starting - 20 to 50°C and devours under 150 mA at 5 V.

All those component are connected to a movable device which will be rounding down the entire house which eventually a compact device of DC Motor which monitor by Motor Shield in NODE MCU. Y365 Plus Camera also installed in the device to monitor the house by selecting camera button on mobile phone. This allow the user to feel more secure as he or she could view the condition trough mobile application.

This movable multi-sensor patrolling device makes security investigate more effective and eludes fire accidents. For sample, if the temperature sensor fails to work and a fire occurs, it will still be capable to sense a fire as the temperature sensor and smoke sensor crosses the threshold value. In addition, in microcontroller we have merged the interrupt function with our sensors so that does not always keep reading values from the sensor, rather the system reads the value if there it detects any change. This also shortens the handling time which makes our system well-organized.