

SMART HOME SECURITY SYSTEM BASED ON INTERNET OF THINGS

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Tajuk Projek : Smart Home Security System based on IoT

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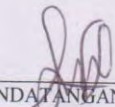
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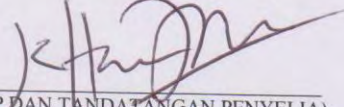
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

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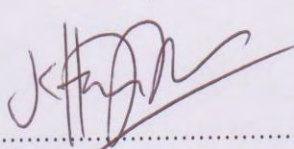
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DEDICATION

Dedicated to my beloved family and friends.

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ABSTRACT

Home burglary is one of priority concern to most home owners especially when they're leaving for a period of time. There are plenty of security system in the market but most of it are pricey. The purpose of this thesis is to implement a smart home security system based on IoT. The objective of this thesis is to design and implement a system that notifies user when there is intruder near their house, to implement a system that will give voice alert when there is motion detected and for user that can turn on and off their light from their phone. There are two systems implemented, one with internet connection and the other without internet connection. For system with internet connection, user will receive notification through their phone, email, and twitter when there is motion intruder coming to their house. Furthermore, user can control their light to make the house look lively. For the system without internet connection, there will be voice alert when motion detect near their house, these is to scare the intruder. Moreover, this system is helpful when there is problem with internet connection. By having this system in residence, resident will feel at ease to leave their house for a longer time, as they can still monitor their house and receive notification when there is intruder detected.

ABSTRAK

Kecurian di kawasan perumahan dipercayai menjadi punca utama penduduk risau untuk meninggalkan rumah mereka dalam masa yang panjang. Terdapat pelbagai sistem keselamatan di pasaran tapi kebanyakannya mahal. Tujuan tesis ini adalah untuk melaksanakan sistem keselamatan rumah pintar berasaskan IoT. Objektif tesis ini adalah bagi mereka bentuk dan melaksanakan sistem yang memberi pemberitahuan sekiranya penceroboh dikesan berhampiran rumah mereka, untuk menghasilkan sistem yang memberi amaran suara sekiranya sebarang pergerakan dikesan dan pengguna boleh mengawal lampu mereka menggunakan telefon pintar mereka. Terdapat dua sistem yang dihasilkan, satu mempunyai sambungan internet dan tanpa sambungan internet. Bagi sistem dengan sambungan wayar, pengguna akan menerima pemberitahuan sekiranya pergerakan dikesan melalui telefon pintar, twitter, dan emel mereka. Seterusnya, pengguna boleh mengawal lampu mereka menggunakan telefon pintar mereka. Bagi sistem tanpa sambungan internet, amaran suara akan dikeluarkan sekiranya sebarang pergerakan dikesan di sekitar rumah pengguna. Sistem ini sangat membantu sekiranya terdapat masalah dengan peyambungan internet. dengan mempunyai sistem ini di kediaman, penduduk akan berasa lebih selamat untuk meninggalkan rumah mereka untuk masa yang lebih panjang kerana mereka masih boleh mengawasi rumah mereka dan menerima pemberitahuan sekiranya penceroboh dikesan

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ABBREVIATION

IDE – Integrated Development Environment

IoT – Internet of Things

LED – Light Emitting Diode

GUI – Graphic User Interface

GND – Ground

Vcc – Supply voltage

CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

This part is about an introduction to this project which is Smart Home Security System Based on IoT. In this chapter, brief explanation related to this project will be given.

1.1 BACKGROUND

In this technology era, smart home alarm is increasingly recognizable in many residences. With the help of internet of Things (IoT) it helps a lot more in many aspects. Typically, IoT is expected to offer advanced connectivity of devices, systems, and services. It also is expected to usher in automation in nearly all fields. Arduino Uno is enabling next generation of devices being integrated on the internet to make smarter home alarm.

This smart home security system will help in preventing intruder into the house. Firstly, when there is intruder detected entering the house, voice alert will be activated to scare the intruder. Notification will be send to house owner about the intruder. House owner can turn on or off their home appliances like light and play sound to make the house look lively. Furthermore, house owner can check the status of his/her home appliances from their phone. This is for validity of the status of home appliances. Owner will stay at ease by knowing the status of their home appliances.

Smart home alarm is build using Arduino Uno connected with ethernet shield for cable connection. Ultrasonic sensor HC-SR04 to detect movement and SD card module to make sound be heard from speaker also connected to Arduino Uno.

1.2 OBJECTIVES

- To design and implement a system that notifies user when there is intruder near the house
- To implement a system that will give sound alert when there is motion detected
- To implement system than can turn on and off light from user's mobile phone.

1.3 PROBLEM STATEMENT

Nowadays, case of robbery in Malaysia is increasing from year by year. House theft fall to ranking number two after snatch theft based on Types of Crimes Experiences statistic. [1]

TYPE OF CRIMES EXPERIENCED	2012 to 2014 %	2005 to 2011 %
House theft	42.4	42.7
Snatch theft	76.4	70.8
Car theft	21.5	26.0
Theft in a taxi	9.0	4.2
Other theft	16.0	20.8
Physical assault	27.8	21.9
Rape	2.1	1.0
Other crime	16.0	8.3

Note: Only for those with direct experience of a crime

Figure 1.3-1:Statistic of crimes experienced [1]

This will make residents afraid to left their home for a long time. This smart home security system will activate voice alert when there is any movement detected near the house and notification will be send to house owner about the intruder. House owner can turn on or off their home appliances like light and voice alert is play automatically to make the house look lively. Thus, will scare the intruder and prevent them from entering house.

1.4 SCOPE OF PROJECT

This project will include be divide into hardware and software. The details will be discussed in this subchapter.

❖ **Software:**

▪ Control Devices

All phones can be used to control home appliances.

▪ Arduino IDE

Arduino IDE is used for inserting coding to Arduino UNO. The coding is written in Java and based on processing and another open-source software. This software also can be used with any Arduino board.

❖ **Hardware:**

▪ Arduino UNO

Basically, Arduino Uno is the most important hardware in this project, because it is used to connect all other hardware and make it function together as a complete system. Arduino Uno also as the platform for connecting the hardware to internet to make it become based on IoT system.

▪ Audio

- ✚ Voice alert to scare intruder

Audio source will be insert in SD card module with speaker attach to produce the sound. When there is any movement detected by the ultrasonic sensor, it will give data and activate the sound.

- **Lighting**
User can check the status of the light inside the house. Other than that, user can also take control of the light system.
- **Network**
Home line will be connected to ethernet shield that connected with Arduino Uno.
- **Phone**
User will receive message when there is intruder at his/her house. User can control appliances from his/her phone

CHAPTER 2

LITERATURE REVIEW

Chapter 2 is about theory and literature review. This chapter will give explanation about the journal or article that related to this project's field of study and the advantages and disadvantages of the research article.

2.1 THE INTERNET OF THINGS



Figure 1.0-1: The Internet of Things [2]

Based on D. Bandyopadhyay and J. Sen (2011), the expression Internet of Things (IoT) envisions a dream without bounds where connecting physical things, from banknotes to bike, through a network will give them chance to take dynamic part in the internet, trading data about themselves and their environment. Unquestionably, the main strength of the IoT vision is the high impact it will have on several aspects of every-day life and behavior of potential users. The most obvious effects of the IoT will be visible in both working and domestic fields such as assisted living, smart homes and offices, and e-health. [2]

While, K. Ashton (2009) said that internet was something more than a decent way to get executive attention. Today computers and internet completely subject to human beings for information. Nearly all the roughly 50 petabytes (a petabyte is 1024 terabytes) of information available on the Internet were first captured and created by individuals by typing, pressing a record button, taking a digital picture, or scanning a bar code. [3]

Next, L. Atzori, A. Iera and G. Morabito (2010), defined that, the IoT is a current correspondence worldview that imagines near future, in which the objects of regular day to day existence will be furnished with microcontrollers, trans receiver for digital communication, and suitable protocol stacks that will make them ready to speak with each other and with the users, turning into an integral part of the internet. The IoT concept, hence, goes for making the internet significantly more immersive and inescapable. Furthermore, by empowering simpler get to and collaboration with a wide assortment of gadgets such as, for example home appliances, observation cameras, monitoring sensors, actuators, displays, vehicles, et cetera, the IoT will encourage the improvement of numerous applications that make use of possibly tremendous sum and assortment of data generated by such objects to provide new services to citizens, companies, and non-government sectors. This paradigm without a doubt discovers application in a wide range of

areas, such as home automation, industrial automation, medical aids, mobile healthcare, elderly assistance, intelligent energy management and smart grids, automotive, traffic management, and many others. [4]

2.1 LITERATURE REVIEW

From the project with title Human Detection by Measuring its Distance based on IOT by Pingle, Y., Ogale, T., Singh, N. C., Sandimani, S., and Shirsath, V. One of the advantage of their research is that data can be stored and used intelligently for smart monitoring. Moreover, they used IoT that make communicating with each other over a wide distance or range is possible. However, their disadvantage is that they lack details and no new features implement. Moreover, not all devices can connect for security purpose. [5]

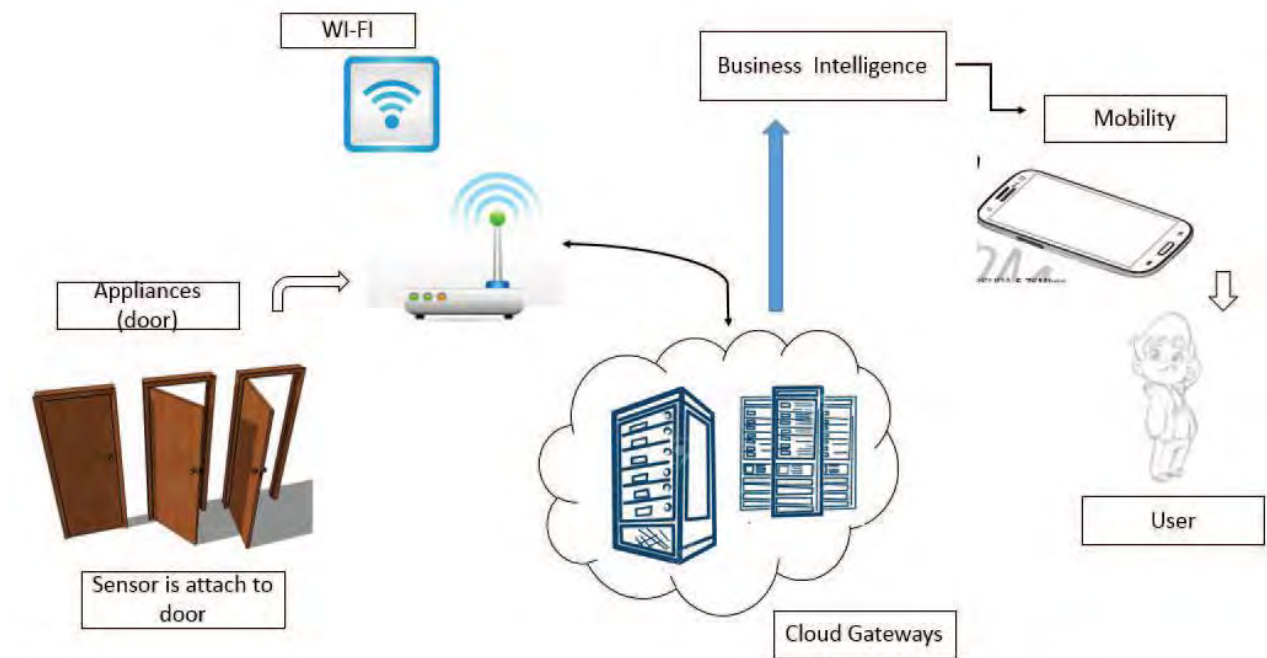


Figure 1.2.1-1: Basic Architecture of The System [5]

Next, from project with title Multi-Functional Secured Smart Home by Shariq Suhail, M., Viswanatha Reddy, G., Rambabu, G., Dharma Savarni, C. V. R., and Mittal, V. K. Advantages of their secured smart home is that Wireless technology (GSM) is utilized to send messages and calling. This

offers chance to the owner to get alarms regardless of their distance from his house. Also, it is not so expensive to send an SMS, the system is cost effective. Even if an intruder de-activates the system by entering the correct password in less than three attempts then also an SMS is sent to owner as "System de-activated", so that the owner can respond fittingly and as snapshots are sent to the mail of the user, it beats the issue of false recognition by the sensors if any. The disadvantage is SMS alerts are sent if and only if there is no network problem. In case of any network problem alerts could not be received by the owner and checking image through mail is likewise impractical if there is no internet connection. [6]

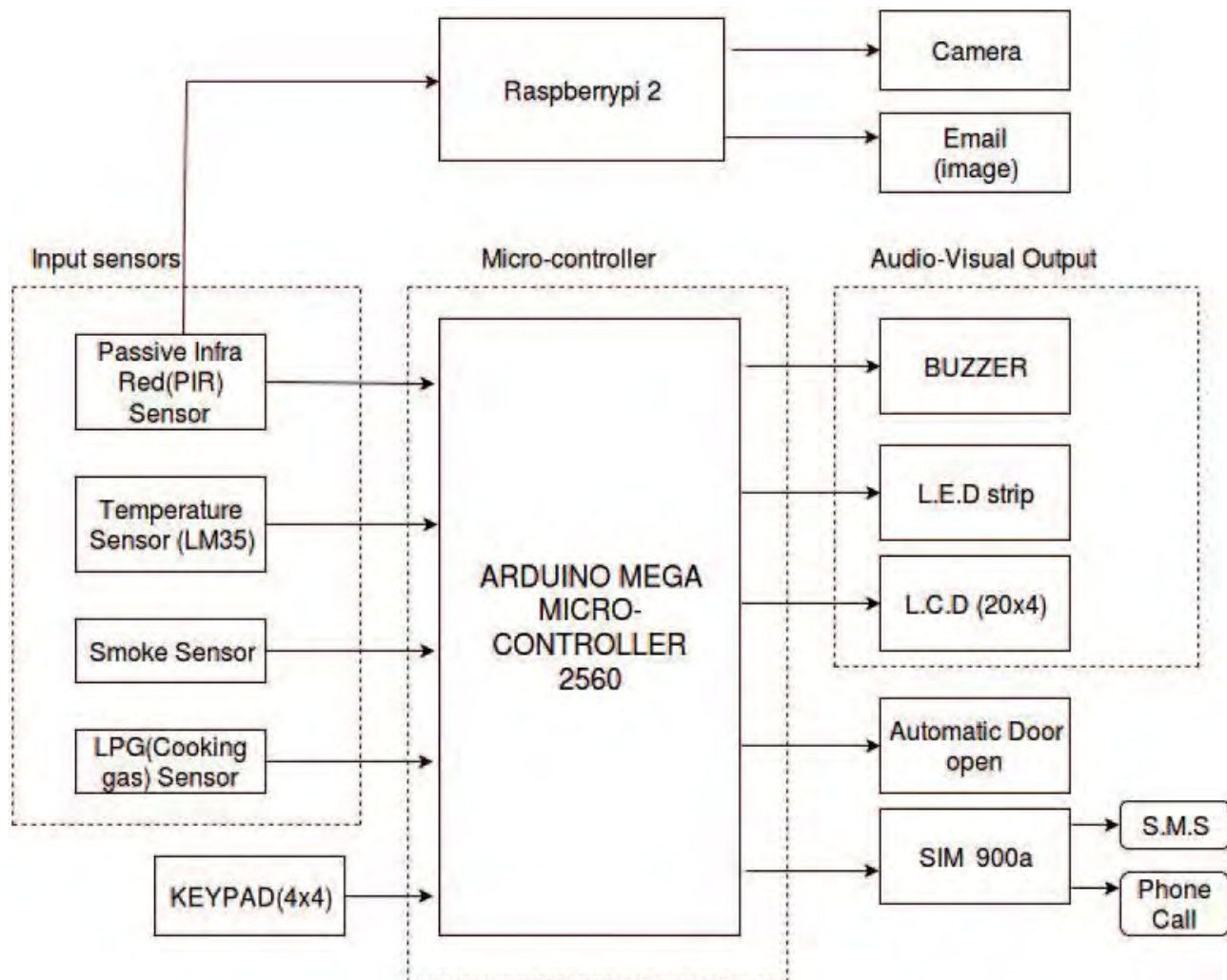


Figure 1.2.1-2:Block Diagram of Proposed Secured Smart Home System [6]

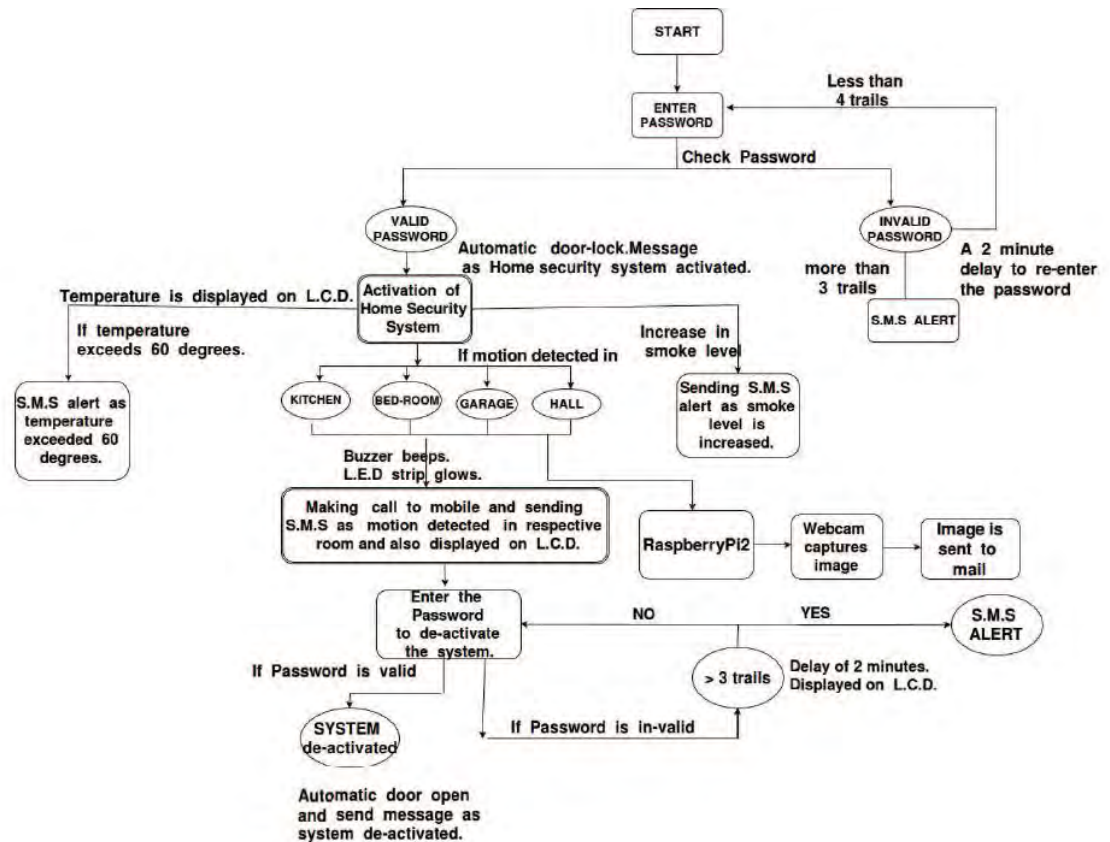


Figure 2.1-3: Software Flow Chart for Secured Smart Home System [6]

Based on Chowdhry, D., Paranjape, R., and Laforge, P. from project title Smart home automation system for intrusion detection. Advantage of their project is the system allows home owner to access the state of home appliances and change them from anywhere at any time. Moreover, the system is of simple architecture, inexpensive and requires no human invention. The disadvantage is that it is substantially difficult to achieve good detection rate in real-time scenarios due to unconstrained illumination. [7]