SMART HOMERITY

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ABSTRACT

This application is name as 'Smart Homerity' where it is an anti-burglar concept implementation with using simple device and easy to get. There are act as security camera whereas the camera will captured image of the burglar, and uploaded to Dropbox and act as notified to the client as the device will send the text messaging to notifying the burglar/intruders unauthorized/ illegally enter the house. This application will worked together as a simple anti-burglar device with easy relocate-able sources. These will aware the client how important is home security for their life, property and family member. There are several problem statements related to customer requirements. Clients are lack of awareness of thief protection as it is one of most favourable home crime nowadays thus this device will assists client to have security for themselves. Client will face many losses of his/her valuable properties due to not implementing any security device inside the home/ workplace. Last but not least, most of the clients are comes from very busy person with difference working background, they does not have any time to monitor their self-belonging due to its busy working hours. The objectives for this system are to design a monitoring system using Arduino, webcam and motion sensor devices; to design a SMS notification system uses an API communication, python language and AVR programming and to develop a comprehensive security system by integrating Arduino, webcam, text-messaging and cloud storage. The methodology that has been chosen is V-model. The V-model model is based on association of testing phase for each corresponding development stage. That means for each stage will have their own respectively suitable testing phase. Both verification and validation process will be used for the development as this processes will make clear path of the development process. V-model makes better understanding besides high in simplicity rather than compactness. During testing phase, User Acceptance Test (UAT) has been conducted to test the system integration and interaction between client and system behaviour. Output can be classified as a result of the system. As a result, Smart Homerity successfully detects motion from human movement, sends SMS notification via API communication, save locally images into SD card and successfully uploaded to Dropbox. PIR motion sensor will detect motion when there is movement around it. From the motion detection, it will trigger the system by captured the images by using webcam. The images will be stored in SD card as a backup before upload it into the Dropbox. At the same time, a SMS notification will be send to the house owner phone number. The process will be continuously if the motion is detected.
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<td>GCC</td>
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<td>GPRS</td>
<td>General Packet Radio Service</td>
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<td>GSM</td>
<td>Global System for Mobile Communication – Groupe Special Mobile</td>
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<td>HTML</td>
<td>Hypertext Mark-up Language is a mark-up language used to design static webpages.</td>
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<td>HTTP</td>
<td>Hypertext Transfer Protocol is a transaction oriented client/server protocol between web browser &amp; a web server</td>
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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Smart Homerity is a security device that protects your self-belonging, family members, home or company by using simple low budget materials. Smart Homerity do more than keep you and your family safe and secure. This system is easy enough for every client to operate, providing a level of simplicity and convenience you will really appreciate. Smart Homerity is mainly used for theft protection for the client self-belonging from being stolen by thief. This system can be setup somewhere in your home or outside of the house of the owner, connect to your Wi-Fi network and then gain access your own Dropbox. Apart from that, the device catalyses by human motion as a sensor to the device alarm and then send notification through text-messaging via smartphone.

The first application for the Smart Homerity will be an advanced rendition of standard errands for the security cam by taking pictures when some movement is recognized. The device will store images taken by the USB camera on a micro SD card inserted into Arduino Yun card slot. Besides that, these images will be automatically uploaded on a protected location (Dropbox) as evidences by using Python language.
The second application that will implement to Smart Homerity is text messaging notification via smartphone. This will be done by register a Temboo and Twilio account that allow the activity to be done for sending text messaging. Once the motion detected, Arduino Yun will send the notification to user via smartphone by stating that intruders are in the house/ any thief movement.

Smart Homerity will be advantages to client as it will protect their safety among members plus enhance the security of the client’s places. By having this device, thief protection will be improved efficiency and highly secure for client’s needs.

1.2 PROBLEM STATEMENT

There are several problem that arise when security of property is relates. Thus, Smart Homerity that will be developed based on the problems:

I. Clients are lack of awareness of thief protection as it is one of most favourable home crime nowadays thus this device will assists client to have security for themselves. So, this will increase the level of secure for them and may reduce the number of cases for intruders.

II. Client will face many losses of his/her valuable properties due to not implementing any security device inside the home/ workplace. This is because there is no security protection that worked well when they are not in home. It will give a chance to intruders to make crime.

III. Most of the clients are comes from very busy person with difference working background, they does not have any time to monitor their self-belonging due to
its busy working hours. So, by having this device, client can get notification alerts from devices and some evidence about the intruders.

1.3 OBJECTIVE

The objectives of the project are:

i. To design a monitoring system using Arduino, webcam and motion sensor device.

ii. To design a SMS notification system uses an API communication and AVR programming.

iii. To develop a comprehensive security system by integrating Arduino, webcam, text-messaging and cloud storage.

1.4 SCOPE

The scope of this project has been research. There are two scopes for this device; user and system.

a. Scope for user

The device only has one user which is a House owner.

i. House Owner
• Receive notification when human motion detect.
• Retrieve evidence from Dropbox if emergency cases.

b. Scope for device

The project has its requirement for software and hardware. There are:

i. Software
   • Google Chrome
   • Temboo
   • Dropbox
   • Twilio
   • Microsoft word
   • Microsoft project
   • Microsoft PowerPoint
   • Draw.io
   • Arduino
   • IBM Rational Software Architect

ii. Hardware
    • Smartphone
    • Laptop
    • USB Webcam
    • Memory SD Card
    • Arduino Yun Board
    • Motion Sensor
    • Jumper Wires

iii. Tools
     • Hobby knife
     • Glue gun
     • Wire cutter
1.5 REPORT OUTLINE

This project consists of five chapters:

Chapter 1 consists of the general overview about of the project. In this chapter, the problem statement is identified. After that, the objective and scope will be characterized by refer to the problem statement. The scope is stated clearly in this chapter.

Chapter 2 consists of literature review about the existing system/device. In this chapter, the current systems are listed. The enhancement of the current systems proposed. Lastly, in this chapter, we also will discuss about the current system/device.

Chapter 3 consists of research methodology that is used in developing this project. This chapter will clarify more about methodology that I used to relate the system development, idea that will apply on device and method that suitable to be executed.

Chapter 4 consists of implementation and result discussion of the system. This chapter will related with SDD to show the flow of the development of Smart Homerity and testing conducted during the development done. This chapter also will discuss the output of the successful respond from User Acceptance Test (UAT).

Chapter 5 consists of conclusion of the whole chapter.
LITERATURE REVIEW

2.1 INTRODUCTION

This chapter will discuss about the selected existing system and current system and the relationship between the systems. It is to find some of the weakness of the existing system and to enhance the currently system to be more efficient and better performance. Three systems have been chosen during these researches which are Arduino Wireless Home Security System, Wireless Security Camera with Arduino Yun and GSM Home security Alarm System with Arduino.

2.2 EXISTING SYSTEM REVIEW

There is several existing system that will be analysed and compared between them in order to get a view of the new system that will be developed.
2.2.1 Arduino Wireless Home Security System

Arduino Wireless Home Security System is a simple anti-theft device for home security. PIR motion sensor is used to detect the human motion then transmitted without wire by using a RF transmitter-receiver module to give some sort of alert. For this device, RF module for wireless communication being used because compared to the existing wireless systems like Bluetooth, XBee or WiFi. Plus, it saves cost and very user friendly simple device. This device consumes of transmitter and receiver since one of them will used to detect human motion.

![Figure 2.1: PIR sensor flow](image)

The transmitter consists of PIR sensor to detect the human motion, Arduino to process the data from PIR sensor and RF transmitter to transmit the data to the receiver. Passive infrared sensors work by measuring approaching infrared from human or creature. They do not radiate energy themselves, which is why they are called "Passive". Passive infrared sensors detect this energy and give a sign to the Arduino.
Figure 2.2: Device respond when motion exist

Figure 2.3: The device being tested

Above figures show how the sensor detect the human motion. The buzzer in the receiver board starts to make and produced "beep" sound. The red light led will appear (deba168).
2.2.2 Wireless Security Camera with the Arduino Yun

Wireless Security Camera with the Arduino Yun is another one anti-theft home security device that implemented with USB webcam for video streaming and captures intruder pictures. This device will be connected to a standard USB webcam and a PIR motion sensor detector to create this application. This security camera will automatically upload pictures on Dropbox when motion is detected in front camera. Then, web camera will streams video on a YouTube event, so that client can monitor their home during their workplace.

![Image showing file structure](image)

Figure 2.4: Dropbox account will used to store the captured pictures via webcam.

The expectation for the first features (capturing the pictures) to take place whenever some motion is trigger by the PIR motion sensor. Apart from that, the images will store locally on the SD card, before uploaded it to Dropbox. Python script code will be used during the implementation for this device. It is much easier to upload files to Dropbox using Python than directly from Arduino sketch if using the Python language.
Second feature is a camera stream video live on the YouTube. The device will produce the camera stream video locally, and then convert this stream to the computer using software called Wirecast, which will finally stream the video to a YouTube live event. In Wirecast, client can add new “Web stream” with the following parameters: HTTP protocol, Motion JPEG format, and "nameofyourYun.local:8080/?action=stream" as the URL. (Schwartz, 2013)
2.2.3 GSM Home Security Alarm System with Arduino

The developed system makes use of an embedded system (microcontroller and a gsm modem) based on Global System for Mobile communication (GSM) technology. This device deals with the design & development of a theft control system for home, which being used to prevent/control any theft attempt. The designed & developed system can be installed in the home. An interfacing intrusion-detector unit is also connected to the microcontroller-based security system. Regarding an attack attempt, a notice message has transmitted by the system (as the text messaging) towards the owner's cell phone, or to be able to any pre-configured cell phone number intended for further control. (Hareendran, 2010)

![Diagram of Home Security System using GSM Technology](image)

Figure 2.7: Features flow Home Security System using GSM Technology

This security system contains an Arduino Uno microcontroller and a standard SIM900A structured GSM/GPRS modem. The full system is usually powered coming from any 12VDC/2A power unit/battery.
Whenever input power is applied to the system, the system retreats into standby setting. However, if your terminals involving connector J2 usually are short circuited, the pre-programmed alert message is actually automatically transmitted towards concerned cell phone number. The circuit is highly-flexible to be able to use any kind of SIM900A modem. (Ang, 2014)

2.3 LIMITATION FOR THE EXISTING SYSTEM

This section will discuss the limitation from the existing system that have been analysed and compared.
2.3.1Arduino Wireless Home Security System

For this device security system, there are several limitation on how it working. Below are the weaknesses for the device:

I. Two Arduino type (same/different) must be used so that the device can be worked properly
   - The reason being one Arduino is employed as a new transmitter, to sense this human movement and send data to receiver.
   - On the other arms, another one Arduino act as a recipient, to obtain the data via transmitter and also activate security alarm.
   - It means two Arduino must be placed nearly between them as there worked as a partner.
   - If there are place very far away from each other, for sure the system will not respond to any human motion and system will be failed to work.

II. Costs for development items are too high.
   - There are too much of items and materials that have been used for the development. Plus the items also rarely found in Malaysia’s market such as 433 MHZ RF Transmitter and Receiver Module.

III. Only worked at limited small range
   - The buzzer only worked/respond with beep sound when those two Arduino are placed nearby.
   - The range without antennae is very limited. Thus to enhance the range, an antenna should be put on only at the TX or RX module. Thus, this will increase the total cost for the new implementation of antenna.
IV. Not a portable home security device

- The device only worked by producing the beep sound when intruders try to take their properties. But what happen if the client is not at home? They should consider this is one of the problem may be faced if the client was a workaholic person.

- The device can be implemented the GSM module/text messaging notification via their smartphone as a solution so that client can monitor their house from their workplace.

2.3.2 Wireless Security Camera with Arduino Yun

For this device security system, there are several limitation on how it working. Below are the weaknesses for the device:

I. No beep sound notification

- I think it is necessary to have the beep sound on every security device so that client will aware for every unauthorized intruder when they are at home.

- Beep sound will trigger owner action as they will quickly react to that emergency sound.

II. Limited range to capture the pictures

- Some webcam have limited range for captures whole picture. Thus, a better and quality might be better to implemented into the device.

- For sure, the cost will be much greater compared to the origin device since the change of the webcam.