UNIVERSITI TEKNIKAL MALAYSIA MELAKA

SMART ANTI-THEFT SURVEILLANCE SYSTEM

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

by

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2016

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **Smart Anti-Theft Surveillance System**

SESI PENGAJIAN: **2016/17 Semester 1**

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This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree Bachelor of Computer Engineering Technology (Computer Systems) with Honours. The member of the supervisory is as follow:

…….

(Project Supervisor)

ABSTRACT

Closed-circuit Television (CCTV), also known as camera surveillance, is the use of video cameras to transmit a signal to a specific place, on a limited set of monitors. It is also used to be monitored from control room to observe and monitor place that need to be secured. Motion detection is the process of detecting a change in the position of an object relative to its surroundings or a change in the surroundings relative to an object. In this modern age, a system that is more secure is a must. Nowadays CCTV is to monitor object from distance place, but now a camera that can monitor and detect body motion so that any unauthorized person cannot simply enter prohibited area also an obligation. This new research is focus to improve camera security system (hardware) which can detect human presence instead just recording it then trigger an alert to the control room or user using electronic mail system. It is also being hope to save the number of memory's storage being used for surveillance system. By using passive infrared, PIR and infrared, IR obstacle detection sensor. PIR is a sensor that can detect presence of body motion inside its coverage of wide lens. This will initiate an input to the Arduino Uno about the presence of motion. Next is the using of IR sensor where it turn High when there is something collide with its infrared ray which can be used to differentiate the height between animal and human. The expected result to be obtained is the sensor will be able to detect the human body motion and save the picture. This chapter mainly covers the general background of this project, the problem statement, objectives, scope, project significance and conclusion.

ABSTRAK

Kamera litar tertutup, atau turut di kenali sebagai kamera keselamatan adalah video kamera yang digunakan untuk menghantar isyarat kepada suatu tempat dan dilihat menggunakan set paparan yang terhad. Kamera ini juga digunakan untuk pengawasan dari billik kawalan untuk memerhati dan merakam tempat yang perlu dilindungi. Pengesanan gerakan ialah suatu proses dimana perubahan tempat oleh sesuatu objek dikesan atau perubahan kawasan sekeliling yang berkaitan dengan objek. Di dalam arus perdana ini, satu sistem yang selamat adalah suatu kewajipan. Masa kini, kamera litar tertutup hanya digunakan untuk menngawasi sesuatu dari jauh, tetapi sekarang sudah tiba masanya untuk kamera keselamatan mempunyai keupayaan untuk mengawasi dan mengesan objek bergerak agar orang yang tidak berkaitan tidak dapat masuk kawasan larangan dengan mudah. Kajian baru ini ialah berfokuskan untuk menaik taraf kamera keselamatan yang boleh mengesan pergerakan kehadiran manusia berbanding hanya merakam dan seterusnya mengeluarkan bunyi amaran kepada pengguna kamera keselamatan ini. Projek ini juga diharapkan dapat membantu dalam menjimatkan ruang simpanan memori data untuk sistem pengawasan menggunakan kamera litar tertutup. Dengan menggunakan beberapa pengesan yang baik seperti pasif sinar inframerah dan sinar inframerah pengesean halangan, projek ini mampu mencapai objektif yang ditetapkan.

DEDICATIONS

Alhamdulillah, praise to the Almighty Allah S.W.T

This project is dedicated to:

My parents,

My beloved family,

My Supervisor,

My lecturers,

And all my friends

Thanks for their encouragement and never end support.

ACKNOWLEDGMENTS

I would like to express my gratitude towards the following groups of people which not only given me continuous support and guidance throughout the entire course of this project. First and foremost, I would like to thank and grateful to Allah SWT for the great health and ability in completing this paper. I would like extent my deepest appreciation to my beloved parents, Mr. Mohd Hashim Bin Effandi and Madam Adawiah Binti Mohd Noor who always pray for my success in this research study. To Mr. Aiman Zakwan Bin Jidin who is my supervisor who not only guided me but also provided me the knowledge about coding, teach me how to use each of software and experience that help in this research project. Next is my lecturer Mr. Shamsul Fakhar who always become my source of reference. Besides that, my fiancée Nur Hafizahanis Binti Marjumin who always give me spirit to complete this project. Not forgotten to my best friend, Wong Shao Pei, Ashwadie and Ahmadee who always teach and guide me in solving the problems happened during this study. Last but not least, others staff and friends in Fakulti Teknologi Kejuruteraan, FTK that always help me when I need them.

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LIST OF SYMBOLS AND ABBREVIATIONS

CCTV	=	Closed Circuit Television
HD	=	High Definition
GSM	=	Global System for Mobile
IDE	=	Integrated Development Environment
SMS	=	Simple Message System
IDS	=	Intrusion Detection System
Hz	=	Hertz
CMOS	=	Complementary metal-oxide semiconductor
PC	=	Personal Computer
K	=	Kilo
Webcams	=	Web Camera
NKRA	=	National Key Right Action
I/O	=	Input and Output
B	=	Bytes
TDMA	=	Time Division Multiple Access
SIM	=	Subscriber Identity Module

CHAPTER 1
INTRODUCTION

1.0 Introduction

As increasing economy growth of Malaysia but there is still also increasing the percentage of crime. This thing should not happen because when one country is stable in economy the crime rate should be low. Surprisingly, with the high technology nowadays CCTV for surveillance system there is still not a solid answer to fight the increasing crime rate. Camera that being used for surveillance system is comes with different quality of image and video that can be recorded. Even for high resolution 1080p or High Definition resolution camera intruder still can enter the restricted area.

This is happen because when the intruder or burglar enter a home when owner outside the house, usually they will wear mask to cover their face. The items or precious belonging still can be stolen during the CCTV is monitored and recording the crime action. This leads to a motivation to study and develop this project by improve and upgrade the normal surveillance security system to a smart anti-theft surveillance system by adding features like detect human body motion and trigger an alert after the intruder being detected.

This smart anti-theft surveillance system is can be an answer to help in reducing the theft problem. PIR and IR sensor will detect the body motion that has been created by intruder. The theory is that the camera will detect the human body movement by read the input from PIR sensor. Then IR obstacle detection will be set to a certain high of normal animal or pet‘s height to distinguish human and animal. With today high technology camera it is no more difficult to get the image of criminal but it is a hard to

detect the presence of criminal. By using simple sensors, it will be used to detect the presence of intruder. Once the sensors is in high state, the camera will take a snap of scene happened.

This project is able to make user save memory storage capacity for surveillance system. The system only snaps or takes picture when the crime is happened. The image taken will be saved in JPEG image format. For surveillance camera system, usually they will monitor and recorded scene then save it in hard disc. For 1080p resolution they will use 1Tb of memory capacity for one week and if nothing happen they will reset it back every 7 days. This leads to no recorded scene that are last longer more than 7 days. To overcome this storage issue, engineer all around the world try to make the recorded scene of surveillance camera system is stored in cloud. Contradiction for cloud storage is it may be stolen by third parties and it still gets a price tag for the service to store data in there.

Arduino GSM will acts as microcontroller application where it will receive the information from the program inside the camera that the presence of human motion is being detected. Next it will trigger alerts to the user by SMS and to the intruder by using buzzer. By this way, it will skip the part where a normal surveillance system relies on third party like security guards or the owner itself to trigger an alert. Imagine that one security guard need to monitor for 10 monitor display that show the video recording from 10 different CCTV for 8 hours in monitoring security room. This will lead to human error where the security guard will feel exhausted and did not realize that the intruder already enter the restricted area. Furthermore, for wireless CCTV application for home usage even the owner can monitor from outside the house but still it will has difficulty to monitor 24 hours.

By this way, it will skip the part where a normal surveillance system relies on third party like security guards or the owner itself to trigger an alert. Imagine that one security guard need to monitor for 10 monitor display that show the video recording from 10 different CCTV for 8 hours in monitoring security room. This will lead to human error where the security guard will feel exhausted and did not realize that the

intruder already enter the restricted area. Furthermore, for wireless CCTV application for home usage even the owner can monitor from outside the house but still it will has difficulty to monitor 24 hours.

This project will focus on how to study and developing the camera that can detect human body motion and trigger an alert. The review is on the smart anti-theft surveillance system based on the PIR sensor and IR sensor, Arduino Mega and GSM module. The real time system is a must for security system manner as a delay might not be forgiven because the criminal will have high chance to escape.

Figure 1.0 Security guard monitors the normal camera surveillance system

1.1 Problem Statement

For a growing economy country, a reliable monitoring security system is a must to protect their goods and assets from being harmed or stolen. Nowadays technology surveillance camera is only for monitoring and recording any activities that happen in the marked area. Hence, a surveillance system nowadays needs an improvement to make a safer environment for public or industry.

One of main problems for standard surveillance system is it cannot detect body motion or any movement made by human. Even high-tech camera that built to record a High Definition image and video cannot detect a human body-like. This improvement

cannot help to solve unauthorized person that enter prohibited area to steal something because the surveillance system used just record and monitor.

Next problem is alert only can be triggered when third party (security guard or police) or user itself turn it on. This reaction even it is happen during crime scene but it is always too late as the criminal already escaped. The basic idea for improvement in this project is to detect the human movement and trigger an alert when an intruder enters into restricted area. After the camera can detect the intruder, the system inside will trigger an alert through Simple Message System, SMS. This will allow direct information of intruder to the user or owner of a building. Thus, the possibility of intruder case can be decrease.

1.2 Objective

There are only three objectives that are determined and needs to be achieved at the end of this project. The objectives of this project are as below.

1. To study on how to make a surveillance system camera that can detect human-like motion and give alert to the user about intruder.
2. To develop an efficient Smart Anti-Theft Surveillance System security system that can detect a body motion and trigger an alert when an intruder enter restricted area.
3. To analyze the effectiveness between body motion detectable surveillance system and normal surveillance system.

1.3 Work scope

This project is smart anti-theft surveillance system which it will be based on PIR sensor, IR sensor, GSM module and Simple Messaging System, SMS. The scope of this project is to cover cases study through the literature review and journals on the security system involving surveillance camera and sensors.

Furthermore, the work scope of this project also want to study the on how to develop a body motion camera that can help to improve surveillance system nowadays. This system will try to catch presence of the human body movement and it makes it as an input to trigger the alert. Hence, user will feel secured as it will notice when intruder trespass the restricted area.

This project can be divided into two main parts which is software and hardware development. In software part, it will focus more on create part in Arduino IDE which can control camera, sensors and coding for SMS. Second part is hardware part where after the camera receive input from human movement it will send a SMS to user by using GSM module by Arduino. Next is the hardware like buzzer will be turn on when it receive input from the sensors. Combination of PIR sensor and IR sensor with ability to detect human movement. User will receive alert from GSM by SMS after intruder(s) entered into restricted area. For testing part, this project will use two subjects as intruders that try to break into room in high intensity of light and low intensity of light. This difference environment is to show the ability of this project to be used in day and night. As to conclude this project will have these features:

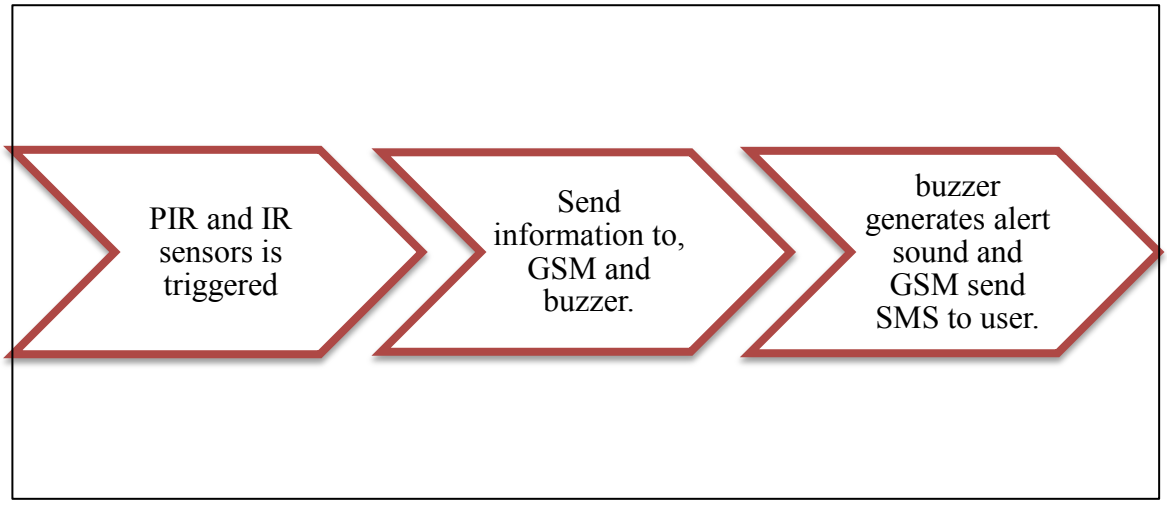

Figure 1.1: Block diagram based on camera surveillance system, GSM and buzzer

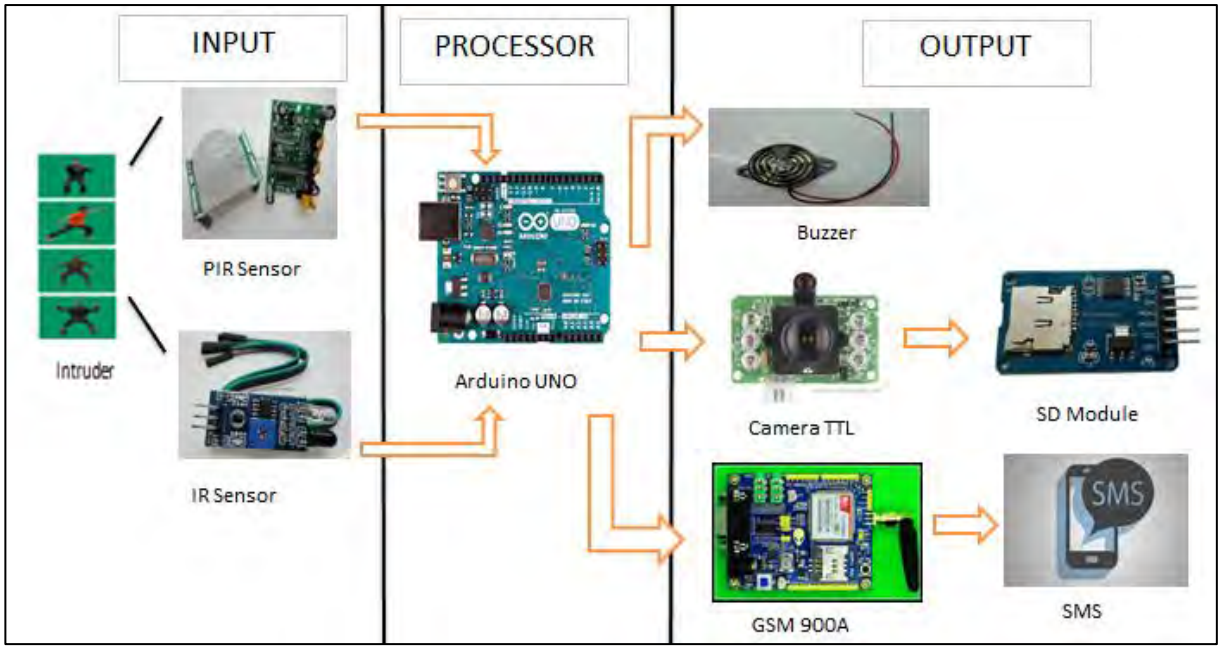

Figure 1.2: Block diagram for this project's process

1.4 Project Significance

The significance and important of this project is to help public and industry to protect their valuable belongings. Every person has their own precious things to be protected. Based on chapter 6 in National Key Right Action, NKRA crime case involving robbery or stolen vehicle inside house area show 70% crime rate percentage from all crime case in Malaysia. Major case from 70% is house or building that is fully installed CCTV system. This leads to insecurity feeling in every Malaysian where there is still trustable answer to reduce this number of crime case. Main idea to do this project is from this report in chapter 6 in NKRA where improvement on normal camera surveillance system is a must to help public feel more secure. By study to improve this normal camera surveillance system to body motion detectable camera and in the same time trigger an alert which is more effective than just rely on third party like security guard. To make this project can be achieved to help public, the system must:

- The smart anti-theft surveillance system must have camera that able to detect human body motion.

- Snap only human body shape not animal shape.
- Trigger an alert at location area to give warning to the intruder
- Send an alert in email form to the user to inform the situation happen.
- The trigger must be in real time.

In today nowadays where mobile phone have been upgrade to smartphone, 3G connection to 4G LTE and from normal television display into High Definition. Now it times for camera surveillance system to be upgrade to body motion detectable camera surveillance system in help public to protect their belongings. By this, public can go anywhere without need to be worried the precious belonging being stolen.

In term of researcher, it is hoped that this project will open the eyes to other inventors and researcher in the future to improve the security system that we have today. This will lead to a lot benefits as crime rates also can be reduced. This also as prove where science and technology can help public in fight the crime.

By completing this project, I hope that I can help industry and public in to protect their items by this smart anti-theft system. This system is more focus on how to detect the body motion then trigger an alert to the user. Hence, the user will keep updated about the security of their belonging even far from home.

1.5 Conclusion

A deep researching and better understanding about the project will help student to fully understand on how the project should be done and gain more knowledge from that. The limitation like time, cost and subject might be a big challenging to the student to accomplish this project. The chapter 1 or introduction chapter covers the background, problem statement, objective, scope and project significance. All these elements will help reader getting know the main idea and concept on how this project will be conducted. With all the information being discuss and elaborate in details will make it easier to understand on how this smart anti-theft surveillance system performing. Next for chapter 2, the literature review will explain more about the surveillance system,

camera history, CCTV, GSM module, PIR and IR sensor, SMS, related research and related project. The approach and method applied in this project are present in the Chapter 3 which is methodology. Last but not least, the results and discussion will cover in Chapter 4 while the last chapter will covers the conclusion and recommendation.

CHAPTER 2

LITERATURE REVIEW

In this chapter, the theory will be discussed regarding this project, which reveals the knowledge that gained via resources from reference book, journal, articles, newspapers, and websites that contain application, research work, and related theories. Gain knowledge and study about the related theory of surveillance system, camera, PIR sensor, IR sensor, GSM, SMS, related search, programming language, people behavior, hardware requirement and existing technology.

2.0 Introduction

In this project, some studies and research information had been done in order to make the project become reality and successful. This study and research will focus more on some major aspect and component that related to the project. To make a great outcome every rational idea and theory being compared among it and the best will be chosen to be selected to be used in this project.

2.1 Motion Detection

A moving object is can be defined by a changes slightly or major in photometric brightness from its environment, the motion its generated is able to be detected through motion sensor that able to identify the change in luminance at a certain point on the