INTELLIGENT AUTOMATED GATE SYSTEM

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JUDUL: INTELLIGENT AUTOMATED GATE SYSTEM

SESI PENGAJIAN: SESI 2016/2017

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INTELLIGENT AUTOMATED GATE SYSTEM

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This report is submitted in partial fulfillment of the requirement for the Bachelor of Computer Science (Computer Networking)

FACULTY OF INFORMATION AND COMMUNICATION TECHONOLOGY
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DECLARATION

I hereby declare that this project report entitled

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is written by me and is my own effort and that no part has been plagiarized

without citations.

STUDENT : _____ Date : 22/8/2017

(LIM CHONG GEE)

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I hereby declare that I have read this project report and found

this project report is sufficient in term of the scope and quality for the award of

Bachelor of Computer Science (Computer Networking) With Honours.

SUPERVISOR : _____ Date : 22/8/2017

(ERMAN BIN HAMID)

DEDICATION

In the name of God, the Most Gracious, the Most Merciful. This project is dedicated to my beloved parents, siblings and my supervisor who always support and inspire me along the way. Without them I would never able to finish this project.

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ACKNOWLEDGEMENT

First and foremost, I would like to thank my supervisor, En Erman Bin Hamid for the valuable guidance and advice to lead me till the end of this final year project session 2016/2017. His willingness to motivate me contributed tremendously to my project. I would also like to thank my evaluator for this project, Dr. Nazrulazhar Bahaman for taking his time to evaluate me. This evaluation gave me a deeper understanding of my weakness and what I can improve to make it better.

I would also like to thank the authority of Universiti Teknikal Malaysia Melaka (UTeM) for providing me with a good environment and facilities to complete this project. Finally, an honourable mention goes to my families and friends for their understandings and supports me in completing this project. With the help of everyone that was mentioned above, I was able to overcome many problems and completed my project successfully on time.

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ABSTRACT

Intelligent Automated Gate System (IAGS) is a type of medium security gate system especially implemented for the small company who are not able to spent a lot of money to install the high technology auto gate system. IAGS is a system that using a valid & encrypted staffs' QR code pass card to avtivate the gate without triggered the alarm. The problem statement states that the current gate system needs a high installation and maintenance fees which are not afforable by all small company. Besides that, some of the current gate system doest not provide the monitoring tools to monitor the gate system and its not connected to the internet connection. Hence, no real time notification being sent to the relavant department. To solve the current problem of the gate system, IAGS is proposed to develop with the objectives to implement a medium security level gate system with lower cost. Furthermore, it is developed to connect to internet connection and provide a real time email notification if any unauthorized activities detected. Besides that, it is also designed to record down all the incoming and outgoing activities for all staff. All QR code pass card that generated to staffs will be encrypted to provide the integrity of the data. To ensure the project can be succesfully developed, the Rapid Application Development (RAD) methodology is being chosen. This is because the RAD is a software development methodology that uses minimal planning in favor of rapid planning. It allows the end users to collaborate with the system developer from the starting of the project. This will cause the project fulfilled the requirement of the customer and can be done in the shortest time. IAGS will be developed in 2 phase which is hardware and software development. For hardware development, a real enviroment will be set up and demostrate. The hardware invloved includes Arduino Uno Microcontroller, servo motor and web camera. Each hardware plays a different roles in this project. For software development, a system will be created by using visual basic language. The system functionality includes generate new QR code for staff, record enter and leave time, sending Email for any suspicious system login and etc. The system will be tested by the developer and the end users. A proper testing procedure has to be followed to make sure it's functioning well and satisfied by the customer. As a conclusion, the IAGS can solve the problem that facing by the current small companies and it can effectively secure the company from the burglary.

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ABSTRAK

Intelligent Automated Gate System (IAGS) adalah sejenis sistem pintu keselamatan sederhana yang dicipta terutamanya untuk syarikat kecil yang tidak mampu mengeluarkan wang yang banyak untuk memasang sistem pintu yang berteknologi tinggi. IAGS adalah sistem yang menggunakan kad lulus QR kod sah & disulitkan untuk membuka pintu gate. Pernyataan masalah menyatakan bahawa sistem pintu di pasaran memerlukan bayaran pemasangan dan penyelenggaraan yang tinggi yang tidak dapat ditanggung oleh semua syarikat kecil. Di samping itu, sesetengah sistem pintu tidak menyediakan alat pemantauan untuk memantau sistem pintu gate dan tidak dapat menyokong internet. Oleh itu, tiada pemberitahuan masa sebenar dihantar ke jabatan relavant. Untuk menyelesaikan masalah sistem pintu di pasaran sekarang, IAGS dicadangkan untuk dibangunkan dengan objektif untuk melaksanakan sistem pintu tahap keselamatan sederhana dengan kos yang lebih rendah. Selain itu, ia dibangunkan untuk menyambung ke sambungan internet dan memberikan pemberitahuan e-mel masa sebenar sekiranya sebarang aktiviti tidak sah dikesan. Selain itu, ia juga direka untuk merakam semua aktiviti masuk dan keluar untuk memastikan identiti semua kakitangan. Semua kad lulus kod QR yang dihasilkan kepada kakitangan akan disulitkan untuk memastikan integriti data. Metodologi Rapid Application Development (RAD) dipilih untuk menjalankan projek ini disebabkan RAD menggunakan perancangan yang minimum dalam masa yang singkat. Ia membolehkan pengguna bekerjasama dengan pemaju sistem dari permulaan projek. Ini akan menyebabkan projek memenuhi keperluan pelanggan dan boleh dilakukan dalam masa yang singkat. IAGS akan dibangunkan dalam 2 fasa yang merupakan perkakasan dan pembangunan perisian. Untuk pembangunan perkakasan, satu persekitaran yang sebenar akan ditubuhkan. Perkakasan yang disertakan termasuk Arduino Uno Microcontroller, servo motor dan kamera web. Untuk pembangunan perisian, sistem akan dibuat dengan menggunakan VB.NET. Fungsi sistem termasuk menjana kod QR baru untuk kakitangan, mencatat masa masuk dan keluar dan sebagainya. Sistem ini akan diuji oleh pemaju dan pengguna akhir. Sebagai kesimpulan, IAGS boleh menyelesaikan masalah yang dihadapi oleh syarikat-syarikat kecil semasa dan ia secara efektif dapat menjamin syarikat dari pencurian.

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Chapter 1

INTRODUCTION

1.1 Introduction

In this modern society, the crime rate is an imperil that faces by every country. Although the government imposed may laws to reduce and control the crime rate but the result seems not very satisfied as expected. The problem is getting serious and one of the target victims are the small companies. This is because the small company usually are not able to afford a high technologies security system. They have no choice to bear the consequence of office-breaking. Some of the small company even don't have an appropriate gate to prevent an unauthorized person to enter the company area. This is very dangerous and may put the company at the high risk.

The automatic security gate system in the market nowadays is not very satisfied due to 2 factors - the high installation and maintenance fees and incomprehensive functions of the system.

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In general, company gate system used high technology and high security auto gate such as Radio Frequency Identification (RFID) Automatic Gate System. It is very expensive and not all the small company can afford the cost. This will cause those company bear the risk. Unauthorized people can arbitrary to enter the company and steal important information of company.

One new technology suggested to replace the weakness of high installation and maintenance fees of RFID automated gate system is Intelligent Automated Gate System with Quick Response code (QR code). QR code is a machine-readable code consisting of an array of black and white squares, typically used for storing information for reading by the camera. QR Code is very easy to generate by the free web-based in the internet resources. QR Code acts as an efficiency storage to store amount of data and the storage is depending on his parameter. (Victor, 2012)

In addition, QR Code is not easily to damage as it has high-levels of error correction. It will definitely reduce some expenses for a small company for somehow. ("QR Code Error Correction," 2011)

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QR code not only can activate the gate system of a company but it also stores every staff's basic information. Every staff with holding a valid QR code are able to enter the company easily. The date and time during scanning will also be recorded as an attendance record. This can help administrator to trace who are late on the particular date and time easily. Any unauthorized or invalid QR code will triggered the alarm and an email notification will be send to the security department so that the immediate action can be taken to avoid any loss to the company. Although it does not provide a high security level such as RFID, but it is suitable for small/medium companies to provide a medium security level to the company.

1.2 Project Problem Statement

Nowadays, many small companies do not have incomprehensive security gate for preventing any unauthorized person to enter the company area. The main reason behind is due to the high installation and maintenance fees for current technologies gate system (RFID). This is very dangerous and put the company at the high risk. Some company hired the security guard to minimized the risk. However, it is very difficult for security guard to recognized every authorized person. Besides, it's a time consuming for the guard open the gate and it is much slower compare to the automated gate.

Furthermore, the current automated gate system is only triggered alarm if any unauthorized scanning detected. It does not notify the security department immediately or does not provide any application to monitor the system and hence, a quick response action couldn't be taken to prevent or minimized the loss to the company.

When QR Code apply in automated gate system, the system takes 1-2 seconds to matching QR Code of the valid staff. However, verification of QR Code scanner is slower than other scanner system such as RFID. Therefore, the scanner of automated gate is not be able to identify the authorized staff in shortest time. Some of the staff may need to scan more than 1 times as he or she could not be able to accurate match by scanner. The summary of problem statement for this research are shown at table 1.

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Table 1.1 Summary of Problem Statement

PS	Problem Statement
PS1	Automated gate system in the market needs high installation and maintenance fees.
PS2	The existing automated gate system does not provide any tool to monitor the system.
PS3	No alert or notification is being sent to notify the relevant department.

1.3 Project Research Question

Project Research Questions is used to identify the question of the existing gate system. Based on the research, we can conclude that there are few weaknesses of the current gate system. The table 1.2 shows the summary of the project research question.

Table 1.1 Summary of Project Research Question

PRQ	Project Research Question
PRQ1	What type of automated gate system can have lower cost?
PRQ2	How to notify the owner if unauthorized scanning detected?
PRQ3	What application can be used to monitor gate system?

1.4 Project Objectives

Project objective defines the improvement that want to achieve at the end of the project. The improvement must be considered based on the problem statement and the project question of this project. The objectives for this project are shown in below.

1. To implement a lower cost medium level security automated gate system for small company.
2. To notify the security department for any unauthorized entering if the invalid QR scanning is detected.
3. To record down the entering and leaving time the company for all staff.
4. To protect the QR code information with salted hashing algorithm.

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1.5 Project Research Hypothesis

A research hypothesis is the statement created by researchers to improve the outcome of a research. Based on the research, the current gate system has insufficient features and not very satisfying due to high installation and maintenance fees, no alert being sent when unauthorized detected and no interfaces to control the system. Some of the hypothesis have been suggested to improve the current gate system. The figure 1.1 shows the problem of the current gate system and the hypothesis to make an improvement.

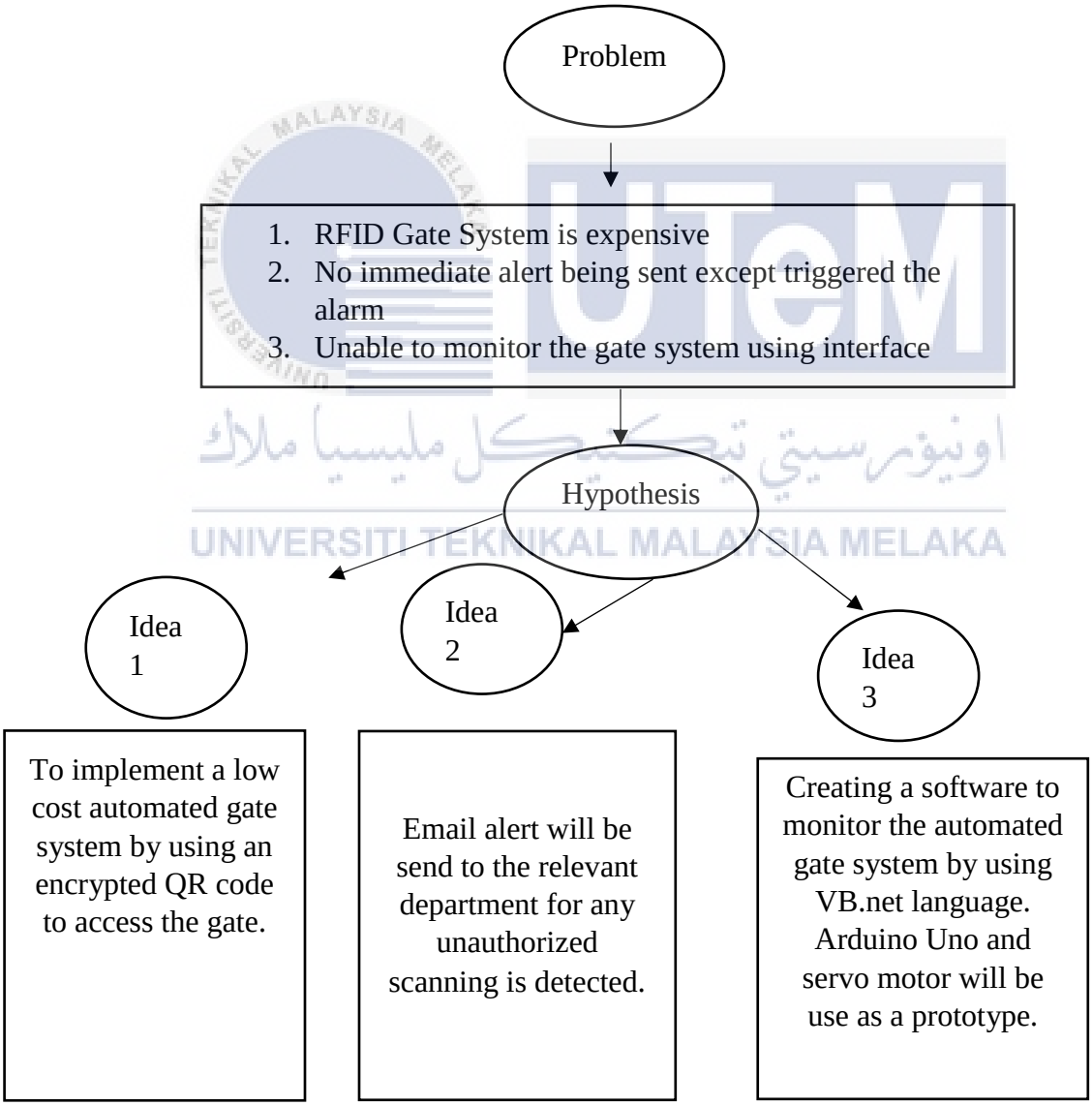

Figure 1.1 Project Research Hypothesis

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1.6 Project Scope

The main purpose for Intelligent Automated Gate System is to perform an automated gate system by using QR code. The QR code technology applied in the automated gate system of company can provide a medium level of security as the information in the QR code will be encrypted by using salted hashing algorithm. It will not be easily cracked by the QR code decoder. A valid QR code will be generated for every valid staff as a pass card to enter or leaving the company. QR code technology is suggested to be implemented due to low cost and high efficiency. The Intelligent Automated Gate System not only can help to perform the security task but at the same time it also can be used in company to record the time check in and check out of each staff. Every staff who entered the company area will be recorded with the date and time. By using this system can reduce the workload of administrator and no need to spend money on the attendance system.

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Furthermore, the system users will be the security department and all valid staff in the company. Any valid staff will be holding a valid QR pass card to enter the company without triggered the alarm. Security department will inactive the QR code pass card immediately for any invalid staff to prevent he/she enter the company. A video recorder will also be implement. It will record all the activities happened at the gate for the security purpose. If any unauthorized scanning detected, an email will be sent immediately with the attachment photo of the unauthorized person to inform the security department to take an immediate action to prevent any loss to company. The figure 1.2 shows the overall flow of the system.

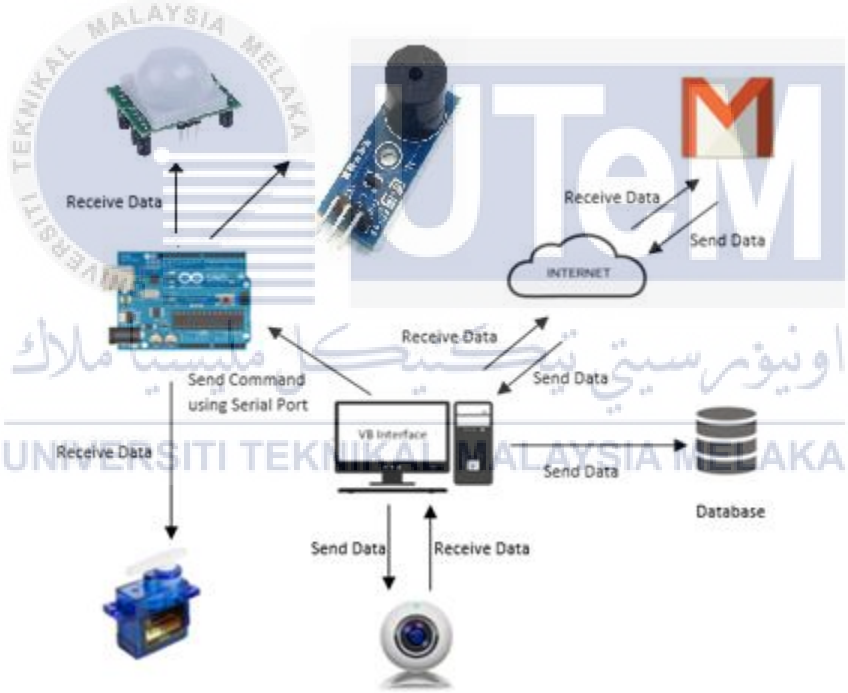

Figure 1.2 Flow of the system

1.7 Project Contribution

Project contribution defines the expected output from this project. This part can be referred to the objectives of this project. The project contribution can be referring to the table 1.3 in below.

Table 1.2 Table of Project Contribution

PC	Project Contribution
PC1	Proposed a software system using VB.NET language to monitor the automated gate system.
PC2	Proposed a hardware system using Arduino UNO that are able to connect to software system perform as an automated gate.

1.8 Conclusion

In conclusion, the Intelligent Automated Gate System able to solve the problem that facing by the small companies. The Intelligent Automated Gate System provides lower cost installation and maintenance fees; it also provides a GUI to easy monitor the system. Although it has lower security level compared to RFID automated gate system but it is a difference and new technology implemented and extra choices for companies when deciding to have an automated gate system. Appendices I shows the summary of the chapter 1.

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Chapter 2

LITERATURE REVIEW

2.1 Introduction

This chapter will discuss about the problem and solution of the existing gate, to have a better understanding about concept and technique need to be implement in this project.

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This chapter also will contain the related publish information and material or article, previous project finding and research that related to the objective in this project. Furthermore, this chapter also compare the hardware or tools which is the most suitable to use in the project.

The **domain** of this project is to focus on the hardware and software development which will interact with Arduino Uno and VB.net. In this project, the Arduino Uno will receive the command from the VB.net to control the servo motor.

2.2 Research Problem

Concept

According to Antigua and Barbuda (1980), Security System is a defense system that designed to prevent any unauthorized entry/intrusion to a building or a company. Security System is widely used in housing area, company, and military properties for protection against the burglary. A good security system is very important as it can help the owner to take the immediate action to minimize the loss.

The front line of the security system is Gate System. Gate System is a mechanical system that are mainly used to control a gate to open or close. It is usually implemented at the main door of the company to provide security proposed. A comprehensive gate system is able to reduce the workload of the security guard, increase the efficiency and defense the company from burglary.

Theory

The function of the Gate System is to prevent any unauthorized/suspicious person to enter the area of the company. Anyone with holding a valid pass card are only allow to activate the Gate System to enter the area of the company. Basically, a wrong/ spoiled pass card will not be able to activate the Gate System successfully and it will trigger the alarm as intruders being detected. The security department is responsible to take immediate action to prevent any unauthorized detected. ("What are the Different Types of Driveway Gates," 2014)

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