SUPERVISOR'S DECLARATION

I hereby declare that I have checked this project and in my opinion, this project is adequate in terms of scope and quality for the award of the degree of Bachelor of Mechanical Engineering with Automotive Engineering.

Signature	:
Name of Supervisor	: DR YUSNITA BINTI RAHAYU
Position:	: LECTURER
Date:	:

STUDENT'S DECLARATION

I hereby declare that the work in this project is my own except for quotations and summaries which have been duly acknowledged. The project has not been accepted for any degree and is not concurently submitted for award of other degree.

Signature :
Name : MOHD AFIZE SYAFRI BIN MOHD AJWI
ID Number : MH06057
Date :

To my beloved mother and father

Mohd Ajwi Bin Mamat

Fauziah Binti Daud

ACKNOWLEDGEMENTS

First and foremost, I would like to express my heartily gratitude to my supervisor, Dr Yusnita Binti Rahayu for the guidance and enthusiasm given throughout the progress of this project.

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ABSTRACT

Nowadays, security system has already become one of the important device for each people as a protection for their asset. Security system as a form of protection are structures and processes that provide or improve security as a condition. The ease of control and excellent performance of the password programming will ensure that the number of applications using them will continue grow for the foreseeable future. This project is mainly concerned on improving vehicle starting system by using password program. A program in Borland C++ was developed to provide a protection for the user's vehicle. User must enter their password first before start the engine. For this application, this project need to use L298N drive motor. The drive motor will receive the signal form the password that user insert in the program then allow the current to flow in the circuit. The motor will turn on if the user insert the password correctly.Besides that, the motor will not turn on. Through the project, it can be concluded that L298N drive motor can control motor to turn on or not based on the effectiveness password program.

ABSTRAK

Pada masa sekarang, sistem keselamatan sudah menjadi salah satu peranti yang penting bagi setiap orang sebagai perlindungan bagi aset mereka. Sistem keselamatan ini adalah sebagai bentuk perlindungan struktur dan proses yang memberikan atau meningkatkan keselamatan sebagai syarat. Kemudahan kawalan dan prestasi yang sangat baik daripada program kata laluan akan memastikan bahawa jumlah aplikasi yang menggunakan kaedah kata laluan akan terus meningkat untuk masa yang akan datang. Projek ini terutama berkaitan tentang meningkatkan sistem keselamatan bagi kenderaan dengan menggunakan program kata laluan. Program kata laluan di buat dengan menggunakan peririsian Borland C + + adalah memberikan perlindungan bagi pengguna kenderaan. Pengguna perlu memasukkan kata laluan mereka terlebih dahulu sebelum menghidupkan enjin. Untuk aplikasi ini, projek ini perlu menggunakan drive L298N motor. Drive motor akan menerima isyarat berbentuk kata laluan pengguna yang dimasukkan dalam program kemudian arus akan mengalir didalam rangkaian. Motor akan dihidupkan jika pengguna memasukkan kata laluan dengan betul.Jika sebaliknya, motor tidak akan hidup. Melalui projek ini, dapat disimpulkan bahawa drive L298N motor boleh mengawal motor berputar atau tidak berdasarkan pada keberkesanan program kata laluan tersebut.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Security is the degree of protection against danger, loss, and criminals. Securities as a form of protection are structures and processes that provide or improve security as a condition. It has to be compared and contrasted with other related concepts: safety, continuity and reliability. The difference between security and reliability is that security must take into account the actions of people attempting to cause destruction (Bruce, 2000). In the security area, there are four categories such as Internet Technology (IT) realm, Physical realm, Political and Monetary

1.2 PROBLEM STATEMENT

People always worried about to left their vehicle at the place that does not have security to watch and protect their vehicle. The security system that already have in the vehicle also cannot prevent from the auto theft and still not good enough to protect their vehicle. This is because cases of car have been stolen was increased day by day. Besides that, it is only take a few minutes for the theft to break in the vehicle and run away. The worst situation also can be happen even the owner of the vehicle still in the vehicle. So there is no guarantee for their life. Law enforcement also is limited in what they can do to prevent the auto theft. Then user must find their initiative way to protect their vehicle.

1.3 OBJECTIVE OF THE PROJECT

There are three main objectives that were highlighted according to the field of study for the improvement of vehicle starting system by using user password.

- Design the starting system password programming using VISUAL BASIC (VB) software.
- Develop electronic circuit board.
- Attach the electronic and mechanical component together as a part.

1.4 SCOPE OF THE PROJECT

In this area of study BORLAND C++ software is used to design a password programming. BORLAND C++ is a programming studio used to create computer applications for the Microsoft Windows operating systems. Borland C++ Builder is based on the C++ computer language with a lot of improvements and customized items. For the electronic circuit board, L298N DC motor drive is used to rotate the motor because it is a high voltage and high-current dual full-bridge driver that designed to accept standard transistor–transistor logic (TTL) logic levels.

1.5 OUTLINE OF THESIS

This thesis consists four chapters. In first chapter, it discuss about the objective and scope of this project as long as summary of works. While Chapter 2 will discuss more on theory and literature reviews that have been done. It includes the study of starting system, starting system component and types of security in vehicle. It also brief discuss about Borland C++ software. In Chapter 3, the discussion will be on the methodology hardware and software implementation of this project. The result and discussion will be presented in Chapter 4. Last but not least, Chapter 5 discusses the conclusion of this project and future work that can be done.

1.6 SUMMARY

Implementation and works of the project are summarized into the flow chart as shown in Figure 1.1. Gantt charts as shown in Figure 1.2 and Figure 1.3 show the detail of the works of the project that had been implemented in the first and second semester.

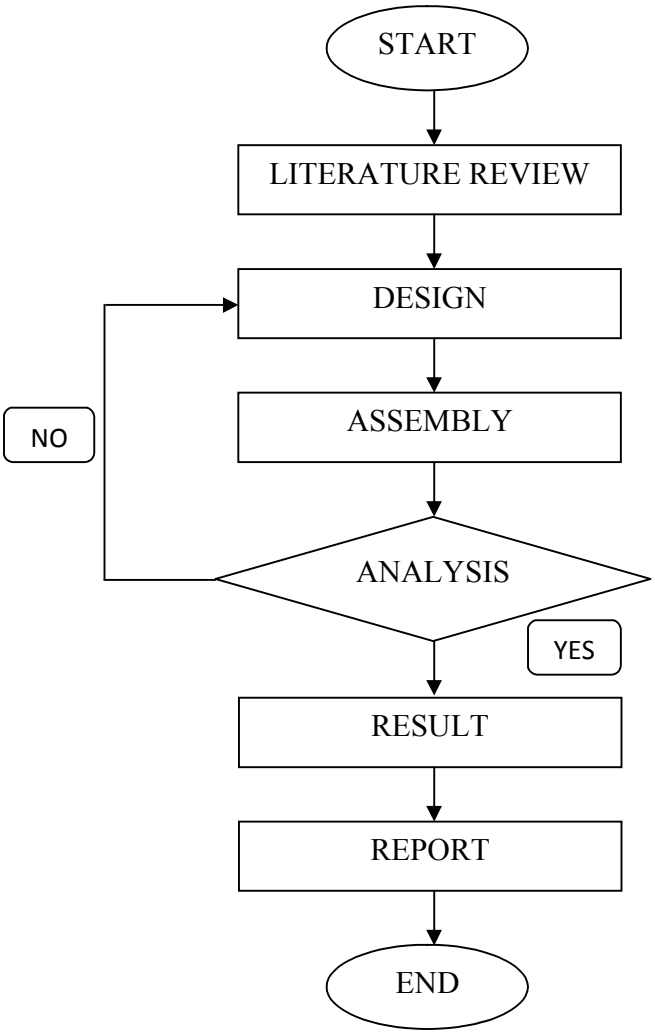

Figure 1.1: Project overview

Week / Project activities	1	2	3	4	5	6	7	8	9	10	11	12	13	14
• Project confirmation - Meet the supervisor, confirm the title of the project and discuss more detail about the project														
• Literature study - Find information about the starting system														
• Introduction - Verify the objective, scope and problem statement based on project title														
• Literature review - Find more information about history of starting system, component of starting system, how the system works and types of starting system														
• Methodology - Make a password's programming - Design the circuit diagram for electrical part														
• Make a proposal and report FYP 1														
• Presentation 1														

Figure 1.2: Gantt Chart of the project schedule for semester 1

Week / Project activities	1	2	3	4	5	6	7	8	9	10	11	12	13	14
• Assembly - Combine the mechanical and electrical part as a one system.														
• Analysis - Test the system according to the effectiveness of password's program														
• Evaluation - Get the result														
• Report Writing - Report preparation and submission														
• Presentation 2														

Figure 1.3: Gantt Chart of the project schedule for semester 2

CHAPTER 2

RESEARCH STUDY

2.1 INTRODUCTION

A review of the literature was performed to identify studies relevant to the topic. The main source for the literature search was the current studies and references books that are correlated with the field of study of vehicle starting system and security. This chapter includes the study of starting system, starting system component and types of security in vehicle.

2.2 STARTING SYSTEM OVERVIEW

The first inventor for starting system is by Carl Benz while he and his family in journey from their home in Mannheim to Pforzheim by riding three-wheeler car that used gasoline engine in August 1888. He started his car by spinning the flywheel but it required physical strength to start the engine. Many years later, an engineer began to look for an easier method of getting the engine going. (Chrysler, 1961)

The purpose of the starting system is to convert the chemical energy stored in the battery into the electrical energy. Then convert again into the mechanical energy in the starter motor to crank the engine.

The starting system is the heart of the electrical system in vehicle and also one of the important parts that make the vehicle start to move. This system begins with the battery. The key is inserted into the ignition switch and then turned to the start position. Small amounts of current then passes through the neutral safety switch to a starter relay or starter solenoid which allows high current to flow through the battery cables to the starter motor. The starter motor then cranks the engine so that the piston, moving downward, can create a suction that will draw a fuel/air mixture into the cylinder, where a spark created by the ignition system will ignite this mixture. If the compression in the engine is high enough and all this happens at the right time, the engine will start. (James, D. H., & Chase, 2001)

2.3 STARTING SYSTEM COMPONENTS

The typical starting system component is consisting of battery, ignition switch, starter motor, neutral safety switch and starter relay. Each component of the starting system has their own characteristic and related to the each other.

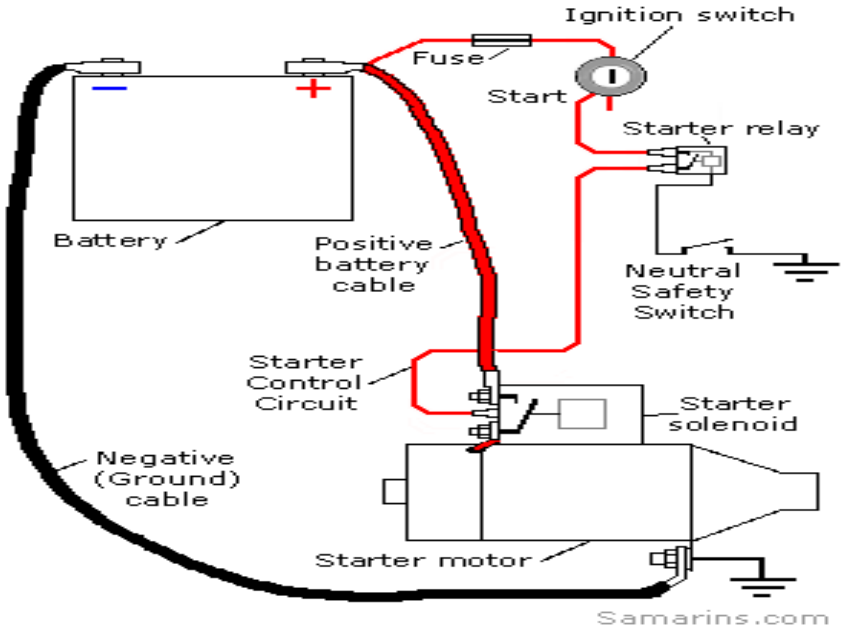

Figure 2.1: Starting System Components and configuration [http://www.samarins.com]

Figure 2.1 shows that the configuration of the typical vehicle. This system work when user turn the ignition key to the "Start" position, the battery voltage goes through the starter control circuit and activates the starter solenoid, which in turn energizes the starter motor. The starter motor will cranks the engine. A starter can only be operated when the automatic transmission shifter is in "Park" or "Neutral" position or if the car has a manual transmission and when the clutch pedal is depressed. To accomplish this, there is a Neutral safety switch installed at the automatic transmission. When the automatic transmission is not in "Park" or "Neutral" position or when the clutch pedal is not depressed, the neutral safety switch is open and the starter relay disconnects the starter control circuit.

2.3.1 Battery

Figure 2.2: Lead acid battery 12V [http://www.familycar.com]

The automotive battery, also known as a lead-acid storage battery, is an electrochemical device that produces voltage and delivers current. In an automotive battery, user can reverse the electrochemical action, thereby recharging the battery, which will then give many years of service. The purpose of the battery is to supply current to the starter motor, provide current to the ignition system while cranking, to supply additional current when the demand is higher than the alternator can supply and to act as an electrical reservoir.

2.3.2 Ignition Switch

Figure 2.3: Ignition Switch [http://factoryfiveparts.com]

The ignition switch allows the driver to distribute electrical current to where it is needed. There are generally 5 key switch positions that are used:

- **Lock-** All circuits are open (no current supplied) and the steering wheel is in the lock position. In some cars, the transmission lever cannot be moved in this position. If the steering wheel is applying pressure to the locking mechanism, the key might be hard to turn. If you do experience this type of condition, try moving the steering wheel to remove the pressure as you turn the key.
- **Off-** All circuits are open, but the steering wheel can be turned and the key cannot be extracted.
- **Run-** All circuits, except the starter circuit, are closed (current is allowed to pass through). Current is supplied to all but the starter circuit.
- **Start-** Power is supplied to the ignition circuit and the starter motor only. That is why the radio stops playing in the start position. This position of the ignition switch is spring loaded so that the starter is not engaged while the engine is running. This position is used momentarily, just to activate the starter.
- **Accessory-** Power is supplied to all but the ignition and starter circuit. This allows you to play the radio, work the power windows, etc. while the engine is not running.

Most ignition switches are mounted on the steering column. Some switches are actually two separate parts;

- The **lock** into which you insert the key. This component also contains the mechanism to lock the steering wheel and shifter.
- The **switch** which contains the actual electrical circuits. It is usually mounted on top of the steering column just behind the dash and is connected to the lock by a linkage or rod.

2.3.3 Starter Motor

Figure 2.4: Starter Motor [http://www.samarins.com]

A starter is an electric motor needed to turn over the engine to start it. From the figure 2.4, a starter consists of the very powerful DC electric motor and starter solenoid that is attached to the motor. A starter motor requires very high current to crank the engine, that's why it is connected to the battery with large cables. The starter solenoid works as an electric switch - when actuated, it closes the circuit and connects the starter motor to the battery. At the same time, it pushes the starter gear forward to mesh with the engine's flywheel.

The starter motor is a powerful electric motor, with a small gear (pinion) attached to the end. When activated, the gear is meshed with a larger gear (ring), which is attached to the engine. The starter motor then spins the engine over so that the piston can draw in a fuel/ air mixture, which is then ignited to start the engine. When the engine starts to spin faster than the starter, a device called an overrunning clutch automatically disengages the starter gear from the engine gear.

2.3.4 Neutral Safety Switch

Figure 2.5: Neutral Safety Switch [http://www.swedishautoparts.com]

The purpose of the neutral safety switch is opens the starter circuit when the transmission is in any gear but Neutral or Park on automatic transmissions. This switch is normally connected to the transmission linkage or directly on the transmission. Most cars utilize this same switch to apply current to the backup lights when the transmission is put in reverse. Standard transmission cars will connect this switch to the clutch pedal so that the starter will not engage unless the clutch pedal is depressed.

2.35 Starter Relay/Solenoid

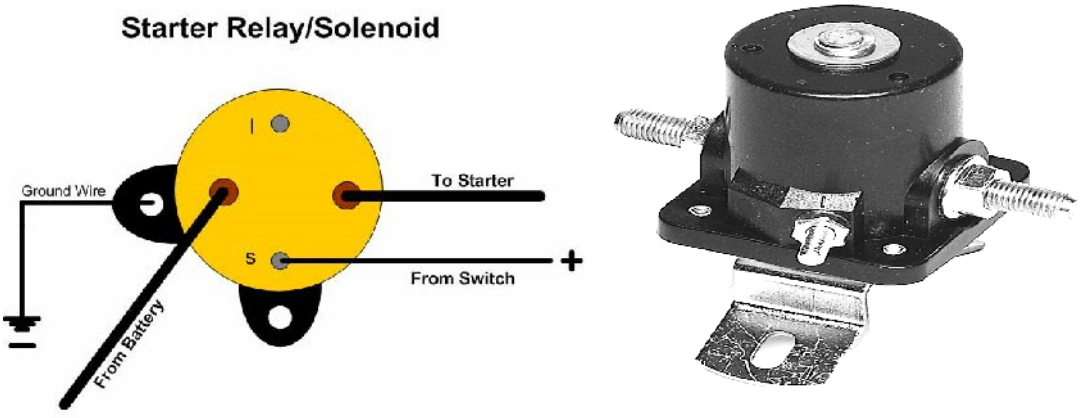

Figure 2.6: Starter Relay/Solenoid [http://www.light-sport-aircraft.org]

A relay is a device that allows a small amount of electrical current to control a large amount of current. An automobile starter uses a large amount of current (250+ amps) to start an engine. To allow that much current to go through the ignition switch, it would not only need a very large switch, but all the wires would have to be the size of battery cables. A starter relay is installed in series between the battery and the starter. Some cars use a starter solenoid to accomplish the same purpose of allowing a small amount of current from the ignition switch to control a high current flow from the battery to the starter. The starter solenoid in some cases also mechanically engages the starter gear with the engine.

2.4 TYPES OF SECURITY

Now days, in the automotive field there are such a security that already exists in the vehicle. The purpose of the security is to protect the vehicle against danger, loss, and criminals. Example types of the existing security in the vehicle are car alarm, immobiliser, anti-hijack system, security lock and anti-theft system.

2.4.1 Car Alarm

A car alarm is an electronic device installed in a vehicle in an attempt to discourage theft of the vehicle itself, its contents, or both. Car alarms work by emitting high-volume sound when the conditions necessary for triggering are met, as well as by flashing some of the vehicle's lights, and (optionally) notifying the car's owner via a paging system and interrupting various electrical circuits necessary for the car to start.

2.4.2 Immobiliser

An immobiliser is an electronic device fitted to an automobile that interrupts the power supply to two or more systems required to start a vehicle's engine, which is the fuel pump, starter motor or ignition unless the correct electronic signal is provided to the system by the ignition key, or a unique transponder or coded plug, the vehicle will not start. The system is deactivated by a constantly changing signal that is virtually impossible to 'crack'.

2.4.3 Anti-Hijjack System

An Anti-Hijack System is an electronic system fitted to motor vehicles to deter criminals from hijacking them. Although these types of systems are becoming more common on newer cars, they have not caused a decrease in insurance prices as they are not as widely known about as other more common anti-theft systems such as alarms or steering locks. It can also be a part of an alarm or immobiliser system.

There are three basic principles on which the systems work.

- **Lockout**: A lockout system is armed when the driver turns the ignition key to the on position and carries out a specified action, usually flicking a hidden switch or depressing the brake pedal twice. It is activated when the vehicle drops below a certain speed or becomes stationary, and will cause all of the vehicles doors to automatically lock, to prevent against thieves stealing the vehicle when it is stopped,
- **Transponder**: A transponder system is a system which is always armed until a device, usually a small RFID transponder, enters the vehicle's transmitter radius.

Since the device is carried by the driver, usually in their wallet or pocket, if the driver leaves the immediate vicinity of the vehicle, so will the transponder, causing the system to assume the vehicle has been hijacked and disable it.

- **Microswitch**: A microswitch system is always armed and is usually activated if one of the vehicle doors is opened and closed again while the vehicle's engine is running. Once the system has been activated, the driver will have a set time limit to disarm it by entering a code before the vehicle takes measures. If the system is not disarmed in the time window, it will warn the driver by sounding the vehicles horn once every 10 seconds for 30 seconds, at which point the system will start sounding the horn at much shorter intervals and will usually activate the vehicles hazard lights.

2.4.4 Security Lock

Security Lock, also known as Passive Anti-Theft System (PATS), is Ford Motor Company's immobilizer technology. In 1996 it started showing up on select models of Ford and Lincoln Mercury vehicles. The keys for these vehicles have a minute radio frequency transponder imbedded in the plastic Head.

When the vehicle is started, the onboard computer sends out a RF signal that is picked up by the transponder in the key. The transponder then returns a unique RF signal to the vehicle's computer, giving it confirmation for the vehicle to start and continue to run. This all happens in less than a second, with the intention of being completely transparent to the vehicle operator.