

# MOBILE CAR ALARM VIA BLUETOOTH APPLICATION

NORSYAFIQAH BINTI JAMALUDDIN

FACULTY OF COMPUTER SYSTEMS AND SOFTWARE  
ENGINEERING

2015



**UNIVERSITI MALAYSIA PAHANG**

***BORANG PENGESAHAN STATUS TESIS***

**JUDUL: MOBILE CAR ALARM VIA BLUETOOTH APPLICATION**

**SESI PENGAJIAN: 2014/2015**

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MOBILE CAR ALARM VIA BLUETOOTH APPLICATION

NORSYAFIQAH BINTI JAMALUDDIN

A thesis submitted in fulfillment of the requirements  
for the award of the degree of the  
Bachelor of Computer Science (Software Engineering) with Honours

FACULTY OF COMPUTER SYSTEMS & SOFTWARE ENGINEERING

UNIVERSITI MALAYSIA PAHANG

2015

## STUDENT DECLARATION

I hereby declare that the work in this thesis e n t i t l e d “*Mobile Car Alarm Via Bluetooth Application*” is my own research except for quotations and summaries which have been duly acknowledged. The thesis has not been accepted for any degree and is not concurrently submitted in the candidature of any other degree.

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### **SUPERVISOR DECLARATION**

I hereby declare that I have read this thesis and in my opinion this thesis/report is sufficient in terms of scope and quality for the award of the degree of Bachelor of Computer Science (Software Engineering )with Honours.

Signature : .....

Supervisor : Dr.Mohamed Ariff Ameen

Date : .....

## **ACKNOWLEDGEMENTS**

First and foremost praise to Almighty Allah for all his blessings for giving me patience and good health throughout the duration of this research project. I would like to dedicate my highest gratitude for those who have involved directly or indirectly during this research. They have contributed onwards my understanding and thoughts.

Primarily, I would like to express my sincere gratitude to my supervisor Dr.Mohamed Ariff Amedeen for the continuous collaboration of my bachelor study and research, for his inspiration, patience, enthusiasm, brilliant ideas and incalculable knowledge. His guidance helped me in all the time of research and writing of this thesis. I would like to express my high appreciation to all lecturers and friends that have guided me throughout the completion of this project. Moreover, I am very grateful to both of my family for love and endless support

## **EXECUTIVE SUMMARY**

Car alarm has become an essential feature for all car users as it ensure safety to the car and prevent it from being stolen. The purpose of this project is to develop a mobile central-locking and alarm system for car that can be access using android smartphone as the remote control. The system will control all alarm functions in a car such as locking the door, unlocking the door, activate and deactivate the alarm. The Bluetooth technology is used as the control medium between the car and the smartphone. There are few issues being raised that lead to this project development. The first issue is the current car alarm system is not interactive enough and car owner needs an additional alarm remote control plus the car key to bring anywhere. Other issues are the loss of car key, where user can use this application installed in their smartphone as an alternative key to unlock their car. This project is expected to enhance the capability of the existing car alarm system to be more interactive and user friendly.

## **RINGKASAN EKSEKUTIF**

Penggera kereta telah menjadi satu ciri penting untuk semua pengguna kereta kerana ia memastikan keselamatan kereta dan mengelakkannya daripada dicuri. Tujuan projek ini adalah untuk membangunkan pusat-mengunci mudah alih dan sistem penggera untuk kereta yang boleh diakses menggunakan telefon pintar android sebagai alat kawalan jauh. Sistem ini akan mengawal semua fungsi penggera di dalam kereta seperti mengunci pintu, membuka pintu, mengaktifkan dan menyahaktifkan penggera. Teknologi Bluetooth digunakan sebagai medium kawalan antara kereta dan telefon pintar. Terdapat beberapa isu yang dibangkitkan yang membawa kepada pembangunan projek ini. Isu pertama ialah sistem penggera kereta semasa tidak cukup interaktif dan terdapat terlalu banyak kekunci pada alat kawalan jauh tradisional. Isu-isu yang kedua ialah kehilangan kunci kereta, di mana pengguna boleh menggunakan aplikasi ini yang dipasang di telefon pintar mereka sebagai alternatif utama untuk membuka kunci kereta mereka. Projek ini dijangka akan meningkatkan keupayaan sistem penggera kereta yang sedia ada untuk menjadi lebih interaktif dan mesra pengguna.



## TABLE OF CONTENTS

STUDENT DECLARATION	vi
SUPERVISOR DECLARATION	vii
ACKNOWLEDGEMENT .....	viii
EXECUTIVE SUMMARY .....	ix
RINGKASAN EKSEKUTIF .....	x
TABLE OF CONTENTS.....	xi
LIST OF FIGURES .....	xiv
LIST OF TABLES .....	xvii
LIST OF ABBREVIATIONS.....	xviii
CHAPTER 1 : INTRODUCTION.....	1
1.1 Overview .....	1
1.2 Problem Statement .....	2
1.3 Objective .....	3
1.4 Project Scope.....	4
1.5 Existing System.....	5
1.5.1 ScyTek Galaxy Mobile 500 .....	5
1.5.2 Directed SmartStart.....	6
1.5.3 Viper VSS3000 .....	8
1.6 Summary Existing Application.....	9
1.7 Existing System & Its Limitation.....	10

CHAPTER 2 : LITERATURE REVIEW .....	11
2.1 Overview .....	11
2.2 User Requirement.....	12
2.3 Technique Used.....	13
2.4 Flowchart.....	14
2.5 Method .....	15
2.5.1 Rapid Application Development (RAD).....	15
2.5.2 Requirements Planning .....	16
2.5.3 User Design .....	17
2.5.4 Construction .....	17
2.5.5 Implementation .....	17
2.6 Material Outline .....	18
2.6.1 Arduino Uno.....	18
2.6.2 Car Central Lock .....	20
2.6.3 Mini Power Relay 12V DC .....	21
2.6.4 Power Adapter 12V 1A .....	23
2.6.5 Smartphone .....	24
2.6.6 Smartphone Programming .....	25
2.6.7 Smartphone Models .....	26
2.6.8 Serial Port Bluetooth HC-6 module .....	27
2.6.9 Software .....	28

CHAPTER 3 : DESIGN AND IMPLEMENTATION .....	32
3.1 Implementation .....	32
3.2 Tools and Technologies.....	33
3.3 Hardware Implementation.....	34
3.4 User Interface Construction .....	36
CHAPTER 4 : RESULT AND DISCUSSION.....	41
4.1 Overview .....	41
4.2 Expected Results .....	42
4.3 Discussion .....	42
4.4 Project Constraint.....	43
4.5 Advantages and Disadvantages of Application.....	44
4.6 Future Work .....	45
CHAPTER 5 : CONCLUSION .....	46
REFERENCES .....	47
APPENDIX A.....	64
APPENDIX B .....	65
APPENDIX C .....	66

## LIST OF FIGURES

FIGURES	Page
Figure 1.1: System Structure	6
Figure 2.1: Block Diagram	12
Figure 2.2: Flowchart for establishing Bluetooth Connection	16
Figure 2.3: Rapid Application Development	18
Figure 2.4: Arduino Uno Board	20
Figure 2.5: Arduino Uno Board	22
Figure 2.6: Car Central Lock	22
Figure 2.7: Relay	22
Figure 2.8: Relay Pin	22
Figure 2.9: Adapter 12V	22
Figure 2.10: Block Editor	22
Figure 2.11: Samsung S5	22
Figure 2.12: Bluetooth Module	22
Figure 2.13: Wiring	22
Figure 2.14: MIT App	22
Figure 2.15: Arduino Software	22

Figure 3.1: MIT App emulator interface	36
Figure 3.2: Bluetooth HC-06	
Figure 3.3: Bluetooth Signal HC-06	39
Figure 3.4 Lock	40
Figure 3.5: Unlock	40
Figure 3.6: Home Page	41
Figure 3.7: Pattern Lock Page	42
Figure 3.8: Main Menu	43
Figure 3.9: Block Editor	44
Figure 3.10: Arduino Code	46

## LIST OF TABLES

TABLE	Page
Table 1.1: Comparison of Existing System	24
Table 2.1: Specification Arduino Uno	28
Table 2.2: Specification Car Central Lock	30
Table 2.3: Specification Mini Relay	33
Table 2.4: Specification Adapter	45



## **LIST OF ABBREVIATIONS**

UMP	Universiti Malaysia Pahang
PDA	Personal Digital Assistant
PHP	Hypertext Preprocessor
IDE	Integrated Development Environment
IBM	International Business Machines Corporation
HTML	HyperText Markup Language
XML	Extensible Markup Language
USB	Universal Serial Bus
APP	Application







## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 OVERVIEW**

Nowadays a handheld device called "smartphone" is trending among people. Smartphone is casually used everywhere, including in trains, on platforms at train stations, in coffee shops, and on park benches. By using smartphone, users can watch videos or read novels on the Internet. They can also do shopping or keep pocket-money ledger. This project is aiming on designing a car alarm that can be controlled on the smartphone via Bluetooth with the same concept as normal remote control. This application is capable to control several function such as lock and unlock the door. The system can only be accessed and configured by car owner using Bluetooth communication via Android smartphone to turn it on or off.

Other than that a car alarm system has become an essential feature for all car users to install on their car as it ensures safety to the car. This system can ensure the car become safer from criminal activity as the owner have spent a lot of money on it. In case of losing their phone, the car owner does not have to worry about their car security since the system require authentication to access it.

## **1.2) Problem Statement(s)**

There are three core problems in the existing car alarm system described as follow:

### **i) Not interactive and too many key in the pocket**

The existing car alarm key can be enhance to be more interactive and user friendly by transforming it into smartphone application. It is due to current trend of using smartphone where car owners can just carry their smartphone to lock and unlock the car instead of using car key and the alarm remote control to do the same task.

### **ii) Human error**

In case the owner of the car lost their key, they can use this application installed in their smartphone as an alternative key to unlock the car as they might leave the key inside the car or when the car automatically locked.

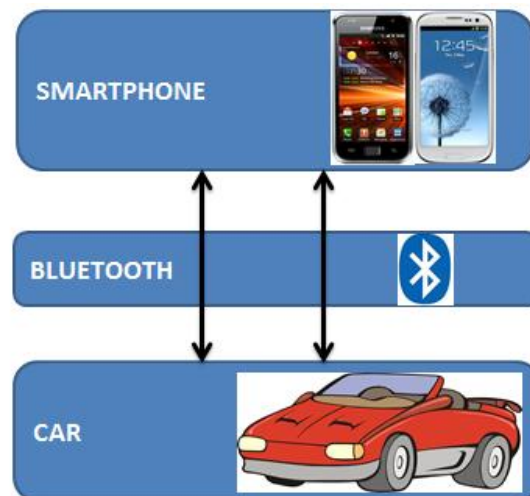
### **iii) Car Thief**

In criminal cases involving vehicle, frequently car owners noticed that the doors are unlocked, and found that their valuable things has disappeared. No matter where we park our vehicle, there is always risk of it getting stolen nowadays, so better alarm system can be implemented to make it hard for car thief to broke into the car to steal.

### 1.3 OBJECTIVE

To achieve success on Mobile Car Alarm via Bluetooth Application purposes, the following objectives are set:

- To develop an Android smartphone application that locks and unlocks a car.
- To integrate application into the car circuitry to allow remote locking and unlocking.
- To develop a security feature that blocks connection from the phone to the car in case the phone is stolen.



**Figure 1.1: System Structure**

## **1.4 PROJECT SCOPE**

In order to realize this type of car central-locking system by considering time constraint and budget, there are several scopes that need to be outlined. This is to ensure the project objective can be achieved successfully. This project is proposed under certain defined scopes:

- The car must be modified with specific devices before the application can be used.
- This application is a native Android application that does not required browser or internet connection.
- The user needs unlock the pattern lock for the security.
- The radius of the coverage is bound by Bluetooth protocol.

## 1.5 Existing System

Before proceed to the project, a research need to do for the existing system. This is for to find the similarities project that need to develop and to find the weaknesses of the current application.

### 1.5.1) ScyTek Galaxy Mobile 500



This application can start the vehicle without the user need to be inside the car and it also can control the car security system with variety type of the smartphone. The user only needs to push the simple push button. The way to monitoring the system is sending automatic alerts to the smartphone to notify of any tempering. If the user or the parent are worried about their children when the children are going out with this application the user can use the GPS to track where the location of their children.

## Function

### Remote Start

The function of this application is allows the vehicles to start active without any physical contact from the user this is because to warming up the car engine. In the cold weather the user can have the interior hot or warm weather.

## **Keyless Entry**

The other function of this application is can lock and unlock the vehicles without the physical contact from the user. It also can control the power door lock from far away using the remote fob. The remote fob is emits a radio frequency that encoded to prevent frequency stealing from other frequency.

## **Dual Zone Shock Sensor**

The dual zone shock sensor is for give a warning to the user for the disturbances and it also can lessen the false alarm. These sensors to let the thieves know that the user vehicles have an advance alarm system.

### **1.5.2) Directed SmartStart**



The directed SmartStart application is for the car security or any vehicle and remote start. There are many features for this application such as lock and unlock the car, start the car, trunk release, the panic and also the aux channels. There are several requirements that need to follow such as it only compatible with the iOS, android and BlackBerry smartphone. The user needs to download the application into the smartphone.



## **Function**

### **Auxiliary Channels**

The auxiliary buttons allow controlling custom features through the smartphone. It will customize and control the look and feel of two auxiliary channel buttons on the application home screen and the user can fix the application up to interact remotely with any part of the car.

### **SmartStart Bluetooth Module**

The Bluetooth module for this application is to connect with the vehicle and connect with the smartphone Bluetooth to allow the user to control the car. The Bluetooth will automatically connect with the phone Bluetooth. When the user opens the application it will detect the Bluetooth connection and will run the application to execute the command.

### **SmartPark**

The smartPark application is to notify a user vehicle location, when the users push the door lock button from the car control screen. If the users want to find the location of the vehicle, the user can easy press the button find my car the application will give the location.

### 1.5.3) Viper VSS3000



The application Viper SmartStart have a keyless entry which means the user can lock and unlock the car by press the button on the smartphone. This application can control any vehicle and can assign more than one user to control the vehicles and the user also will receive a text message on the smartphone if the alarm sounds. There are several features in this application such as lock and unlock the vehicle, remote car, trunk release and also car finder.

#### **Function**

##### **SmartSchedule**

This application is for the user to set the daily routine into the SmartSchedule and this application will manage the schedule for the user. This application will supervise the temperature, location and etc. from the stored cloud.

##### **Vehicle Status**

The vehicle status in this application is for the user to know the status of their vehicle, if the user leaves the car door open or the trunk popped this application will update the status and notify to the user. In this application is used the real-time car status so that the user know the vehicle status in the real-time.

### 1.6) Summary Existing Application

Application	Platform	Price	Function
ScyTek Galaxy Mobile 500	iPhone, Android, & Blackberry	RM1,015.20	The summarize ScyTek Galaxy Mobile 500 function, this application can control the car security alarm and also can start the vehicle using the smartphone. It also has a vehicle tracking system and has a real-time GPS tracking with high cellular antenna. In this application also has a notification alerts to send to the user phone and email and has multi vehicle monitoring.
Directed SmartStart	iPhone, Android, & Blackberry	RM458.71	The summarize Directed SmartStart function is can lock and unlock the vehicle door and also can start the car. It also can have a features trunk release, panic and aux channels.
Viper VSS3000	iPhone, Android, & Blackberry	RM 1,323.3	The summarize Viper VSS3000 function is can lock and unlock the vehicle door and also can start the car. It also can have a features trunk release, panic, aux channels and car finder.

\*Convert from USD, conversion rate 3.27261 as of 13/3/2014

**Table 1.1: Comparison of Existing System**

### **1.7) Existing System & Its Limitation**

The usual problem for the three existing system is the price and the application that need to install. There are problem with the application existing system some of the application when the user install the application into the smartphone the application user cannot used. When users push the button start the button not function. This makes users angry because users have to spend too much money to buy the product, but the product is not fully utilized.

The price of the product is too expensive for user to buy, what make the product expensive is because it used too many component and the user need to modify the car with the component that had given when buy the product. The user also needs to pay more for the service installation charge. The user needs to spend too much money for the application.

Other than that the user also need to pay for the service security application every month. There is too much money that the user needs to spend for the product, service and for the service security. So base on the problem the new application will develop to minimize the price and the equipment.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 OVERVIEW**

After make a research about the existing system the next stage is development phase, in this development phase the project will develop with the combination of electrical engineering. In this chapter also need make a research about the electrical engineering this is for the wiring part that needed to modify the car. The microcontroller will show the coding for all electronic device working and how the microcontroller will interact with the smartphone. This chapter also will explain the flow of the application and also explain about the material, software that needed to complete this application. In this part content the user requirement, techniques used in the application and the method that will used for this application

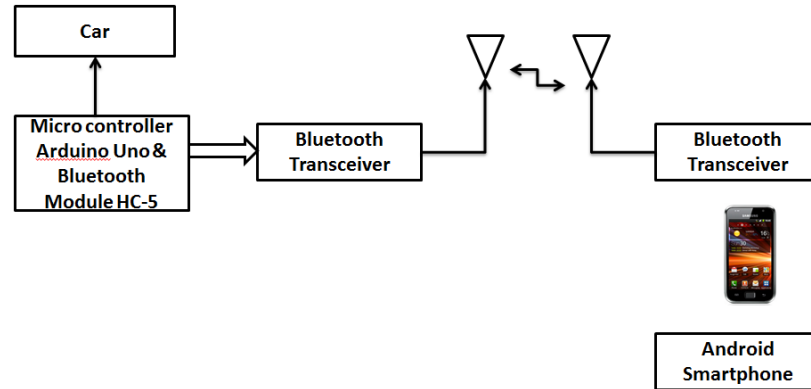
## **2.2) User Requirement**

The user requirement is a process to understand what the user or the client request, the information of the user requirement is to identify the list of the content, function of the application that the user request in the application with the requirement from the user this application will develop based on the user requirement.

After meet the user what the user need for the application development is mobile car alarm via Bluetooth application the user need the application on the android smartphone that the user can unlock and lock the car using the Bluetooth application. The application need to contain the security so that incase the user lost their phone the user can disable the function application in the smartphone. The user also requests not to use much cost to develop the application. Other than that the user wants not used to many component circuits to develop the application. This is because it will increase the cost to develop the application. The application must fully function and do not contain any error, the interface of the application is user friendly and easy the user understand the button on the application. The user requirement more details at Appendix A (Software Requirement Specification).

### 2.3) Technique Used

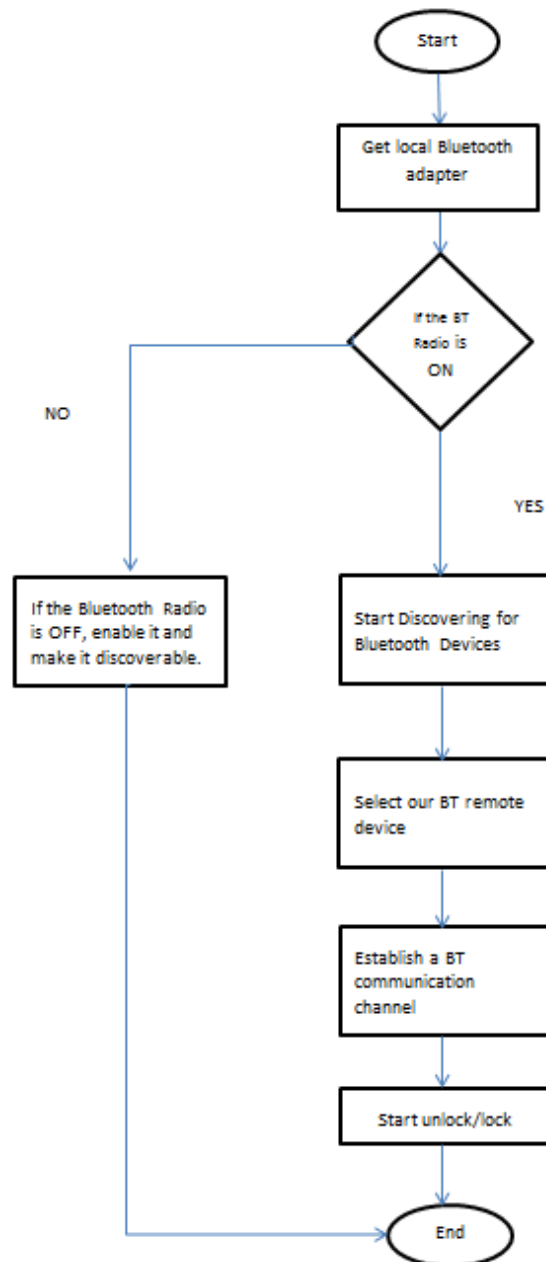
#### Block Diagram



**Figure 2.1: Block Diagram**

The figures 2.1 are a diagram that shows the block diagram that present a quick view of the process step in this application. In this diagram the microcontroller that will use is Arduino Uno and Bluetooth module HC-6. The smartphone will start discover the Bluetooth signal to the Bluetooth transceiver, the microcontroller will give a Bluetooth signal to the Bluetooth transceiver smartphone. When the both transceiver are connected the application can be used.

## 2.4) Flowchart



**Figure 2.2: Flowchart for establishing Bluetooth Connection**



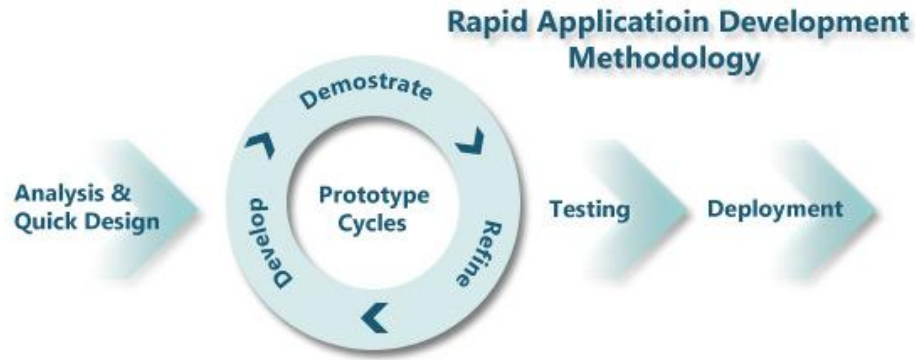
The figure 2.2 show the flow of the application how the application process from microcontroller interacts with the Bluetooth mobile smartphone. If the Bluetooth from the smartphone turn on it will start discovering the Bluetooth connection from the car. If the both Bluetooth are connecting with each other the function of the application will start the user can unlock and lock the car using the smartphone. If the Bluetooth from the smartphone are off it will enable to discoverable and the application cannot be used without the Bluetooth connection.

## **2.5) METHOD**

The method that I will be used in the PSM 1 is the Rapid Application Development (RAD) this is because the method of the RAD is relating to my project application development. In this section I will explain more details about the RAD process.

### **2.5.1) Rapid Application Development (RAD)**

RAD model is a type of incremental model components that is developed in parallel as they were mini projects. The concept of the RAD is can be developed faster and higher quality develop this is because RAD used the predefined prototyping so that the user can see the prototype of the project from the prototype the user can give a result and feedback regarding their requirement. The RAD usually embraces the object-oriented programming methodology, which is indeed re-use of software components. For this project the language that will be using is Java , so that in this project can implement the re-use of software component .



**Figure 2.3: Rapid Application Development**

### **2.5.2) Requirements Planning**

In the planning phase the client and analysts meet to identify the objective of the application and to know the details of the requirement from the objective. All the details of the new application will be discussed in this phase, for this project that has been discuss with the client are the objective and the proposed of the project. In this phase also will discuss how to archive the goal of the application that can meet the client requirement. To archive the goal the research about the problem of the current system will be discuss with the client in this phase. The scope of the project has been specified and the schedule has been designing with the client. This is because to make sure that the project is complete on the time.

### **2.5.3) User Design**

User design phase is where the prototypes are made, in this part the prototype for the application mobile car alarm via Bluetooth will develop with the requirement that the user need . In this phase the requirement from the client will be develop as a prototype. The user interface will be designed in this phase so that it easy for the client to understand the application. The user design stage produce a detailed system area mode , an outline system design, and implementations plan so that the user can see the application like actual application.

### **2.5.4) Construction**

Also known as the Development Stage, this stage completes the construction of the physical application system, builds the conversion system, and develops user aids and implementation work plans. In this project the system application will be design according to the user requirement and the objectives listed in the previous chapter. The details application development will be elaborate further with the functionality in the subsequent chapter.

### **2.5.5) Implementation**

Also known as the Deployment Stage, this stage includes final user testing and training, data conversion, and the implementation of the application system. In this stage the new application will be testing for their functionality before transfer to the working environment or to the user. If the application contains an error then the application can be corrected once the system has been testing.

## 2.6) Material Outline

### 2.6.1) Arduino Uno



**Figure 2.4: Arduino Uno Board**

The material that will be used to develop this application is the Arduino Uno. The Arduino Uno will act as the microcontroller to interact with the Bluetooth in the mobile smartphone. This microcontroller board has 14 digital input and output pins. It also has 6 analog inputs with a 16MHz crystal oscillator. The Arduino Uno has a USB connection that can connect to the PC or the laptop; it also has a power jack and an ICSP header. It also has a reset button to reset the Arduino Uno board. This Arduino Uno has everything that is needed to develop this application.

### Technical Specification

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pin	14(of which 6 provide PWM output)
Analog Input Pin	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32KB of which 0.5 KB used by bootloader
SRAM	2 KB
EEPROM	1 KB
Clock Speed	16 MHz

**Table 2.1: Specification Arduino Uno**

## Board

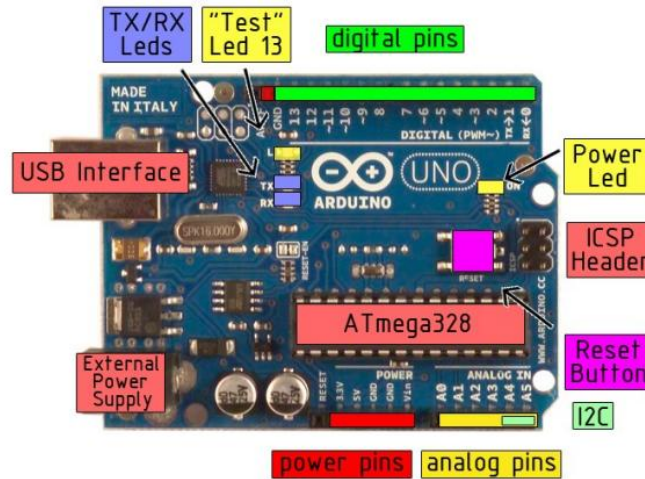


Figure 2.5: Arduino Uno Board

## Power

The Arduino Uno can be powered by using the USB connect or any external power supply such as form AC to Dc adapter or the battery. The power of Arduino Uno will be selected automatically by the system. The external supply can support the power from 6 to 20 volt. The power voltage must not use more that 12V, this is because the voltage regulator may overheat and can damage the board. The recommended range to use the power is around 7 to 12 volts only.

The power pins on the board are as follows:

- VIN: The input voltage when using an external power source.
- 5V: This is used to power the microcontroller and also can come either from VIN via an on-board regulator or etc.
- 3V3: A 3.3 generated volt supply by the on-board regulator with maximum current draw is 50mA.
- GND. Ground pins.

### 2.6.2) Car Central Lock



**Figure 2.6: Car Central Lock**

Power door locks (also known as electric door locks or central locking) allow the driver or front passenger to simultaneously lock or unlock all the doors of an automobile or truck, by pressing a button or flipping a switch. Central locking system is one that unlocks all doors on a car when one door is unlocked. And the reverse is also true if you lock the driver's door, central locking will lock all the doors.

#### Technical Specification

working Voltage	DC12 $\pm$ 2V
Load current	2.3A
No load current	0.15A
Flexible distance	18 $\pm$ 1mm
Dynamic torsion	4.5--5.5kg
Static torsion	2.0kg--2.5kg
Control time	0.2s
Longevity	100,000 times
Working temperature	-30--65°C

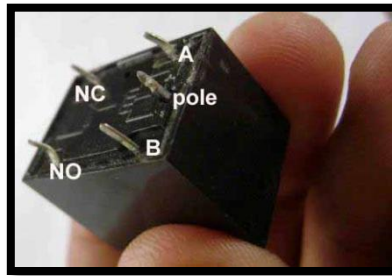
**Table 2.2: Specification Car Central Lock**

### 2.6.3) Mini Power Relay 12V DC



**Figure 2.7: Relay**

A power relay is a switch which utilizes an electromagnetic loop as a part of request to close or open a circuit. A power relay likewise contains an armature, a spring and one or a few contacts. On the off chance that the force transfer is intended to regularly be open, when force is connected, the electromagnet pulls in the armature, which is then pulled in the curl's heading until it achieves a contact, in this way shutting the circuit. On the off chance that the hand-off is intended to be regularly shut, the electromagnetic loop pulls the armature far from the contact, in this manner opening the circuit.



**Figure 2.8: Relay Pin**

The Pin of the relay function:

- COM/POLE= Common, NC and NO always connect to this; it is the moving part of the switch.
- NC = Normally Closed, COM/POLE is connected to this when the relay coil is not magnetized.
- NO = Normally Open, COM/POLE is connected to this when the relay coil is MAGNETIZED and vice versa.

### Technical Specification

Model	SRD-12VDC-SL-C
Operating Voltage	Coil Voltage 10A 250VAC / 10A 125VAC
Rated load	10A 30VDC / 10A 28VDC
Contact resistance	$\leq 100\text{m (ohm)}$
Electrical life	100,000
Mechanical life	10,000,000
Coil power	0.36W, 0.45W
Coil pick-up voltage	$\leq 75\%$
Coil drop-out voltage	$\geq 10\%$

**Table 2.3: Specification Mini Relay**



#### **2.6.4) Power Adapter 12V 1A**



**Figure 2.9: Adapter 12V**

The 12 Volt Adapter Power Supply is presumably the most generally utilized force connector and a return to the beginning of hardware when 12V was a typical battery yield voltage. With the move by the purchaser to utilize strong state hardware in the auto and afterward into home was certain as one essential outline was widespread. The 12 Volt Power Adapter gives a directed 12 Volts DC output. A 12 Volt Adapter Power Supply is encased in a plastic defensive case that accompanies either a connected AC rope, or a mating attachment for one of the 3 normal IEC cordsets. 12 Volt Adapter Power Supplies then have an attached output cord that plugs into your equipment.

### Technical Specification

Voltage – Input	100 ~ 240 VAC
Voltage – Output per Connector	12V
Current – Output (Max)	1A
Power (Watts)	12W
Power Supply Type	Switching
Polarization	Positive Center
Output Connector	2.1mm I.D. x 5.5mm O.D. x 11mm Female
Applications	Commercial
Features	OVP, SCP
Efficiency	Level V
Operating Temperature	0°C ~ 40°C
AC Input Connector	-
Cord Length	72" (1.83m)

**Table 2.4: Specification Adapter**

### 2.6.5) Smartphone

Today the smartphone have a more common features of a computer or the laptop, the smartphone technology allow the user to keep the information, install the application with using a mobile smartphone device. The smartphone component assumes the role of the main processing unit. It is responsible to control unlock and lock the car alarm. The use of a smartphone guarantees a small embedded application that can be easily programmed. Today, smartphones are very important in the mobile devices industry being recognized as good computational devices thanks to their functional capacities (e.g. Bluetooth).

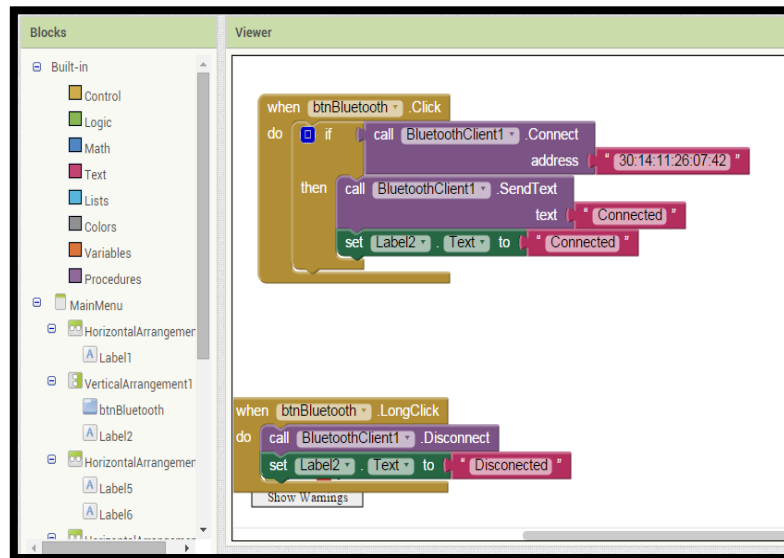
## **2.6.6) Smartphone Programming**

### App Inventor Language Blocks

The blocks editor in the first form ran in a different Java methodology, utilizing the Open Blocks Java library for making visual blocks programming languages and programming. Open Blocks is dispersed by the Massachusetts Institute of Technology's Scheller Teacher Education Program (STEP) and is gotten from expert's postulation explore via Ricarose Roque. Educator Eric Klopfer and Daniel Wendel of the Scheller Program bolstered the conveyance of Open Blocks under a MIT License. Open Blocks visual writing computer programs is nearly related to StarLogo TNG, an undertaking of STEP, and Scratch, a task of MIT Media Laboratory's Lifelong Kindergarten Group. Application Inventor 2 supplanted Open Blocks with Blockly, a blocks editor that runs inside the program. The MIT AI2 Companion application empowers ongoing investigating on associated gadgets through Wi-Fi, not simply USB.

Built-in blocks are available regardless of which components are in the project. In addition to these language blocks, each component in the project has its own set of blocks specific to its own events, methods, and properties. This is an overview of all of the Built-In Blocks available in the Blocks Editor.

- Control Block
- Logic Block
- Math Block
- Text Block
- List Block
- Color Block
- Variable Block
- Procedures Block



**Figure: 2.10 Block Editor**

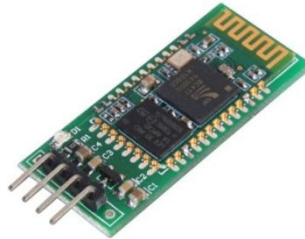
### 2.6.7) Smartphone Models

For system testing, the smartphones used are Samsung Galaxy S5. The devices have good processing capabilities and considerable memory, when comparing with other smartphones available in the market, and can be programmed using the Java platform previously presented.



**Figure 2.11: Samsung S5**

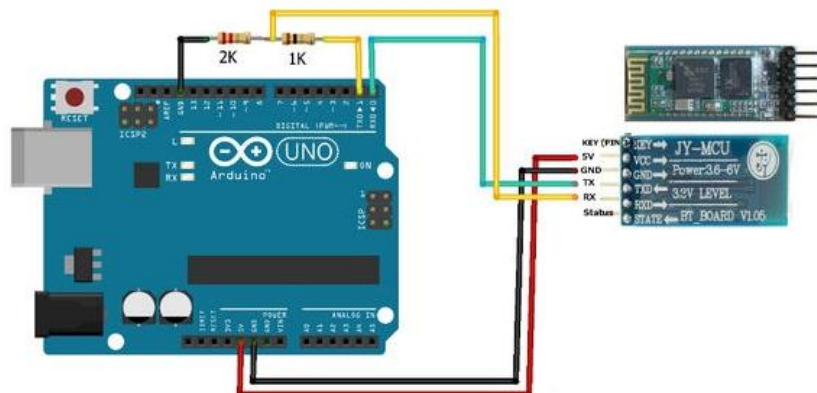
### 2.6.8) Serial Port Bluetooth HC-6 module



**Figure 2.12: Bluetooth Module**

The other material or hardware that needed to develop this application is HC-06 module this is used to have a Bluetooth on the Arduino Uno board so that it can interact with the smartphone Bluetooth. The HC-06 will be wiring on the Arduino board so that the Bluetooth connect can fully function to connect with the smartphone. The specification of the HC-06 is low power 1.8V operation to 3.6V input and output. It also has PIO control and integrated with antenna and edge connector.

### Wiring



**Figure 2.13: Wiring**

### **The Material for wiring**

Material that needed for wiring the Arduino Uno and HC-06 Bluetooth module is Arduino Uno board, HC-06 Bluetooth module (Bluetooth over serial), breadboard, jumper wires and Arduino IDE.

### **WIRING**

- HC-06 GND will connect with Arduino GND Pin
- HC-06 VCC (5V) will connect with Arduino 5V
- HC-06 TX will connect with Arduino Pin 10 (soft RX)
- HC-06 RX will connect with Arduino Pin 11 (soft TX)
- HC-06 Key (PIN 34) will connect with Arduino Pin 9

### **2.6.9) Software**

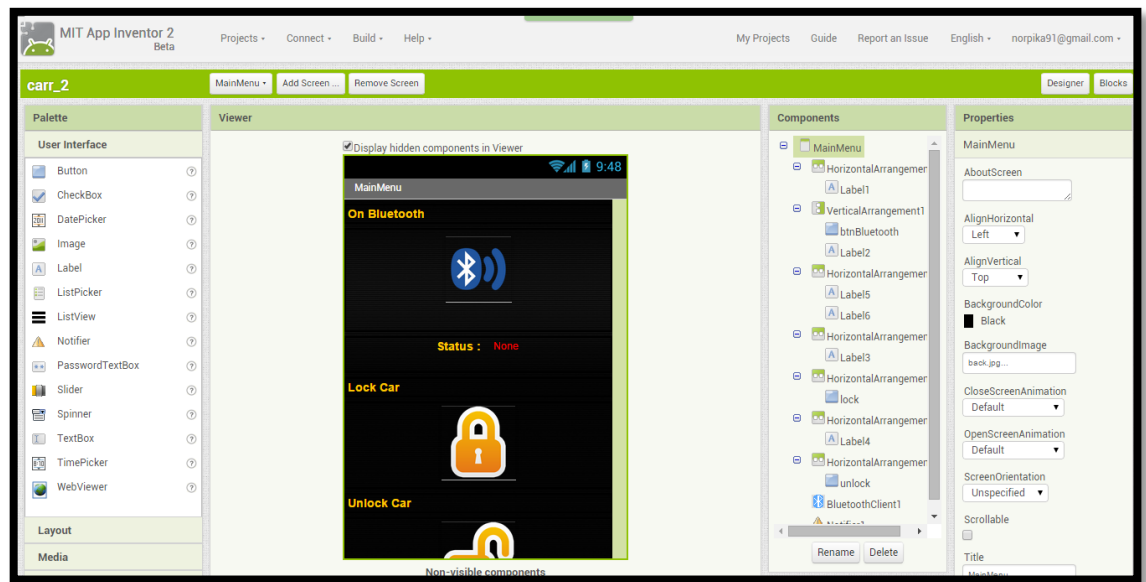
In completing the development of this system, there is a number of software that is required and has been used. Below is a list of the software used in developing this system:

### **App Inventor for Android**

Application Inventor for Android is an open-source web application initially gave by Google, and now kept up by the Massachusetts Institute of Technology (MIT).

It permits newcomers to PC programming to make programming applications for the Android working framework (OS). It utilizes a graphical interface, fundamentally the same to Scratch and the StarLogo TNG client interface, which permits clients to move and customize visual articles to make an application that can run on Android gadgets. In making App Inventor, Google drew upon noteworthy earlier research in instructive processing, and also work done inside Google on online advancement situations.

Application Inventor and the tasks on which it is based are educated by constructionist learning hypotheses, which underscores that programming can be a vehicle for connecting with capable thoughts through dynamic learning. Accordingly, it is a piece of a continuous development in PCs and instruction that started with the work of Seymour Papert and the MIT Logo Group in the 1960s and has additionally showed itself with Mitchel Resnick's work on Lego Mindstorms and StarLogo



**Figure 2.14: MIT App**

## **Arduino Software**

Arduino is an open-source stage utilized for building electronics projects. Arduino comprises of both a physical programmable circuit board (regularly alluded to as a microcontroller) and a bit of programming, or IDE (Integrated Development Environment) that runs on the PC, used to compose and transfer PC code to the physical board.

The Arduino stage has gotten to be truly mainstream with individuals simply beginning with gadgets, and in light of current circumstances. Dissimilar to most past programmable circuit sheets, the Arduino does not require a different bit of equipment (called a programmer) with a specific end goal to load new code onto the board – It can essentially utilize a USB link. Furthermore, the Arduino IDE utilizes a rearranged form of C++, making it less demanding to figure out how to program. At long last, Arduino gives a standard structure calculate that breaks out the elements of the micro-controller into a more open accessible package



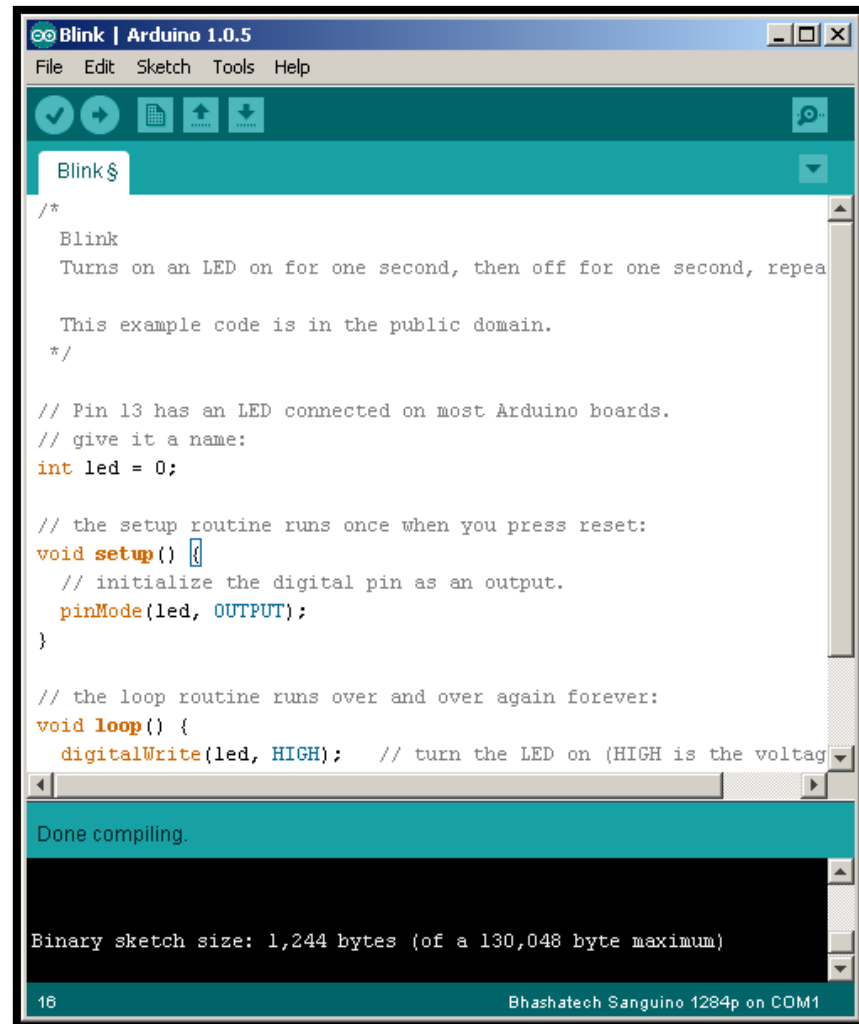


Figure 2.15: Arduino Software

## **CHAPTER 3**

### **DESIGN AND IMPLEMENTATION**

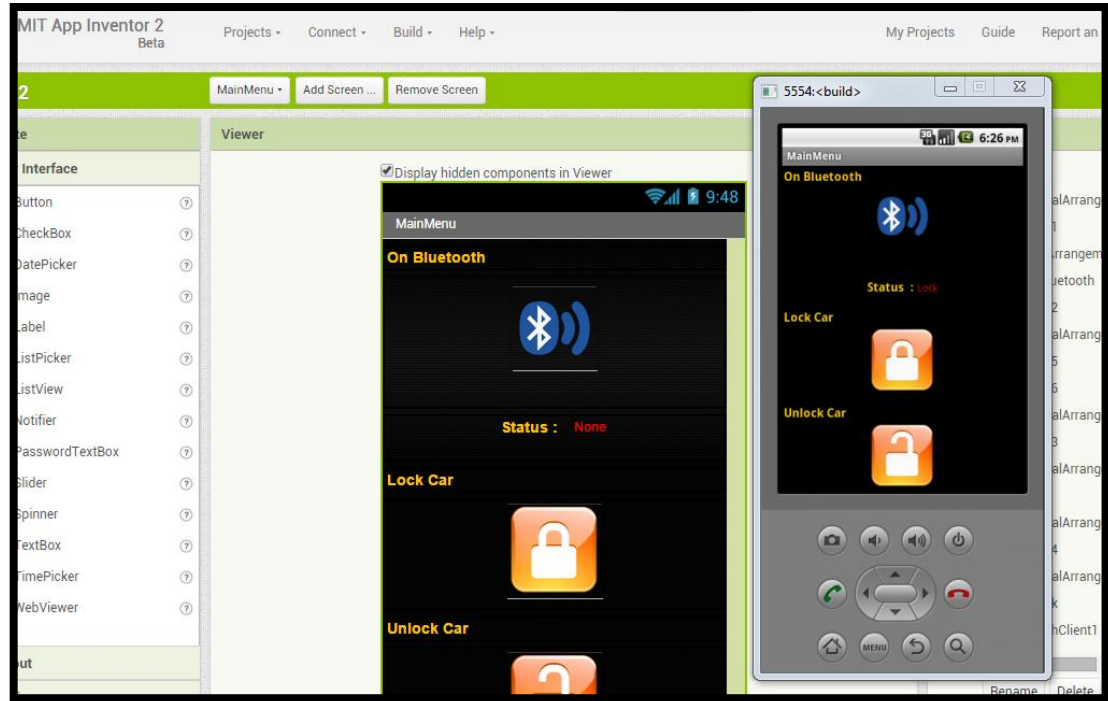
#### **3.1 Implementation**

The motivation behind this part is to outline the needs of this application and how the overall of the flow of the application. This part covers the implementation of unlock and lock car door using smartphone with Bluetooth. The usage for the application is including the coding, debugging and documenting. The interface is outline taking into account necessity require that is expressed by customer and the prerequisite are changing from stream methodology of storyboard. This application is creating utilizing MIT App Inventor for the interface configuration and all the capacity for the application required.

### 3.2 Tools and Technologies

Mobile Application for Car Alarm has been produced utilizing the software MIT App Inventor for the interface and functionalities of the application. The mobile application is modified utilizing Java programming language for the functionalities of the interface in MIT App Inventor programming. In this venture, the MIT App Inventor programming is utilized to add to the customer side application.

Amid improvement transform, the mobile application needs to be troubleshooting and run utilizing either the emulator on MIT App Inventor programming or straightforwardly run on Android gadget which is the Samsung Galaxy S5. For testing the application is run just on the phone and the emulator.

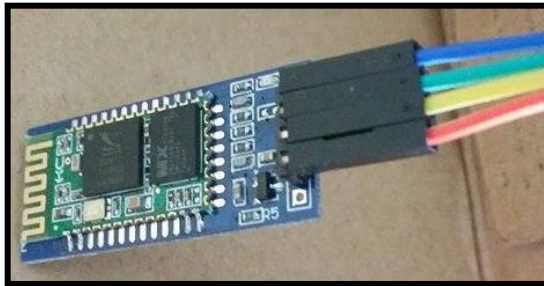


**Figure 3.1: MIT App emulator interface**

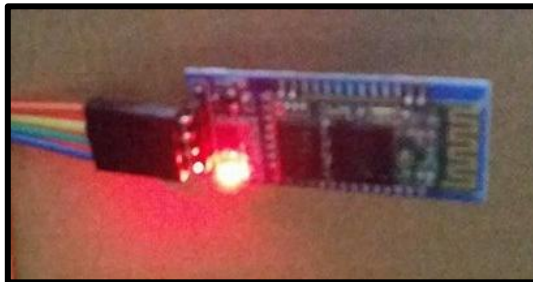
Figure 3.1 shows the emulator interface in MIT App software. The emulator is used to run the application for testing locally in MIT App. The emulator provides an interface the same as on a real mobile device interface to allow the programmer to customize the application to be suitable with a real device.

### **3.3 Hardware Implementation**

User needs to connect the Bluetooth to the car Bluetooth to allow accessing the car central lock. User will access the car central lock via Bluetooth with the Arduino Uno and control the relay when the user requests to lock and unlock the car door. The controller board will implement near the car distribution board. Usually the circuit breaker (CB) at the car will send the signal to the user Bluetooth.

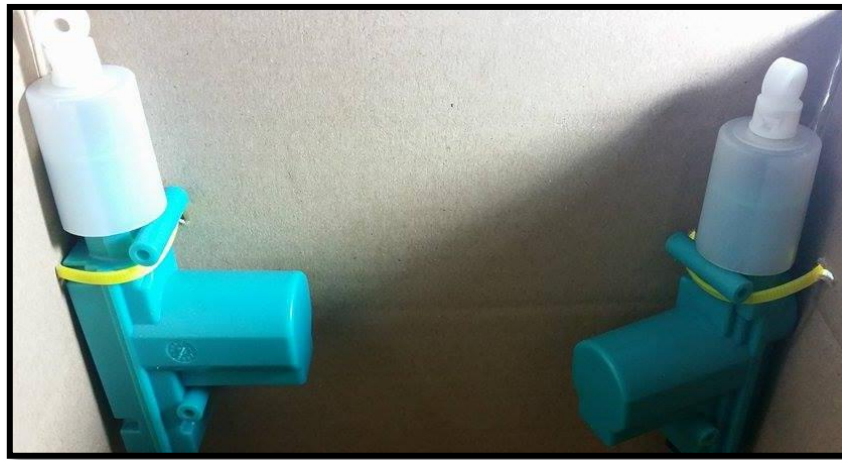


**Figure 3.2: Bluetooth HC-06**



**Figure 3.3: Bluetooth Signal HC-06**

Figure 3.2 show the Bluetooth that used to connect with the user Bluetooth, when the Bluetooth connect with the user Bluetooth it will have a signal like figure 3.3 the tiny red light will appear. The address Bluetooth HC-06 is 30:14:11:26:07:42 to connect the user Bluetooth



**Figure 3.4: Lock**

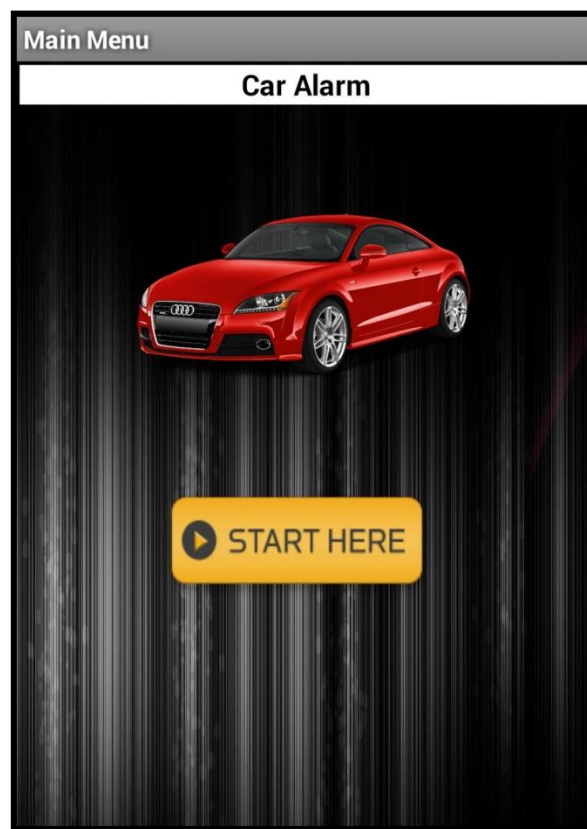


**Figure 3.5: Unlock**

The figure 3.4 and 3.5 show the prototype of the car central lock, when the user click the button lock the central lock will be lock and the white plastic like in the figure 3.4 is down. If the user click the unlock button the white plastic will be up like in the figure 3.5 it show that the car door is unlock.

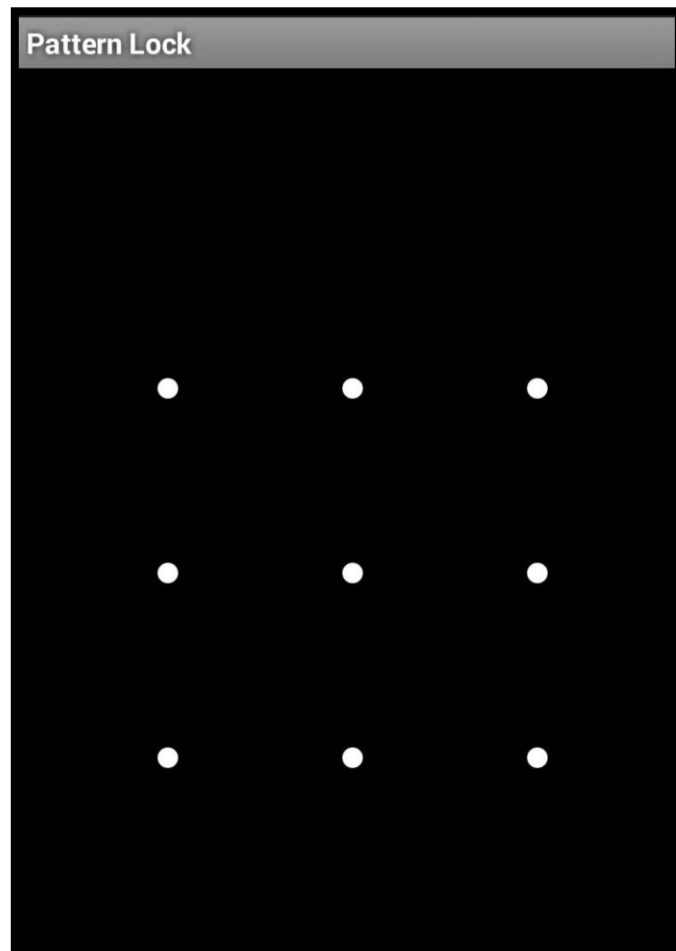
### 3.4 User Interface Construction

During the development process of the application, an Android emulator in MIT App is used to test the system functionalities. There are a few interface of the mobile car alarm via Bluetooth application is the home and main menu interface.



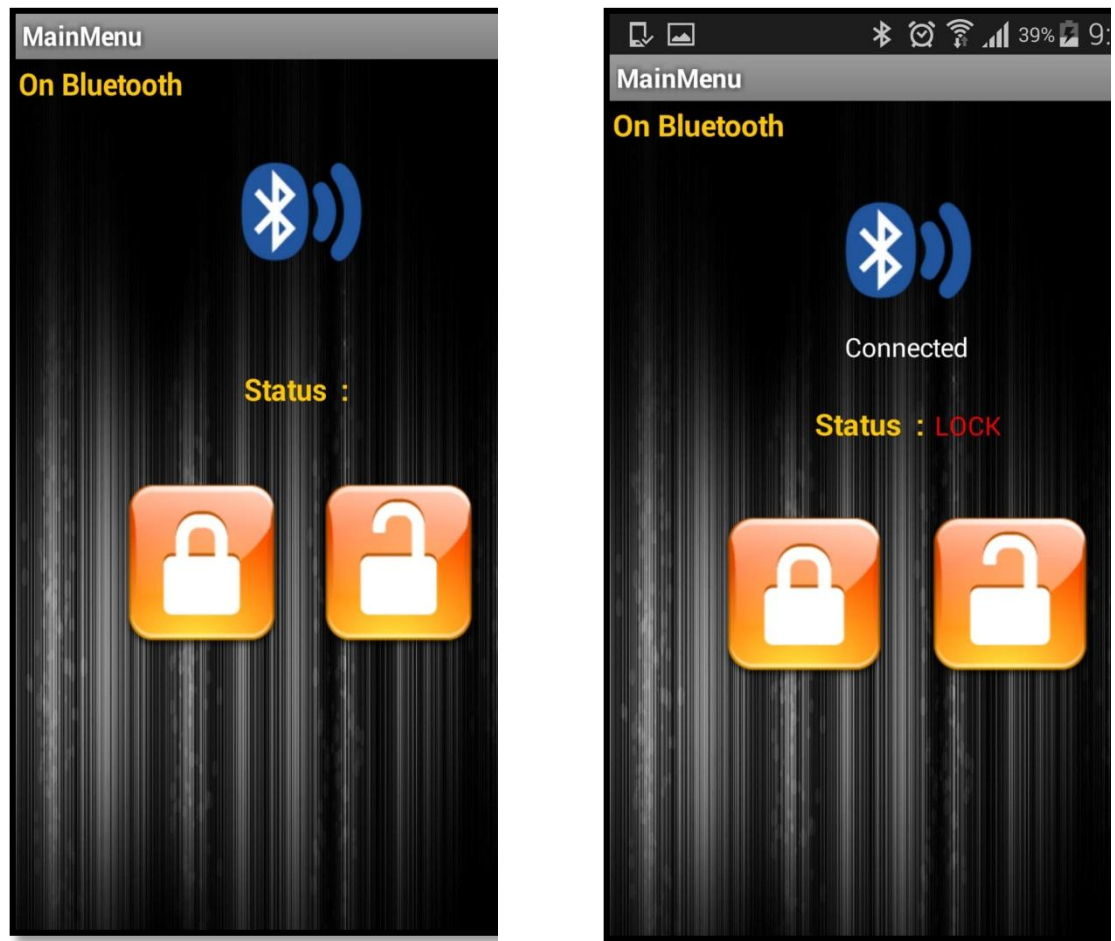
**Figure 3.6: Home Page**

Figure 3.6 shows the Home interface which is the first interface appeared when launching the Mobile Application for mobile car alarm via Bluetooth. On this interface, user needs to click the button start here to go to the pattern lock page or the next page.



**Figure 3.7: Pattern Lock Page**

The figure 3.7 show the pattern lock page, the user need to unlock the pattern before proceed to the next page. This page is to secure the application if the phone is loss or stolen the other person cannot used the application.



**Figure 3.8: Main Menu**

Figure 3.7 shows the Main Menu interface for Mobile Application car alarm via Bluetooth. This is the interface directed from the Home page after user clicks the button on the application. On this interface, there are three choices of functions which are connecting the Bluetooth, lock and unlock car door. Button connect the Bluetooth will connect the user Bluetooth with the car Bluetooth and to disconnect the Bluetooth the user need to long click the button. Button lock is to lock the car door when user click the button the status of the car will appear. Button unlock is to open the car door and when user click the button the status of the car will appear.



## Block Editor Code

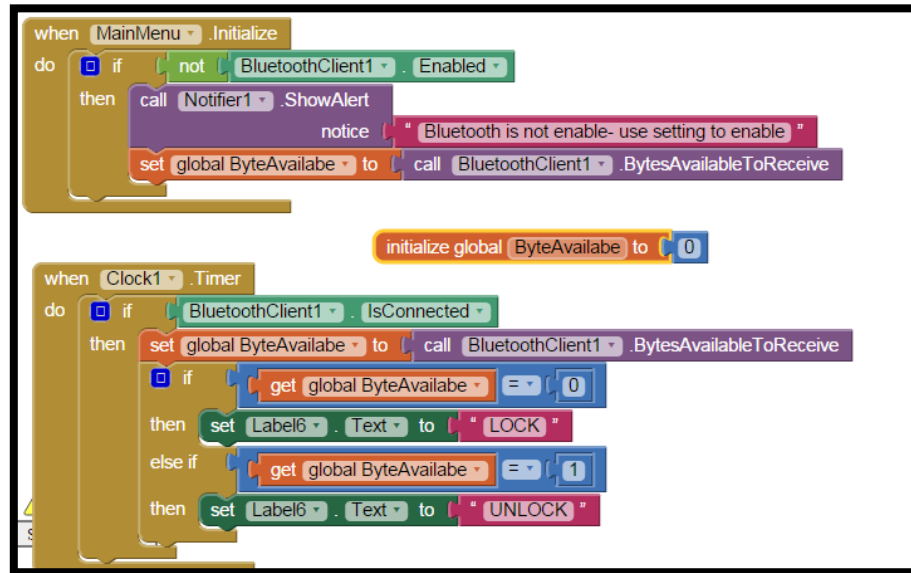


Figure 3.9: Block Editor

## Arduino Code



Figure 3.10: Arduino Code

## **CHAPTER 4**

### **RESULTS AND DISCUSSION**

#### **4.1 Introduction**

In this chapter, there are six subtopics including the overview which are Subtopic 4.2, Subtopic 4.3, Subtopic 4.4, Subtopic 4.5, and Subtopic 4.6. Subtopic 4.2 will discuss on expected result from this project and continue with Subtopic 4.3 which is discussion. It continues with Subtopic 4.4 which will discuss on the project constraint. Subtopic 4.5 will explain on the advantages and disadvantages of the application. The last Subtopic 4.6 will discuss on future work that can be done to improve the application.

## **4.2 Expected Results**

A prototype of the Mobile Application for Mobile Car Alarm via Bluetooth has been developed based on the project proposal in order to achieve the objective of this project. This prototype is developed to fulfill the plan of developing the application before start developing the final application after improving all related problems. The prototype application is functioning well and has been test on client. The application is able to perform its functions is to unlock and lock car door using smartphone with Bluetooth. The objective to develop an Android smartphone application to lock and unlock a car is achieved with minor problems and improvements.

## **4.3 Discussion**

Using the prototype of the application has successfully achieve the objective of the project which is to develop an Android smartphone application to lock and unlock a car .The prototype application has proven great improvement from using the car key including saving time and easy to used.

A few improvements has been analyzed and recorded to be including into future work. The improvements are made to eliminate minor problem such as the user interface design layout, security and error handling mechanism. With improvement through future work that will be started after this project development, the Mobile Application for Mobile Car Alarm via Bluetooth might become an application that meets professional standard.

#### **4.4 Project Constraint**

Project constraint is the problem and constraints in developing the project. This includes development constraint, software constraint, and hardware constraint.

Development Constraint:

- i. Limited time and skill in mobile development platform has caused slow development progress to developer to research mobile development method.
- ii. Limited skill about Block Editor because development process delayed when there is error on application debugging and cause longer time to solve the error.

Software Constraint:

- i. The MIT App software comprises of complicated structure for beginner developer and might give problem in development process.
- ii. The MIT App emulator software is slow in performance thus force developer to use Android device to debug application in development.

Hardware Constraint:

- i. Limited time and skill in wiring the hardware relay and the Bluetooth module.
- ii. Limited budget in providing the central lock, relay, adapter and arduino Uno device to be used with the application.

#### **4.5 Advantages and Disadvantages of Application**

There are various advantages of using Mobile Application car alarm via Bluetooth. The first advantage is that the application has successfully transformed the manual car key into a keyless which easy to use to unlock and lock the car. Using the mobile application can improving the existing car alarm key to more interactive and friendly by using the smartphone. Moreover, the this application can installed in the smartphone as an alternative key to turning on the Bluetooth or the car owner might leave the key inside the car and car automatically locked. The application is also user friendly since it is easy to install on smartphone and compatible with most Android device which is owned by majority of people.

Aside from the advantages of the application, there are also some disadvantages arise. One of the disadvantages is the application is the car need to modified before used application. Therefore, user might need to modify their car to use the application. Other than that, the radius of the coverage is bound by Bluetooth protocol. The minor problem on the application is the security feature depends on the smartphones security.

## **4.6 Future Work**

Based on the disadvantages of the Mobile Application car alarm via Bluetooth stated, the improvement that can be made on the application is improve the user interface while adding more user-friendly characteristics such as error handling with proper validation and UI design that apply usability concept. The application can also improve in the part of the security if the phone is stolen or loss the car will safe. Other than that, there might be more improvement that can be made to this application to make it more usable for future use that may not be listed here. It is hope that the improvement on Mobile Application car alarm via Bluetooth can be continued by future developer.

## **CHAPTER 5**

### **CONCLUSION**

With the advancing technology, mobile car alarm via Bluetooth application will develop. One of the features of this application is lock and unlocks the car using the smartphone. This means user can easily using their phone to open the car door. It more interactive along with the technology and user do not have a lot of key in their pocket. The user also can make their smartphone as their alternative key for the car. This application also can minimize the price and the equipment that used to install in the car. The hardware that will be used is Arduino Uno and Bluetooth module to install inside the car. It opened up a new path from remote key to a smartphone application using the Bluetooth.

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## **APPENDIX A**

## **Software Requirements Specification**

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**For the**

**MOBILE CAR ALARM VIA BLUETOOTH APPLICATION**

**Prepared By:**

**NORSYAFIQAH BINTI JAMALUDDIN**

**CB12017**

## DOCUMENT APPROVAL

	Name	Date
<b>Verified by:</b>     <hr/> Project Manager	Norsyafiqah Binti Jamaluddin	
<b>Approve by:</b>     <hr/> Supervisor	Dr.Mohamed Ariff Ameen	



## 1. Introduction

---

### 1.1 Purpose

The purpose of this project is to replace the remote car to a smartphone. With this application, it will allow user to uses the smartphone to unlock and lock the car. The user can click the button unlock or lock to open the car door using the smartphone. In addition, the application also can reduce the key in the pocket. The users of this application is the owner car that using the smartphone android. This application is able to unlock and lock the car door using the smartphone.

### 1.2 Problem Statement

Three issues have been identified as the core problem in existing car alarm key which are:

iv) Not interactive and too many key in the pocket

To improving the existing car alarm key to more interactive and friendly by using the smartphone. This is because now's day everyone carry their smartphone everywhere it easy for the car owners to carry the phone to unlock and lock the car using the smartphone rather than using the key to unlock and lock the car.

v) Human careless

In case the owner of the car lost their key, they can use this application installed in their smartphone as a alternative key by turning on the Bluetooth or the car owner might leave the key inside the car and car automatically locked.

vi) Car Thief

In some other cases, when the owner back to the vehicle, they noticed that the doors are unlocked, and found that the valuable things was disappeared. No matter where we park our vehicle, there is always a risk of it getting stolen nowadays

### 1.3 References

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vyasa[http://vyasa.sourceforge.net/vyasa\\_software\\_requirements\\_specification.pdf](http://vyasa.sourceforge.net/vyasa_software_requirements_specification.pdf)

## **1.4 Document Overview**

This document outline based on the IEEE Standard 830-1998 for Software Requirement Specification (SRS). The explanations of the SRS are divided into 4 chapters:

### **Chapter 1 Introduction**

This section is described about the purpose of this document. Generally, in this chapter was state the problems that occur in the current manual way performing the related task associated Mobile Car Alarm via Bluetooth Application. Also indicates in this chapter are the references for this document and document overview for SRS.

### **Chapter 2 Overall Descriptions**

This chapter is related with the overall description of product functions, user characteristics. This chapter also states the constraints requirement and the assumptions and dependencies of the system.

### **Chapter 3 Specific Requirements**

Chapter Specific Requirements is addition from the Chapter 2. In this chapter the requirement of the system will be state clearly and more details. Each module description was accompanied with the sequence diagram. It will describe the external interface requirements, software product features, performance requirements and requirements traceability.

### **Chapter 4 Definition, Acronyms and Abbreviation**

In this chapter, the definition and acronyms are listed. This chapter can help the user to know the definitions and the acronyms which are been used in developing Mobile Car Alarm via Bluetooth Application.





## 2. Overall Description

---

### 2.1 Overall Description

This section of the SRS should describe the general factors that affect the product and its requirements. This section does not state specific requirements. Instead, it provides a background for those requirements, which are defined in detail in Section 3 of the SRS.

#### 2.1.1 Product Perspective

Mobile Car Alarm via Bluetooth Application will develop using mobile application for unlock and lock car door and pattern lock for the security. The language will be used is MIT App Block Editor.

1. The interface for mobile application using the MIT APP to provide the user interface for the user interacts with the application.
2. The software arduino use to code the coding Bluetooth and function lock and unlock.

#### 2.1.2 System Interfaces

No system interfaces are involved.

### 2.1.3 User Interfaces

The user that used this application is user that owns a car and using the smartphone android. The user needs to download the application on the phone to use the application. The application function is to lock and unlock the car door using the smartphone.

#### Interface for Mobile Application

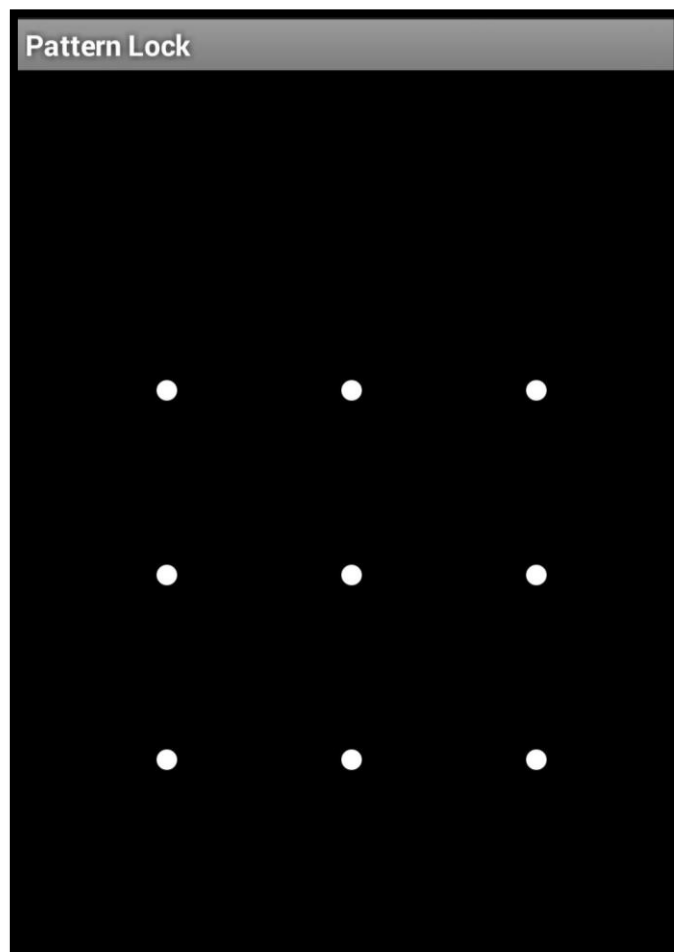


Figure 2.2 Pattern Lock

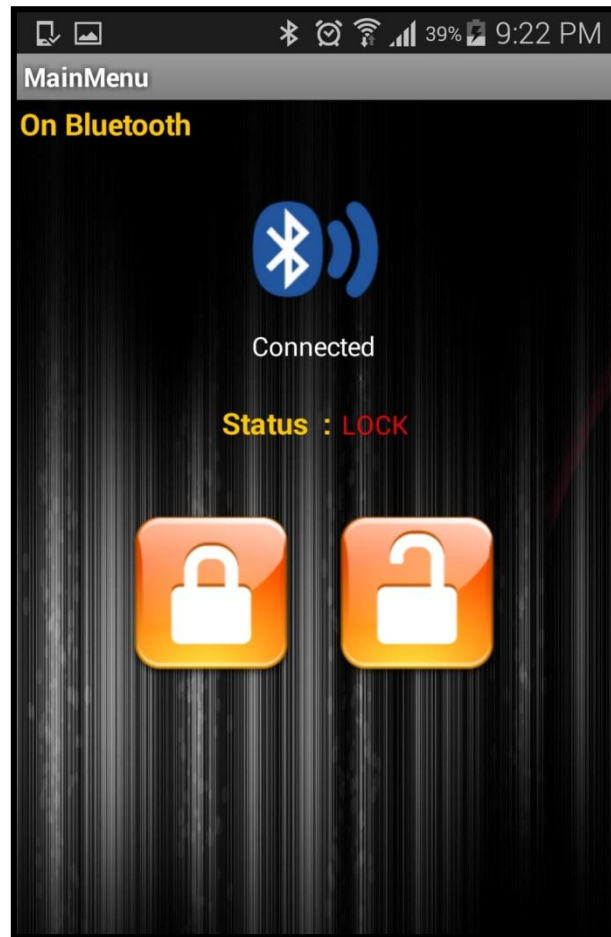


Figure 2.3 Unlock and Lock

#### 2.1.4 Software Interfaces

This subsection will be explained in detail in subsection 3.1.3

## **2.2 Product Functions**

The mobile car alarm via Bluetooth application can be accessed for the user that install the application on the phone android and also the car that make a small modified .The user need to unlock the pattern to the menu page or to use the application. After unlock the pattern lock user can used the application by click the button lock or unlock the car door.

## **2.3 User Characteristics**

- Basic skills to handle application system
- Basic knowledge about using the application
- Available for normal and expert user cause it easy to use and understand.

## **2.4 Constraints**

1. The radius of the coverage is bound by Bluetooth protocol
2. The car need to modify to uses the application.

## **2.5 Assumptions and Dependencies**

1. The application did not use any browser and it is a stand-alone application.
2. This application can only be used on short distance.

### 3. Specific Requirements

---

#### 3.1 External Interface Requirements

This should be a detailed description of all inputs into and outputs from the application.

##### 3.1.1 User Interfaces

The user interface is for the user interact with the application, there one user interface that is mobile application interface.

##### 3.1.2 Software Interface

In this section, it will briefly describe the software that is being used. Besides that further explanations of the software functions are also included.

Software Name	Descriptions
Microsoft Windows Operating System • Windows 7 Ultimate	<ul style="list-style-type: none"><li>• As a platform for a system to run</li><li>• operating system which will be used to develop the system</li></ul>
Arduino	Coding for arduino UNO to control the car central lock.
MIT Application	Interface design for application and coding.

Table 3.1 Software Interface

## 3.2 Software Product Features

### 3.2.1 Use cases

#### 3.2.1.1: Pattern Lock

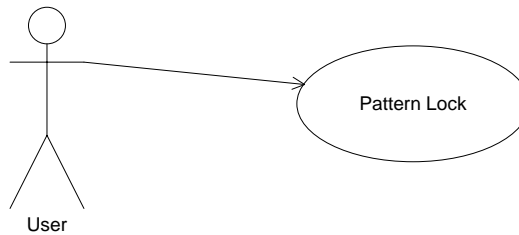


Figure 3.1

Use Case:	Pattern Lock Application
<b>ID:</b>	MB 001
<b>Scope:</b>	Mobile Car Alarm Via Bluetooth
<b>Priority:</b>	Essential
<b>Summary:</b>	The purpose of this use case is to unlock the pattern lock,
<b>Primary Actor:</b>	• Users
<b>Supporting Actors:</b>	▪ Users
<b>Stakeholders:</b>	▪ None
<b>Precondition:</b>	Login the application
<b>Trigger:</b>	None
<b>Normal Flow:</b>	1. Unlock the pattern lock with the correct pattern
<b>Sub-Flows:</b>	None
<b>Alternate Flow/ Exceptions:</b>	None
<b>Post-Condition:</b>	None
<b>Non-Behavioral Requirements:</b>	None
<b>Source:</b>	None
<b>Revision &amp; Date</b>	Revision 01

### 3.2.1.2: Unlock and lock

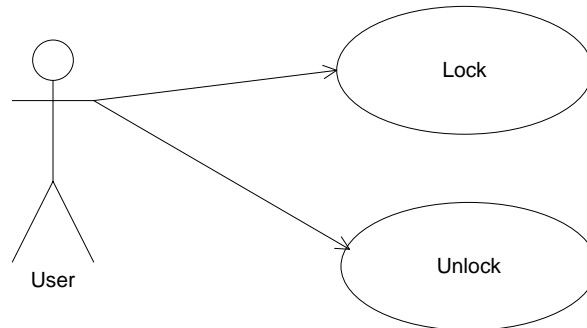


Figure 3.1

Use Case:	Unlock and lock Application
<b>ID:</b>	MB 001
<b>Scope:</b>	Mobile Car Alarm Via Bluetooth
<b>Priority:</b>	Essential
<b>Summary:</b>	The purpose of this use case is to unlock and lock the car,
<b>Primary Actor:</b>	• Users
<b>Supporting Actors:</b>	▪ Users
<b>Stakeholders:</b>	▪ None
<b>Precondition:</b>	Login the application
<b>Trigger:</b>	None
<b>Normal Flow:</b>	2. Click the start button to start to unlock and lock.
<b>Sub-Flows:</b>	None
<b>Alternate Flow/ Exceptions:</b>	None
<b>Post-Condition:</b>	None
<b>Non-Behavioral Requirements:</b>	None
<b>Source:</b>	None
<b>Revision &amp; Date</b>	Revision 02

#### 4. Definitions, Acronyms and Abbreviation

---

This subsection should provide the definitions of all terms, acronyms, and abbreviations required to properly interpret the SRS. This information may be provided by reference to one or more appendixes in the SRS or by reference to other documents.

##### 4.1: Definition

**Table 4.1:** Definition

No	Item	Definition
1.	User	A person who owns the car that using the android smartphone to unlock and lock the car .

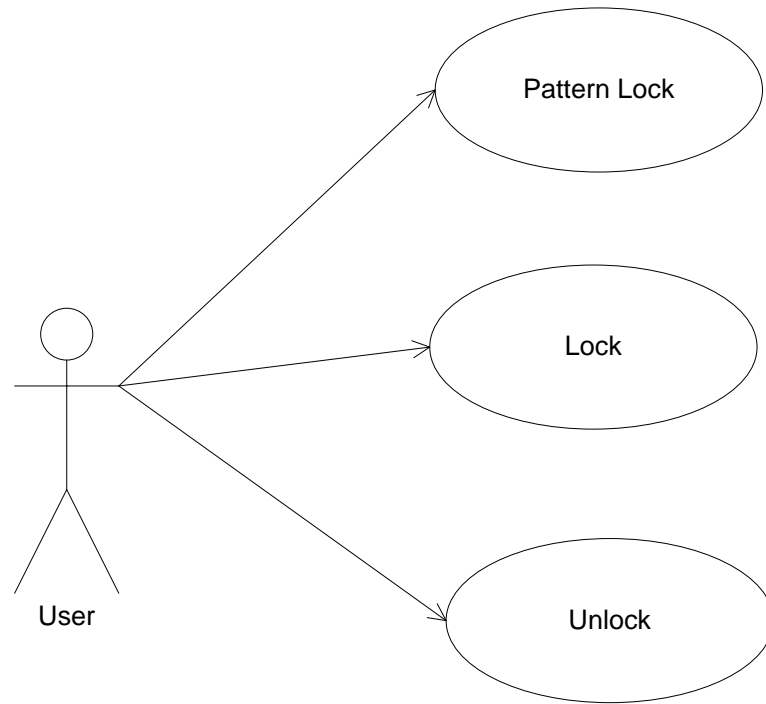
##### 4.2: Acronyms

**Table 4.2:** Acronyms

No	Item	Definition
1.	SRS	Software Requirement Specification



## Use Case Diagram



**Figure 1: Uses Case Diagram**

## **APPENDIX B**

# **MOBILE CAR ALARM VIA BLUETOOTH APPLICATION**

## **Software Design Specification**

**Prepared By:**

**NORSYAFIQAH BINTI JAMALUDDIN**

**CB12017**

## Table of Contents

Software Design Specification .....	65
Table of Contents .....	66
1.0 Introduction.....	68
1.1 Goals and objectives .....	68
1.2 Statement of scope .....	68
1.3 Software context .....	69
1.4 Major constraints.....	69
2.0 Architectural design .....	69
3.0 Component-level design .....	70
3.1 Description for Home page.....	70
3.1.1 Pattern Lock Page.....	70
3.1.2 Main Menu interface description .....	70
3.1.3 Main Menu processing detail .....	70
3.1.3.1 Performance issues.....	70
3.2.3.2 Design constraints .....	70
4.0 User interface design.....	71
4.1.1 Home Screen .....	71
4.1.1.1 Objects and actions for Home Screen .....	71
4.1.2 Pattern Lock Screen .....	72
4.1.2.2 Objects and actions for Pattern Lock Screen .....	72
4.1.3 Main Menu Screen .....	73
4.1.3.2 Objects and actions for Main Menu .....	73
4.2 Interface design rules .....	74
5.0 Restrictions, limitations, and constraints .....	74
6.0 Testing Issues .....	75
6.1 Classes of tests .....	75
6.2 Expected software response .....	75

## DOCUMENT APPROVAL

	Name	Date
<b>Verified by:</b>          <hr/> Project Manager	Norsyafiqah Binti Jamaluddin	
<b>Approve by:</b>          <hr/> Supervisor	Dr.Mohamed Ariff Ameen	

## **1.0 Introduction**

This document specifies the requirements for the mobile car alarm via Bluetooth application. . This project is to design a car alarm that can be controlled by the smartphone via Bluetooth as well as normal remote control. This application is capable to control several function such as lock and unlock the door. The system only can be accessed and configured by owner using Bluetooth communication via mobile smartphone to turn it on or off.

### **1.1 Goals and objectives**

To achieve success on Mobile Car Alarm via Bluetooth Application purposes, the following *objectives* are set:

- To develop an Android smartphone application that locks and unlocks a car.
- To integrate application into the car circuitry to allow remote locking and unlocking.
- To develop a security feature that blocks connection from the phone to the car in case the phone is stolen.

### **1.2 Statement of scope**

In order to realize this type of car central-locking system by considering time constraint and budget, there are several scopes that need to be outlined. This is to ensure the project objective can be achieved successfully. This project is proposed under certain defined scopes:

- The car must be modified with specific devices before the application can be used.
- This application is a native Android application that does not required browser or internet connection.
- The user needs unlock the pattern lock for the security.
- The radius of the coverage is bound by Bluetooth protocol.

### 1.3 Software context

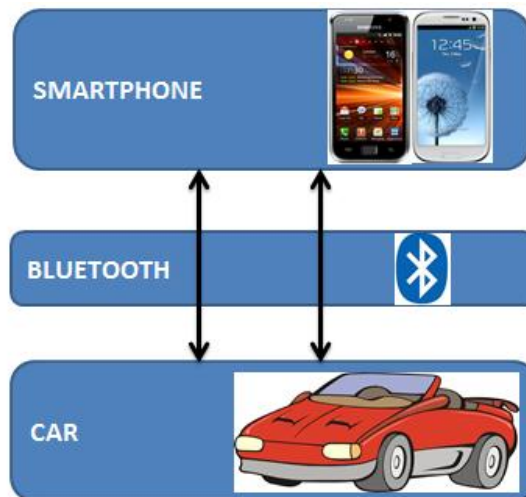
The big picture of this project will be to provide keyless for user to unlock and lock car with access to an Android device.

### 1.4 Major constraints

1. The radius of the coverage is bound by Bluetooth protocol
2. The car need to modify to uses the application.

## 2.0 Architectural design

The Mobile Car Alarm via Bluetooth Application system design.



**Figure 3.1: System Structure**

### **3.0 Component-level design**

Our system is based around a main menu through which each of the user can lock and unlock car.

#### **3.1 Description for Home page**

The main menu is the first thing a user will see when launching the application on their Android based phone.

##### **3.1.1 Pattern Lock Page**

From the home page the user need to unlock the pattern lock with the correct pattern.

##### **3.1.2 Main Menu interface description**

The main menu will consist of Connect Bluetooth button, lock button and unlock button. The Bluetooth button is to connect the phone Bluetooth with the car Bluetooth. If the users do not click the Bluetooth button the application will not function. The unlock button is to open the car door and the lock button is to close the car door. If the user want to disconnect Bluetooth function the user need to click long click to disable the Bluetooth function and the car door will lock.

##### **5.1.3 Main Menu processing detail**

###### **5.1.3.1 Performance issues**

The main menu will use relatively little resources, as it will just be a list of buttons.

###### **3.2.3.2 Design constraints**

The main menu should be simple and easy to use for accessing the application.



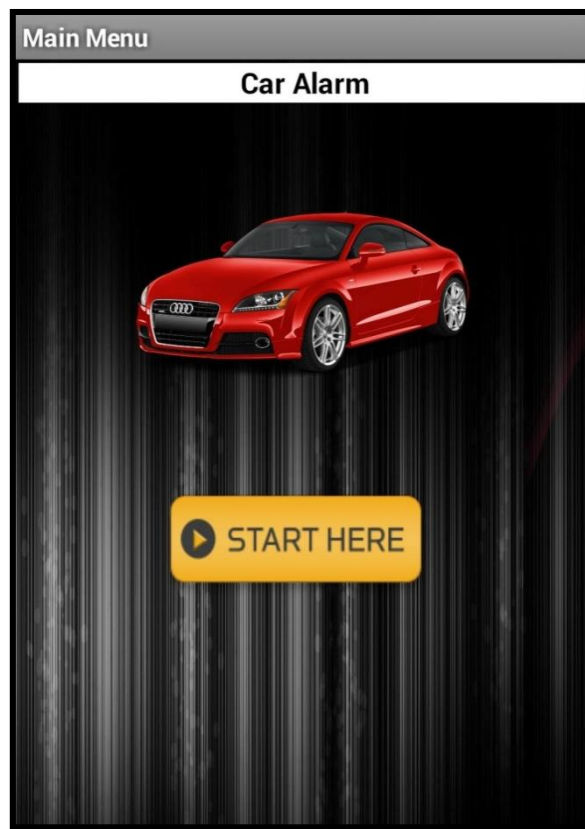
## **4.0 User interface design**

Below are prototype designs of each Mobile Car Alarm via Bluetooth Application

### **4.1 Description of the user interface**

Screen shots from each Mobile Car Alarm via Bluetooth Application are show using the MIT App.

#### **4.1.1 Home Screen**



##### **4.1.1.1 Objects and actions for Home Screen**

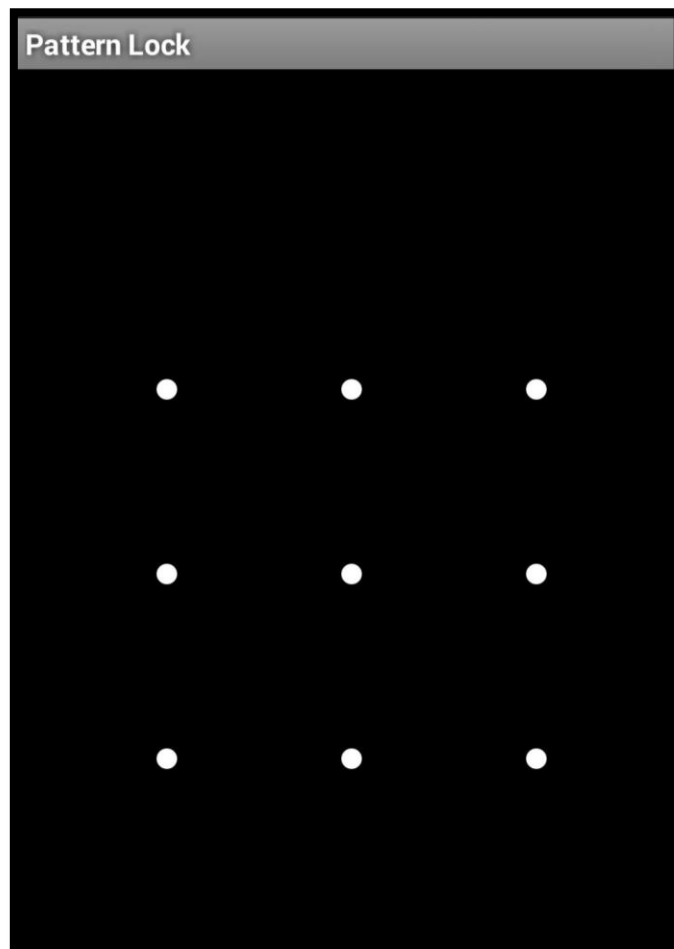
Objects:

- Start Here

Actions:

- Go to Pattern Lock Page
- Exit the application.

#### **4.1.2 Pattern Lock Screen**



##### **4.1.2.2 Objects and actions for Pattern Lock Screen**

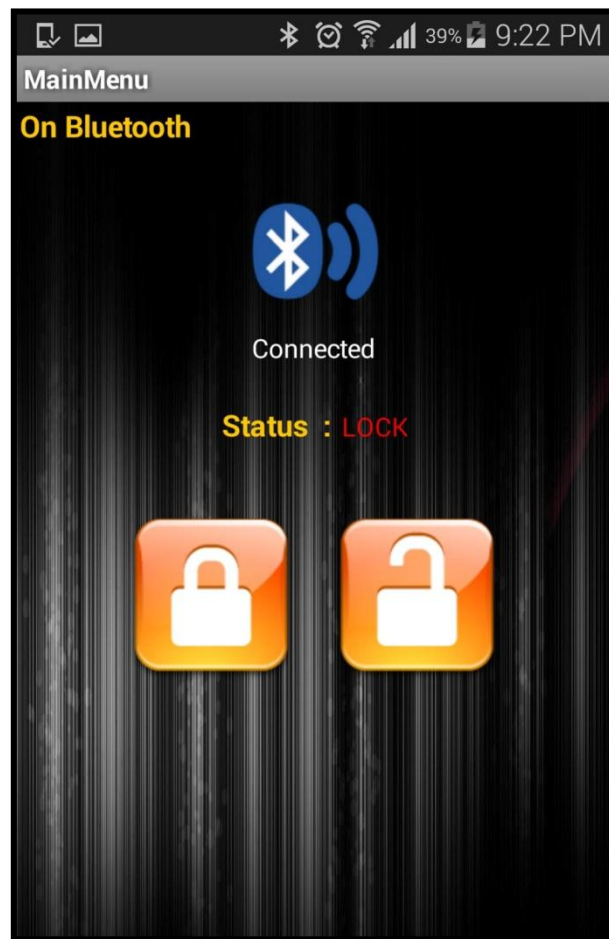
Objects:

- Unlock The Pattern

Actions:

- Go to Main Menu
- Exit the to the Home Screen

#### 4.1.3 Main Menu Screen



##### 4.1.3.2 Objects and actions for Main Menu

Objects:

- Bluetooth Button
- Unlock Button
- Lock Button
- Status

Actions:

- Connect the Bluetooth
- Lock car
- Unlock car
- Show status car
- Disconnect Bluetooth

#### **4.2 Interface design rules**

The interface will be designed under the rules MIT App. These rules help define what can be done for the interface.

#### **5.0 Restrictions, limitations, and constraints**

In order for the application to use the user need to modify the car before used the application. All development for the Mobile car alarm via Bluetooth was done in the MIT APP on Windows 7. Testing of the application was done on the MIT App Emulator that was included with the Android SDK. As long as the Android Marketplace is available to Google's Android mobile Operating System users, the software will be marketable, maintainable and functional to both users and developers.

## **6.0 Testing Issues**

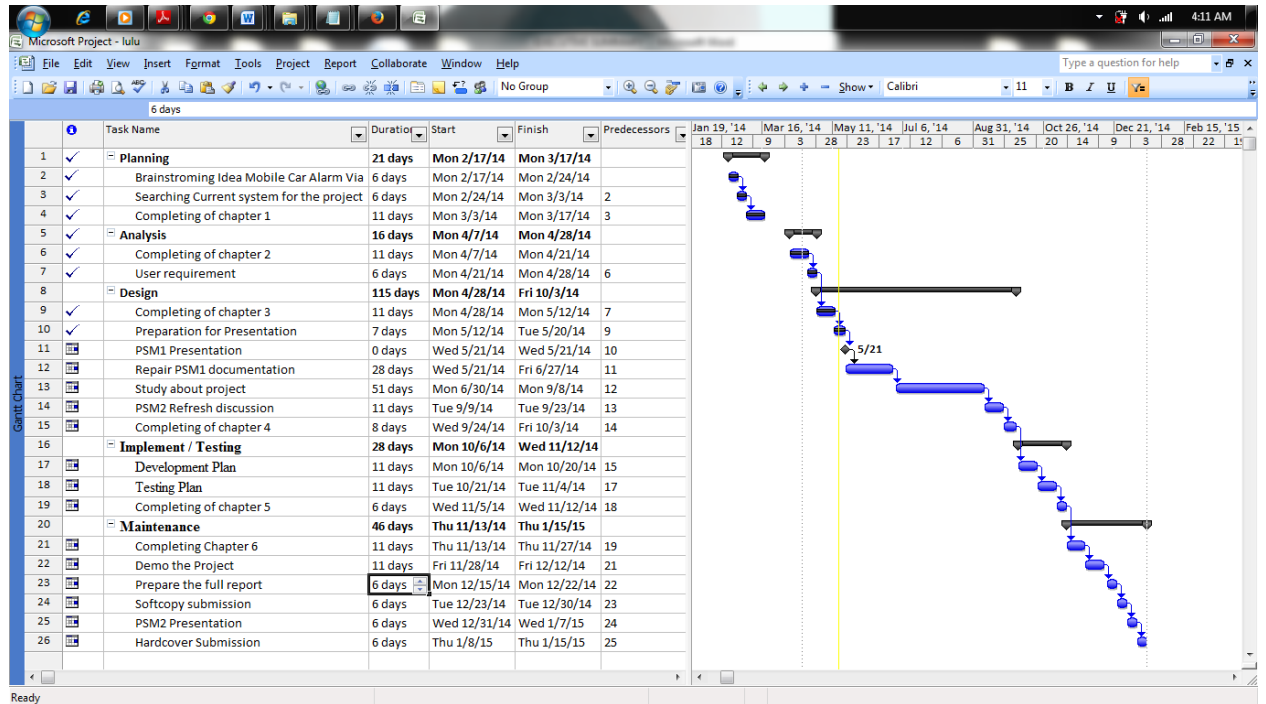
### **6.1 Classes of tests**

It will conduct first tests on the Mobile car alarm via Bluetooth using the MIT App Android Emulator. Once the Mobile car alarm via Bluetooth is tested thoroughly, the package will be built together and tested as a whole. All known valid input will be tested as well as known invalid input. A more comprehensive overview of testing strategies will be included in testing specification documentation.

### **6.2 Expected software response**

Each test performed will be clearly observed as either failing or succeeding.

## **APPENDIX C**



**Gant Chart**