

WIRELESS SECURITY FOR BIKE IGNITION USING ANDROID VIA
BLUETOOTH

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Specially dedicate to,

*My beloved parents, family members, and friends for your supports,
encouragements, understanding, and all the favour, may God bless all of you.*

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ABSTRACT

This project is about building up a prototype of the security system for motorcycle ignition. This system can prevent the motorcycle from being stolen. This security system is developed to control the ignition of the motorcycle through the Android devices. This system consists of a mobile application on an Android device that will connect wirelessly using Bluetooth to the Arduino system that acts as the microcontroller. The Arduino, in turns is connected to the bike ignition system. The system enables users to switch on/off the ignition of the bike by pressing a button in the Android mobile application. To ensure that the system is secure, only Android device that has been paired with the Arduino through the Bluetooth using correct pass key will be able to control the ignition system of the motorcycle.

ABSTRAK

Projek ini adalah mengenai penghasilan sebuah sistem prototaip keselamatan untuk pencucuhan motosikal. Sistem ini boleh mengelakkan motosikal dari dicuri. Sistem keselamatan ini dibangunkan untuk mengawal pencucuhan motosikal melalui peranti Android. Sistem ini terdiri daripada aplikasi mudah alih pada peranti Android yang akan disambung secara wayarles menggunakan Bluetooth untuk sistem Arduino yang bertindak sebagai pengawal mikro dimana ianya akan disambungkan kepada sistem pencucuhan motosikal. Sistem ini membolehkan pengguna untuk menghidupkan / mematikan pencucuhan motosikal dengan menekan butang pada aplikasi mudah alih Android. Untuk memastikan bahawa sistem itu adalah selamat , hanya peranti Android yang telah dipadankan dengan Arduino melalui Bluetooth menggunakan kata laluan betul akan dapat mengawal sistem pencucuhan motosikal.

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CHAPTER I

PROJECT OVERVIEW

This chapter will explain briefly about the project background, objectives to be achieved, problem statement and scope of work.

1.1 Introduction

This project is about developing a prototype of security system for motorcycle ignition. This system also has a potential to avoid the motorcycle from being stolen. This lock security was developed to control the ignition of the motorcycle through the wireless communication. The existing lock at the motorcycle actually are not having a very high security. As we can see that it only came with two main security lock which is handled lock and standard ignition switch lock. By doing this project, its clearly showing the variety of security lock can be added to the motorcycle. Furthermore, at least this system can improve the security level of the motorcycle and can help to decrease the motorcycle theft criminal statistic. The idea of this project came when there are a lot cars nowadays came with a wireless security system and several latest technologies. But, the security system for the motorcycle, especially the small bike was not developed as well as the cars. This project focuses on the wireless system communication that controlled using

android operating system for mobile phone. This system will allow the user to keep the ignition circuit maintaining in 'ON' and 'OFF' mode. The application in the android was developed by myself by using the open-source web browsing that called MIT App Inventor.

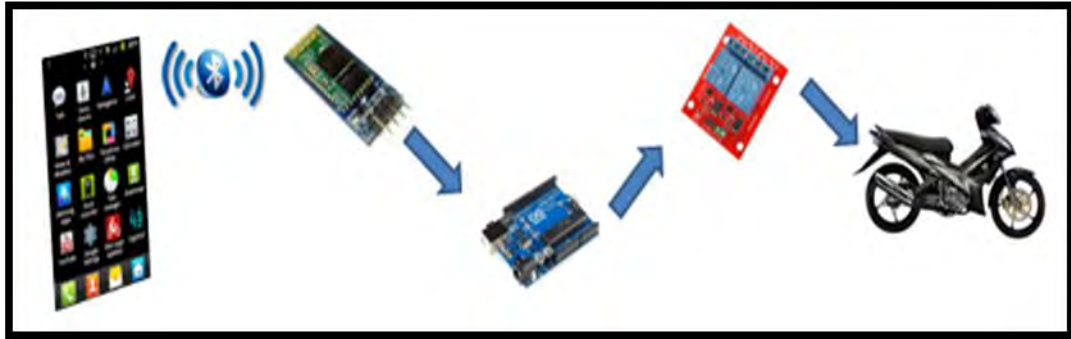


Figure 1.1 Project overview

1.2 Objective

The main objectives of this project are:

1. To design and develop a system using microcontroller that can control the bike ignition system.
2. To create a secure access to the system using pass key.
3. To develop an Android mobile application for the system.

1.3 Problem statement

Vehicle nowadays is very useful in daily life. Thus, It is one of valuable properties. Towards the time changing, there are a lot of vehicle theft cases especially the bike. The bikes nowadays are very easy to be stolen simply by opening the ignition keys with only one key, especially low-powered motorcycles because they are not equipped with advanced systems such as those used in the most high-powered motorcycles (Superbike).

1.4 Scope of project

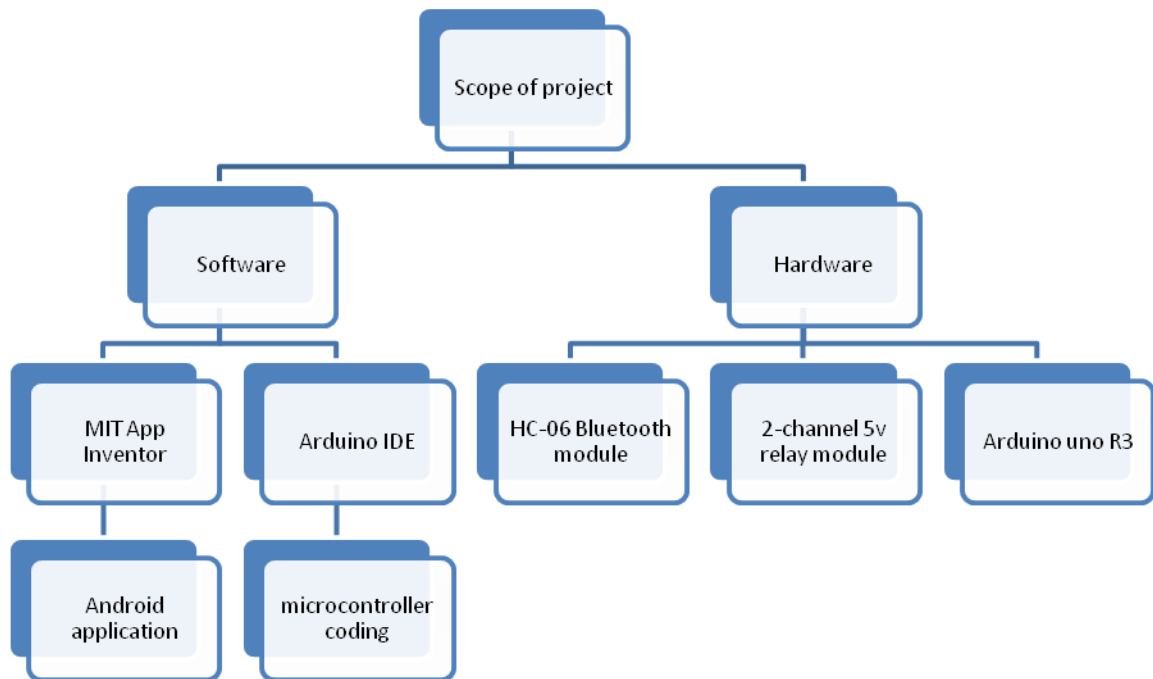


Figure1.2 Hierarchy for scope of project

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

This chapter basically discusses the technology that is implemented in the project and the background of the technology. The review about the previous work related to this project were discussed in this chapter. Bluetooth technology and Android technology is the core of the project. Therefore, the Android and Bluetooth technology will be introduced. The reasons to use Bluetooth and Android technology in the project is also explained in the chapter. This chapter also will introduced about the Arduino board technology that used in this project and the reasons why Arduino is used also will be extracted in this chapter. Besides that, the other components that used in this project also will be elaborate more clearly in this part.

2.2 Reviews of previous work

2.2.1 Car Monitoring using Bluetooth Security System [1]

This paper briefly tells about an auto security framework accompanies additional secure access and canny disturbing for car security system. The framework just can be gotten to and arranged by proprietor utilizing Bluetooth module correspondence through cellular telephone to turn it on or off. This system function when the alarm is triggered, the aggressor alert system will send notification to the user mobile phone through the Bluetooth communication. They are using the PIR sensor in order to monitor the absence of human in the car. This project is using the Blue Smirfsilver Bluetooth module which can operate in the range of 0-10 meters. The operating system (OS) that they are using is for the Nokia mobile which is the Symbian OS. It used the C programming language to build the mobile application. Besides, the project run and controlled by DIC16F877 processor that soldered on the PCB board with others electronic components.

2.2.2 A Remote Lock System using Bluetooth Communication [2]

This paper introduces the configuration and execution of a remote lock framework utilizing remote correspondences. The remote lock framework is a lock framework that can be controlled remotely by a devoted Android application. Furthermore, this system can be implemented to varies by vehicle for instance, car, lorry and others. They are using the Android mobile base for the communication. The Android mobile is prepared with Bluetooth so that the lock can be opened by using the application that built in the mobile. They used the C programming language to build the Android Application system. In the remote lock, they used the HC-06 Bluetooth module to communicate with the mobile. Moreover, this project also using the M328-mini board that equipped with the ATMEGA328-p processor as the main functionality of this system.

2.2.3 Mobile Phone Car Ignition System Using EmbeddedBlue 506 Bluetooth Technology [3]

This project is about the executed and created by an application of cellular telephone auto ignition framework by utilizing EmbeddedBlue 506 Bluetooth innovation. This security system works when the Bluetooth signal was sent from the mobile phone, the ignition can be done by the system although the car still in locked condition. This system also can ignite the car at anywhere and anytime in the distance range between 0-10 meter radius. In addition, the equipment parts used are the Rabbit Core Module (RCM3200) with the Prototyping Board (RCM3100) which is the heart of the created framework, the EmbeddedBlue (eb506) and Mobile Phone as a communication gadget. The software is composed by using the Dynamic C which is then arranged and stacked into Rabbit Core Module (RCM 3200).

2.2.4 Two Wheeler Vehicle Security System [4]

In this paper, they propose a solid and hearty configuration of Two Wheeler Vehicle Security System (TWVSS) with components upgrading the security of the vehicle and guaranteeing the wellbeing of the rider. Few of the imperative elements be supported by this framework are alarming proprietors by SMS about the theft trial, permitting the client to control the framework remotely by SMS, following the area of vehicle utilizing GPS innovation, Remote Keyless System, the servo engine worked bolting framework (handle lock, fuel bolt and back wheel bolt) and side stands pointer. This project is mainly controlled by the Arduino UNO R3 which equipped with the ATMEGA328p processor. The results show that, the remote can transmit signals about 0-100 meter to the receiver module from the vehicle.

Table 2.1 Summarized on review of previous work

	[1]	[2]	[3]	[4]
Vehicle	Car	Various	Car	Motorcycle
Wireless module	Bluetooth (blue smirf silver)	Bluetooth (HC-06)	Bluetooth (embedded Bluetooth-506)	GPS & GSM
OS	Symbian	Android	Symbian	Any mobile phone
Distance (m)	0-10	0-10	0-10	0-100
Language	C	C/C++	Dynamic C	-
Processor	DIC16F877	ATMEGA328p	Rabbit3200	ATMEGA328p
Circuit board	PCB	M328-mini	RCM3100	Arduino UNO R3

2.3 Bluetooth Technology

Bluetooth is basically a wireless technology that is used to receive and transmit data over a short range[5][14]. The wavelength that is used for the transmission of data ranges from 2.4 to 2.485 GHz. Bluetooth actually implements the frequency hopping spread spectrum. This method basically divides the data into packets of data. There is 79 Bluetooth channels available and the packets of data will be transmitted in one of the 79 channels provided. The bandwidth of the channels is 1MHz.

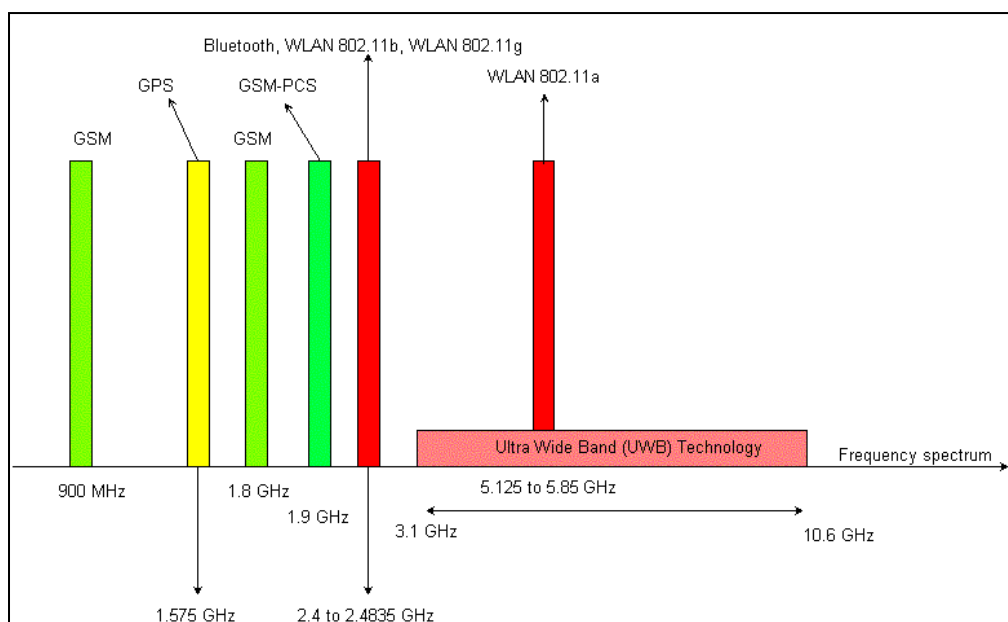


Figure 2.1 Graph showing the frequency spectrum

Bluetooth usually works when two devices connect to each other and start exchanging data. This procedure is known as the pairing of devices. These devices are connected over a short range. Piconets are basically a network developed when Bluetooth Enabled devices are connected to each other in a range of 10m. The maximum number of Bluetooth Enabled devices in a piconet does not exceed 7 devices[2]. The device that initiates the connection will be known as the master and the device that accepts the request will be known as the slave. The data transfer to the devices based on the master clock, which is 315.5 microseconds per interval.

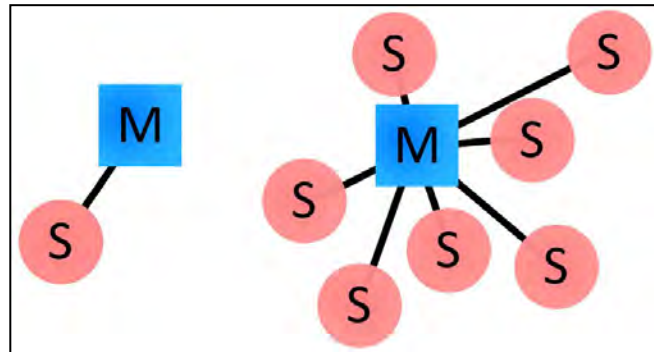
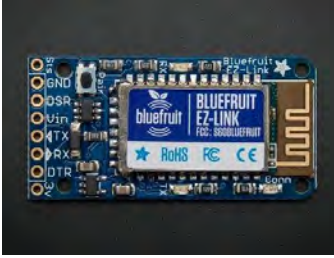







Figure 2.2 Piconet Network of Bluetooth link

2.3.1 Type of Bluetooth module [14]

Table 2.2. Type of Bluetooth

Type of Arduino	Picture	Explanation
1. Bluefruit-EZ link		With the scope of up to 32 feet, the Bluetooth module doesn't require extra programming or custom equipment to impart remotely.
2. JY-MCU		This module capacities a ton like the HC arrangement. This can cover a separation of 9 meters and what makes it so openly is a lot of online group.
3. BLE mini		This is one of the high-class modules out there. It can without much of a stretch unite with the iPhone and even has an open source SDK by Red Bear Company.

4. HC-06		<p>HC series is a standout amongst the most well known arrangement of ICs with specialists and engineers. HC-06 is anything but difficult to set up with an Arduino board and is perfect on the off chance that you need to make your Arduino correspond with a cell phone.</p>
5. HC-05		<p>A cousin to HC-06, the two IC's are economically and effortlessly available. This IC has a scope of 9 meters and is valuable for correspondence between 2 Arduino sheets.</p>
6. XS3868 Bluetooth Stereo Audio		<p>This module is unbelievably worn. iPhones and Android gadgets associate effectively with this too. The little size of this module is likewise an or more.</p>

2.3.2 Bluetooth module used

In this project, module that will be used is the HC-06 Bluetooth module as the wireless communication medium. The main reasons this module has been selected because it is suitable and comfortable with this project. This model can only can be the slave part which is at the receiver from the master which is from the mobile phone.



Figure 1.3 HC-06 Bluetooth module

HC-06 module allows with the Bluetooth communication protocol, that work on the 2.4 GHz band and allows the communication of voice and data over a wireless network called WPAN (wireless personal area network), that allow user to develop projects with a cell phone or other device to work under the same protocol.[1][3] Furthermore, it has the external 8Mbit FLASH and Can work at the low voltage which is in the range of 3.1V~4.2V. Meanwhile, the current in pairing is in the range of 30 to 40mA. During the communication occur between the master, slave, it uses about 8mA of current. In addition, this module was categorized as the Bluetooth class 2 power level where it can be communicated between 0 to 10m distance[8]. The dimension of this Bluetooth is very small in size, which is 27mm×13mm×2mm. Please refer to the appendix C for further detail about HC-06 Bluetooth module.

2.4 Introduction to Arduino

Nowadays electronics world growing fast corresponding due to the technology enhancement. This section will elaborate more about one of the favorite technology now had been used widely. One of the main parts of this project is the Arduino board that purposely to control all the flow of the system that conducted by certain coding. In a clear statement, Arduino is an open-source prototyping platform based on easy-to-use hardware and software[7]. Besides that, it is an open-source platform used for