UNIVERSITI TEKNIKAL MALAYSIA MELAKA

WALLET DETECTION BETWEEN MOBILE PHONE BY USING BLUETOOTH

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Engineering Technology (Type your Department's course here) (Hons.)

by

MUHAMMAD HAMIZAN B ADNAN
B071110254
920126145195

FACULTY OF ENGINEERING TECHNOLOGY

2015

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TAJUK: **WALLET DETECTION BETWEEN MOBILE PHONE BY USING BLUETOOTH**

SESI PENGAJIAN: **2014/15 Semester 2**

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ABSTRACT

This product is revolution device that allowed us to keep tracked of wallet or phone. It can prevent from leaving wallet or phone from lost. The wallet detection is able connected with phone through between 10 meters. From that, it can be way anti lost reminder. Past researches have focused on phone only to detect the wallet from lost. This research aimed to investigate on wallet and phone which is connected each other used Bluetooth technology. The main to create product are wallet, phone, Bluetooth. Wallet is a small case used to carry personal item and generally made from leather or fabrics. Phone can make and received signal over a radio link while moving a wide geographic and support a wide variety of other service such as infrared and Bluetooth. Bluetooth is a wireless technology standard for exchanging data over short distances. It is using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz from fixed and mobile devices, and building personal area networks (PANs). Bluetooth uses a radio technology called frequency-hopping spread spectrum. Combined from this products and technology, wallet and phone have been responsible for each other with a louder buzzer sound between range 85dB-100dB. When we lost our wallet, a lot of thing to do. We need to cancel and replace of our important card such as replace license, credit card and many more. Maybe our card can be abused by thief. This product is the best way to prevent from this problem.

ABSTRAK

Produk ini ialah peranti revolusi yang membenarkan pengguna untuk menyimpan menjejaki dompet atau telefon. Ia boleh menghalang daripada meninggalkan dompet atau telefon dari hilang. Pengesanan dompet dapat berhubung dengan telefon diantara 10 meter. Dari bahawa, ia boleh jadi jalan peringatan hilang anti.Penyelidikan ini telah menumpukan pada telefon hanya mengesan dompet dari hilang. Penyelidikan ini menyasarkan di dompet dan telefon yang mana dikaitkan satu sama lain menggunakan teknologi Bluetooth. Ciri-ciri utama untuk mencipta produk ini ialah dompet, telefon, Bluetooth. Dompet ialah satu kes kecil digunakan untuk membawa item peribadi dan pada umumnya dibuat dari kulit atau fabrik. Telefon boleh membuat dan isyarat yang diterima atas satu talian radio semasa bergerak satu luas geografi dan menyokong satu luas pelbagai jenis perkhidmatan lain seperti inframerah dan Bluetooth. Bluetooth ialah satu teknologi wayarles standard untuk penukaran data atas pendek. Menggunakan gelombang radio UHF jarak gelombang yang dekat di jalur ISM dari 2.4 kepada 2.485 GHz dari peranti bergerak dan tetap , dan membina rangkaian kawasan (PANs) peribadi. Bluetooth menggunakan satu teknologi radio memanggil spektrum rebak lompatan frekuensi. Digabungkan dari ini produk dan teknologi, dompet dan telefon telah bertanggungjawab untuk satu sama lain dengan dilengkapi `buzzer` yang lantang lantang berbunyi antara julat 85dB-100dB. Bila kita hilang dompet, banyak benda lakukan. Kita perlu untuk membatalkan dan menggantikan kad penting seperti menggantikan lesen, kad kredit dan lebih banyak. Mungkin kad kita boleh disalahgunakan oleh pencuri. Produk ini ialah jalan terbaik menghalang dari masalah ini.

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CHAPTER 1:
INTRODUCTION OF WALLET DETECTION

1.1 Background

The new technology has been revolutionary device that allow keeping track of wallet or phone. Wallet detection has been combining with Bluetooth technology. Bluetooth technology is an advance technology allowed to receive the data and exchange for a short range. This ability makes the product able connecting with phone thought the Bluetooth between 1 meters. Mobile phone is a phone can make and receive signal over a radio link while moving around a wide geographic area. In addition, mobile phone also support a wide variety of other services such as email, internet access and short-range wireless communication. This prototype used Arduino BT circuit which is an ideal Bluetooth device for applications designers need low power consumption, outstanding range and minimum size. The prototype is easily inserting it into the wallet. Wallet and phone will now responsible for each other using loud buzzer sound (range between 85db-100db) to allow for more accurate to find. The prototype provide with the Lithium-ion battery. Lithium-ion battery have been combine one of the best energy densities with a low self-discharge, making them ideal for portable and consumer electronics. Lithium-ion batteries range in capacity from 1800mAh to 3600mAh, allowing for long use between recharging

1.2 Problem statement
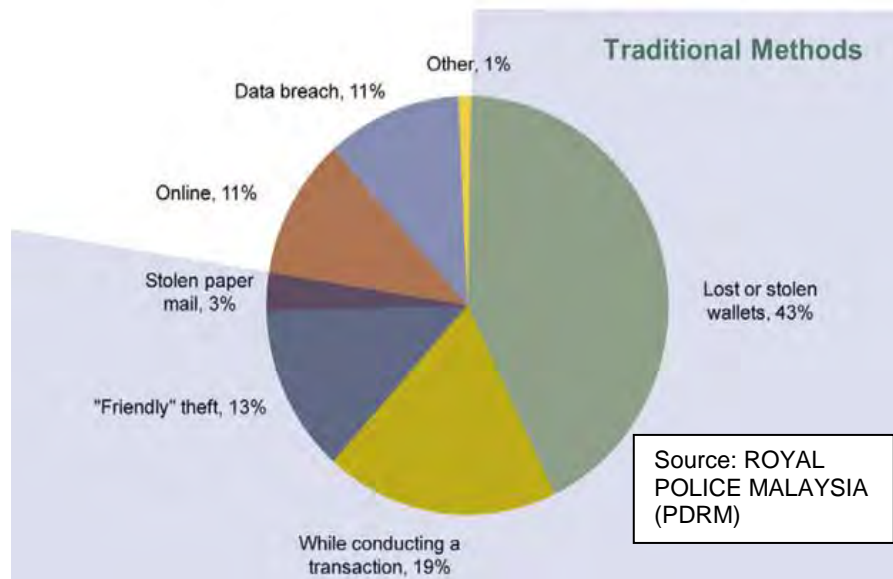
Figure 1.1: Percentages of lost

In this era, wallet and phone are important thing need to bring. This is because wallet and phone carry important personal data such as password account bank, credit card and many more. This is a statistics wallet lost in Malaysia 2012. The lost or stolen wallet is higher percentage than other. A lot of things need to do when we lost phone or wallet. First things need to do are cancel and replace important card. If bad luck, maybe card or personal data can be abused by thief. The losing one wallet only can be an extreme inconvenience and stolen could be catastrophic. This project will be help a person to reduce the percentage of lost or stolen wallet in Malaysia.

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1.3 Objective

The something action are intended to attain or target for this product would be:

- To understand the full internal circuit of Bluetooth and programming by using assembly language
- To understand the type of material can be used for phone and wallet
- To receive signal Bluetooth between phone and wallet
- To understand the range of loud buzzer sound for human hearing

1.4 Scope

This research is focuses to be anti-lost reminder. The wallet detection can help a person care about their wallet and reduce the percentage lost or stolen wallet in Malaysia. The prototype is development using Bluetooth technology. The project also analysis the distance and frequency of Bluetooth can be reached between Android smartphone and wallet detection.

Thief become more intelligent. In a few second, they can steal the wallet from us. This devices is newest technology that can make a person monitoring their wallet over the Bluetooth technology. As long as the prototype in wallet and connected with Android smartphone, the telecommunication system is improvised by apply in safety.

Based on this, it creates a change for person to reminder and find the wallet as long as the Android Smartphone connected with prototype in 1 meters range.

1.5 Project significance

- The development of this product
- Avoid the hassle of randomly searching
- No special set up needed
- Small, handheld main unit is easy to carry
- 2 way anti lost reminder

1.6 Methodology

To achieve the project become a successful with a set of standard to initiate and manage project. Each ask need to do is:

a) Design and simulation software

- Proper planning to decrease costing and difficulties during designing the project.

- Simulation to test the circuit connection before continuing to design the project. Arduino and Android software was used. Find the suitable coding for transmitter and receiver.

- Configuration of Arduino, louder buzzer, ZigBee Wireless and Android software.

b) Etching

- Clean a part or test sample of unwanted substances or to remove the top layers of a material.

c) Soldering

- Process in which two or more metal items are joined together by melting. Soldering the PIC ATMEGA 328P, power supply with Arduino circuit.

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d) Run and test hardware

- Hardware was built in.

- Testing the range connection between device and phone.

- Testing the range loud buzzer can be hearing.

1.7 Conclusion

Wallet is one of item people's need to bring every time in their daily life. This prototype will help people become more alert and core more about their wallet. Wallet detection will help people avoid their wallet from lost or stolen. The advantage of wallet detection is 2 way anti lost reminder, small and handheld main unit is easy to carry, Hope wallet detection can be commercials in Malaysia market until global market. This prototype will have continuous research by a year to make some improvement or additional ability for friendly user. Hope this ideal can be used and create suitable prototype to track other important item such as laptop, phone and many more.

CHAPTER 2:

LITERATURE REVIEW OF PROTOTYPE

2.1 Introduction of Bluetooth

Bluetooth is an open specification that enables low-bandwidth, short-range wireless connections between computers and peripherals, such as mice, cell phones, and personal data assistants (PDAs).The appeal of the Bluetooth model lies in its convenience for wirelessly transferring information and small data files between devices. Bluetooth Profiles describe how to use a specification to fulfill the desired function in the usage models. The usage models are identified by the SIG's marketing group. The Bluetooth Special Interest Group (SIG) has specified the profiles for those usage models. The profile tells us how to implement a solution for a particular use case. Each profile defines the particular messages and procedures from the Bluetooth specification and each device must support at least one profile. Those devices can communicate with each other which have the same profiles for example a cellular phone and headset can communicate on the condition if they both have the headset profile. The profile is used to decrease the interoperability problems amongst devices of different vendors. The Bluetooth certification authority uses the profiles to test and certify compliance, and grants permission for usage of the Bluetooth logo only to those products that qualify the methods and procedures defined in the profiles. [1]

Bluetooth works similar to other wireless technologies. It transmits data in the form of bits (ones and zeros) over a radio frequency. This function is defined by radio layer .Bluetooth transceivers use Gaussian Frequency Shift Keying (GFSK).In GFSK, the binary zero is represented by negative frequency deviation and binary one is represented by positive frequency deviation. The Bluetooth transceivers are available in three Power classes. The range is without obstacles.
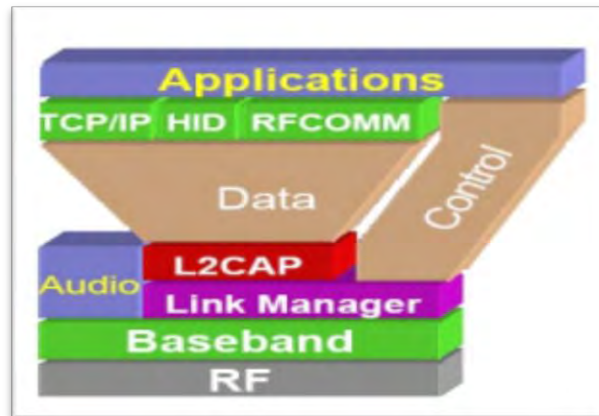

Figure 2.1: Bluetooth Protocol Stack

2.2 Bluetooth Coverage

Bluetooth's short range could be a problem for some applications such as to cover a large area, more number of Bluetooth receivers would be required every 10-100 meters, but this is not the economical way to implement such thesis. Here are few experiments by which the Bluetooth range could be extended when the internal built in antenna is replaced with the external one. The Bluetooth USB dongle has a small antenna which can communicate with Bluetooth device within a range of 10 meters. This antenna small built-in could be replaced with a more efficient one.The Bluetooth antennas are used to extend the range of Bluetooth. The main purpose is to transmit signals and receive. Blue antenna has many characteristics such as gain and direction. It's operation. Antenna performance is very important factor as the same antenna is used for sending the signals and receiving the signals. The main issues which are involved with Bluetooth antenna are power coupling losses between antenna and the transmitter. Then there are antenna placement issues.
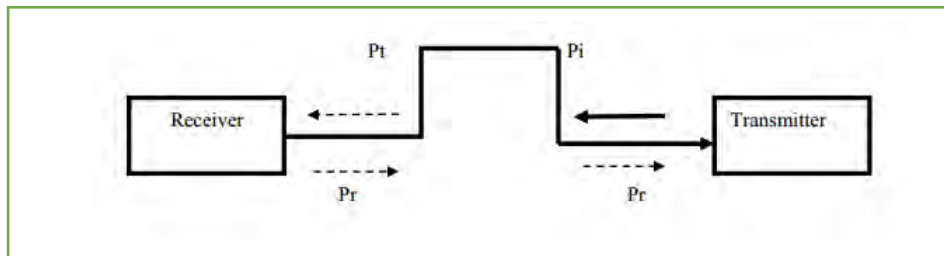
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Figure 2.2: Bluetooth antenna sends and receive diagram

The Figure 2.2 explains the process and functional of Bluetooth antenna, the antenna sends the signal Pi to receiver and Pt is the transmitted signal. Pr is reflected back antenna. The ratio at the transmitter is Pi/Pt. The maximum power which is radiated from antenna must be matched the connected device. Which in most RF circuit cases is 5- ohm impedance and it is consider best for the antenna feed points.

2.3 Function of Bluetooth

Bluetooth is technology for exchange the data over a short distance without using wires. This technology is designed to replace wired connection between devices like cellular phones, computer and other devices. Bluetooth suitable used for a private place such as at the home, in the car or in the office. The function of this technology is allowing users instantaneous connection of voice and information with protection against interference and safety in the sending of information. For example, Bluetooth headset allows phone user to communicate hands free. The device will allow the users pick up the conservation from other users without touching the phone. Bluetooth headset just attaches to ear of the cell phone user and allows user to hear what caller says. In computer industrial, Bluetooth technology used to makes personal computer be more powerful and functional. For example, Bluetooth keyboards and mice make input on personal computer possible without a separate transmitter.[2]

Figure 2.3: Bluetooth usage scenario

2.4 The frequency of range and power

Table2.1 : The frequency range use in another country

Country	Frequency Range	RF Channels	
Europe* & USA	2400 - 2483.5 MHz	f = 2402 + k MHz	k= 0,...,78
Japan	2471 - 2497 MHz	f = 2473 + k MHz	k= 0,...,22
Spain	2445 - 2475 MHz	f = 2449 + k MHz	k= 0,...,22
France	2446.5 - 2483.5 MHz	f = 2454 + k MHz	k= 0,...,22

The radio frequency assigned to Bluetooth is 2.4 GHz ISM (Industrial Scientific Medicine) band. The frequency band 2400 - 2483.5 MHz is used in most of the countries around the world. But some countries have national limitations in the frequency range. The range is divided into 79 MHZ channels (For Spain, France, it is divided into 23 MHZ channels.). Each one of these channel is divided into 625 microseconds and 1600 different slots per second (1600 hops) are being made. Spain, France and Japan have frequency limitations so there are special frequency hopping algorithms specified. The products with the reduced band frequency (e.g. Spain) will not work with products with the full band (America). These products must therefore be considered as local versions for a single market. In order to be compatible and eliminate the limitations, the SIG (Special Interest Group) is taking several initiatives.

Table 2.2 : The device power class

Device Power Class	Maximum Permitted Power mW(dBm)	Range (approximate)
Class 1	100 mW (20 dBm)	~100 meters
Class 2	2.5 mW (4 dBm)	~10 meters
Class 3	1 mW (0 dBm)	~1 meter

The transmission of Bluetooth are qualified in 3 groups according to the level of power of emission. The standard of transmission sensiblity at least 70 dBm and the rate of admissible mistake must be a minor or equal to 0.1%.

2.5 Experiment of Bluetooth

The format of modulation is GFSK having bandwidth × bit time product (BT) equal to 0.5. The index of modulation is having value between 0.28 and 0.35. For the data rate of 1Mbps in Bluetooth technology, frequency deviation value can be from ±140 to ±175kHz. The generation of GFSK signal is as follows: First of all the stream of data d(t) is filtered by using a Gaussian filter with impulse and frequency responses h(t) and H(w) as follows in equations (1) and (2)

$$h(t) = e^{-\frac{1}{2}\left(\frac{t}{\tau}\right)^2} \qquad \ldots\ldots(1)$$

$$H(\omega) = \tau \cdot \sqrt{2\pi}\, e^{-\frac{1}{2}(\tau\omega)^2} \qquad \ldots\ldots(2)$$