POLYTECHNIC SULTAN SALAHUDDIN ABDUL AZIZ SHAH

SMART KEY DETECTOR

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DEPARTMENT of ELECTRICAL ENGINEERING

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This report is submitted to the Department of Electrical Engineering to fulfill some of the requirements of the Diploma Electrical Engineering

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TITLE : SMART KEY DETECTOR

SESSION : JUNE 2019

1. **We, 1. MUHAMMAD HAMSYARI HAMIZAN BIN MUHAMMAD ZAIDI (08DJK17F1145)**

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Made and in fact acknowledged;)

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at..... on .....

In front of me, WAN MOHD ZAMRI

BIN WAN AB RAHMAN (730820-09-5313)) .....

as project supervisor on: .....) WAN MOHD ZAMRI BIN WANNAB RAHMAN

APPRECIATION

First of all, we want to raise our hand supplicate gratitude to god for giving us the opportunity to complete the survey which is entrusted. We are so grateful to god for giving blessings to us to complete this study successfully. Our gratitude goes to all who are involve directly or indirectly in our study.

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Lastly, we offer our regard and blessing to all of those who supported us in any respect during the completion of the project.

ABSTRACT

The project name is "Smart Key Detector". This is the solution to losing key issues in academic institutions. This project was built with the purpose of applying it to the card system in everyday life. The scope of this project is to focus on the establishment of a locking system product according to a registered identity. Identity card scanners are one of the concepts that not only serves as a security system but also to prevent problems that may arise from user negligence. The use of the card will store the identity data that will be part of this security system. The main purpose of developing this project is to build a security system based on RFID. In addition, it also reduced the rate of major loss cases in academic institutions. In addition, this will facilitate a smooth learning session. This is because, the learning system can be started at the right time. Lecturers will not take long to open the doors of the classroom as before. With technology-based IoT, communication systems are essential for connecting prototypes and individuals to find out their status. The status can be seen on electronic devices such as mobile phones. Overall, the project uses RFID cards. When the card is placed on the RFID sensor, the key will be locked after identification. In fact, our prototype project has three main keys. When someone has taken away one of the keys, the phone application will notify the person. This notification is for reminding the locked time and the time taken is a short message service (sms). Therefore, only certain people can access this shelf. So, this is what sets the system and application performance of this product in the Smart Key Detector test.

LIST OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The project to be built is "SMART KEY DETECTOR". The RFID (Radio Frequency IDentification) technology is a well-known wireless application for traceability, logistics, and access control. It became ubiquitous in industry and our daily life (ticketing, payment, passports, car keys, etc.). RFID is nowadays a standardized technology; its inherent advantages, which are unitary, identification, wireless communication, and low cost of tags, provide it with decisive practical benefits that drive new developments in terms of concepts and applications. This trend is largely confirmed by the market forecast, but also by its implementation in the area of health (smart hospital), assistance to persons, anti-counterfeiting, as well as by its perspective in terms of new paradigms for distributed ambient intelligence and the Internet of Things. The first part of this paper briefly reviews the fundamental concepts of the RFID technology, and shows its link with the radio science. A state of the art including the presentation of current performance and developments is also summarized. The second part illustrates the impact of RFID to the service of our society with a focus of applications in the field of autonomy and handicap. Finally, the last part highlights a panorama of perspectives and the future directions of RFID applications dedicated to the service of Humanity. With Bluetooth and GSM (Global System for Mobile communication) module widen their scope and enhance the application areas to a greater extent. This idea is reinforced by the fact that the GSM infrastructure has been deployed in many countries and can be used as the communication via to receive signals captured by remote machines.

1.2 PROJECT BACKGROUND

The project is applying the latest technology concept, the Internet of Things (IoT) where it mediates between humans and devices. IoT is a network of devices and other physical objects implemented with electronic components, sensors, actuators and connectors that allow such devices to connect, collect and exchange data. This IoT also requires an internet connectivity beyond standard tools such as computers and smartphones. it also allows devices to communicate with each other over the internet and can be monitored and controlled remotely. With the application of the IoT to this project, data such as the identity of the key and which key was taken can be recorded using a smartphone only.

1.3 PROBLEM STATEMENT

As we know, all solutions come with problems. So here's the reality of our problem:

a) It's hard to know which keys are missing

- Throughout the semester of each year, the loss of the key is guaranteed at either the lab or the classroom. This is because the key to the classroom is easy to obtain without strict control over the office.

b) It is difficult to have a timely learning session

- Most of the time learning sessions are often wasted solely because of unsystematic classroom use. Some key users do not return the key after using it in the office. In this case, we can see how much time it takes to find that key.

c) It is difficult to identify the identity of a particular class

- Anyone can take the key of the class at any time to enter the classroom or lab without permission. In the absence of a systematic primary escort system, the lock is considered high risk for missing because the identity of the person who took the key cannot be identified while promoting cases involving theft of the classroom.

1.4 PROJECT OBJECTIVES

In developing this system, several project objectives have been determined. The main purpose of the project is to improve the safety factor in the classroom, especially those used by most colleges and universities by developing smart key detector operated through smartphones.

Some of the objectives of this project have been identified and listed below: -

a) To construct and design a product that will remind the user and management towards the time they need to use the security service.

b) To designing mobile warning products and effective key systems.

c) To develop products with friendly consumer products.

1.5 QUESTIONS PROJECT

1. How can we reduce the key loss cases especially at Academic Institution?
2. How can we determine the identity of the person who took the key to the office without returning it?
3. What are the benefits of this project to the center of the institution?

1.6 SCOPE AND LIMITATION OF THE PROJECT

There are also projects that have limitations: -

a) This project involves a locker in an office.

b) Contrary products such as a medium-sized rectangular box that is where the lock is stored.

c) This project is to create a locking system product according to the recorded identity.

d) There will be RFID , Arduino Uno, Gsm Module and Servo Motor to complete the product circuit.

1.7 IMPORTANCE OF PROJECT

This project only helps manage the use of class keys in systematic recovery. It also helps to know the use of each key at a particular time by adding a system that uses data storage to prevent a class lock loss case.

The purpose of this project is to help reduce the case of a class or laboratory key loss and to identify the identity of the key that used the key at that time and return the key to the office within a specified time.

1.9 CHAPTER SUMMARY

After through process introduction, we has introduced the project as a whole. The early and basic explanations has mentioned .This chapter consists of the project's objectives, statements of problems, scope of project , question's project and the simplified definition.

CHAPTER 2

LITERATURE PROJECT

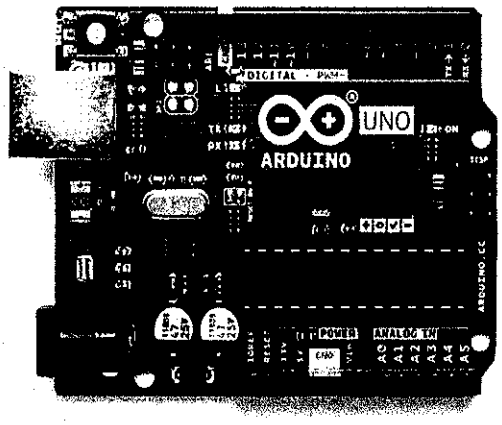
2.1 INTRODUCTION

A Literature review also focuses on the knowledge and ideas established on a topic as well as their strengths and weaknesses. Nowadays, technology is getting better and better to replacing the traditional system to speed up the process by introducing the computerized system.

Before we proceed with "SMART KEY DETECTOR" , we have to analyse and choose the need of the project such as program we should used, circuits and also the physical prototype that need to be tested before we make the real one. This is to avoid damages and it also important so that this project can be made in order and also follow the right specifications.

2.2 CONCEPT / THEORY

a) ARDUINO UNO (Microcontroller)

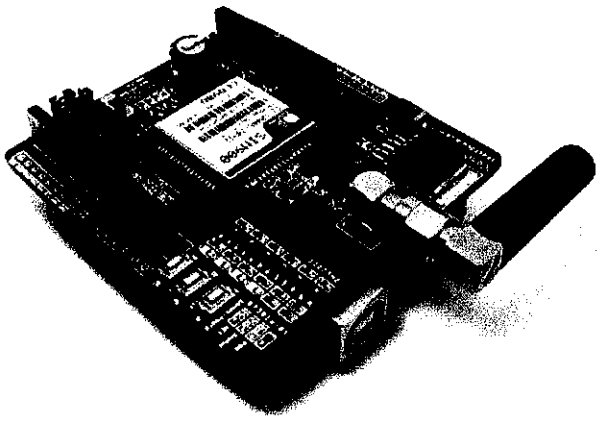


The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0.

The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform The ATmega328 on the Arduino Uno comes preprogrammed with a bootloader that allows uploading new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol. The Uno also differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it uses the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

2.3 PREVIOUS PROJECT

a) GSM Module Interfaced with Arduino



GSM is a mobile communication modem. It is stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands.

GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates.

b) How GSM Module works ?

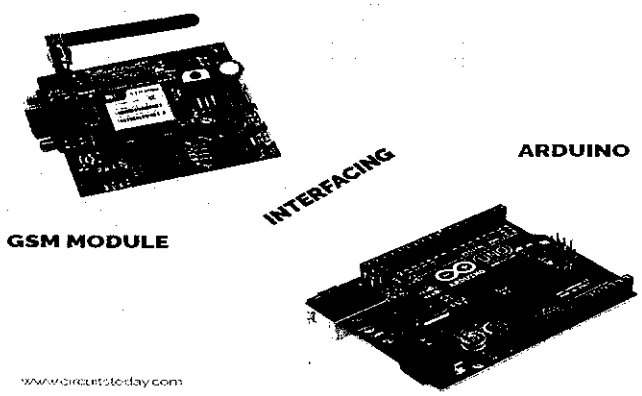


Figure 2.3.2.2 GSM Interfaced with Arduino

1. Insert the SIM card to GSM module and lock it.

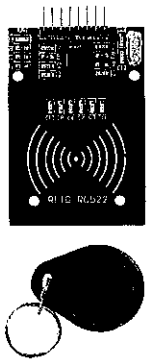
2. Connect the adapter to GSM module and turn it ON!

3. Now wait for some time (say 1 minute) and see the blinking rate of 'status LED' or 'network LED' (GSM module will take some time to establish connection with mobile network)

4. Once the connection is established successfully, the status/network LED will blink continuously every 3 seconds. You may try making a call to the mobile number of the sim card inside GSM module. If you hear a ring back, the gsm module has successfully established network connection.

5. Note that if the LED blinking fastly, that mean the connection at the area are not good (slow). Make sure that you has used the right sim suitable with the area.

C) HOW RFID WORKS ?



Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. The tags contain electronically stored information. Passive tags collect energy from a nearby RFID reader's interrogating radio waves. Active tags have a local power source (such as a battery) and may operate hundreds of meters from the RFID reader. Unlike a barcode, the tags don't need to be within the line of sight of the reader, so it may be embedded in the tracked object. RFID is one method of automatic identification and data capture (AIDC).[1] Functions of a radio frequency identification (RFID) tagging system include internal control of fixed assets, internal control of expensed assets and theft prevention.

2.4 Chapter summary

After gone through the literature review, we found that Arduino can works as microcontroller to control and get a signal from GSM module. In the proposed system, the limitations and weaknesses found from the literature review will be improved and enhances in order to make this project "Smart Key Detector" that has a system that can be used in the future and enhances the safety aspect at the academic institution.

CHAPTER 3

METHODOLOGY

3.1 Introduction

To develop this project, few phase must be set up so that the project will go smoothly like the way we want it according to plan. Like before, there are a few important steps that must be done to finish this project :

i. Planning.
ii. Build structure and programming of the project.
iii. Write a report.
iv. Block diagram or steps taken to finish the project.
v. Flowchart about the flow of the project.
vi. Circuit development
vii. Main project assembly
viii. Application of smartphone

3.2 Study Design

i) Planning

Planning was an aspect that is important to ensure the continuity of the project. Every activities of the project planning was recorded in Gantt Chart that covers all the entire journey of the project from planning until the written of the report.

One of a few activities that involve in this phase is getting the agreement from the lecturer that supervise our project, set up a meeting with the lecturer and teammates, make a list of items needed including references, discussion about the project about the topic, objective, scope, and also problem statement.

ii) Build structure and programming of the project

After every planning is carefully planned, then the building of the structure of the project is must be done. A lot of sources of references is used as reference to develop the system analysis to avoid any flaws on the product. Among the sources are previous certificate, journal that have to do with the project, books, resources from the internet and also paper works. This is done to get a clearer picture about the system.

iii) Procedure to prepare the project

1. Analysis of the project :
    - Analysis about "Smart Key Detector" in the Internet, magazines, local people and other sources of references.
    - Focus on each program and component of "Smart Key Detector" that are suitable to the project circuit.
    - Group discussion with supervisor / lecturer to give comments whether this project is suitable or not.
    - Next, send the result of the project to the leader of supervisor to get a green light.

2. Identify the program and components that will be used in this project :
    - After we can proceed, we gather more informations.
    - Draw the prototype and the project frame.
    - Prepare a list of components and program needed in the circuit of the project.
    - Find the tools needed to get the project to run.

3. Check whether the circuit is functional or not :
    - Do a testing on the voltage and current to the circuit using the computer application like the "Proteus Design Suite (schematic)" to make sure the circuit is fully functional or otherwise.
    - Write the Hex Code to program it into the Arduino Uno by using the "Proteus" to simulate the real circuit.

4. Starting of the project :
    - After have done an overall checking on the circuit, then we did is transfer the circuit we made into real one , on the PCB.
    - Write an Arduino code programming.
    - Test and do a frequent maintenance on the project.
    - Did a few testing that involve the real situation.

iv) Block Diagram

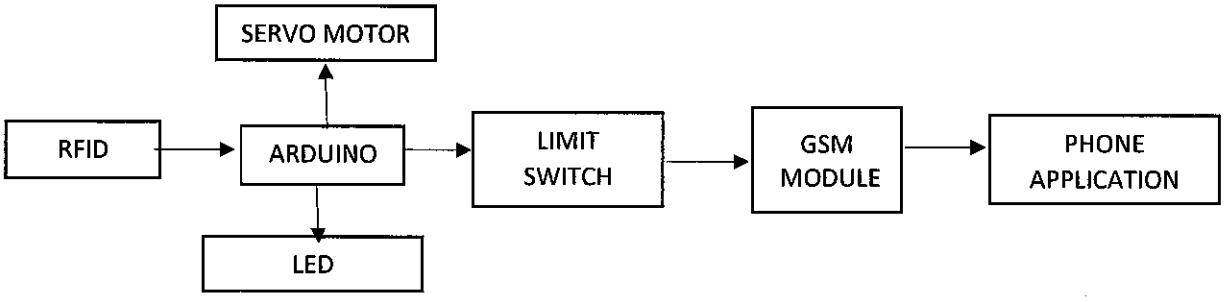
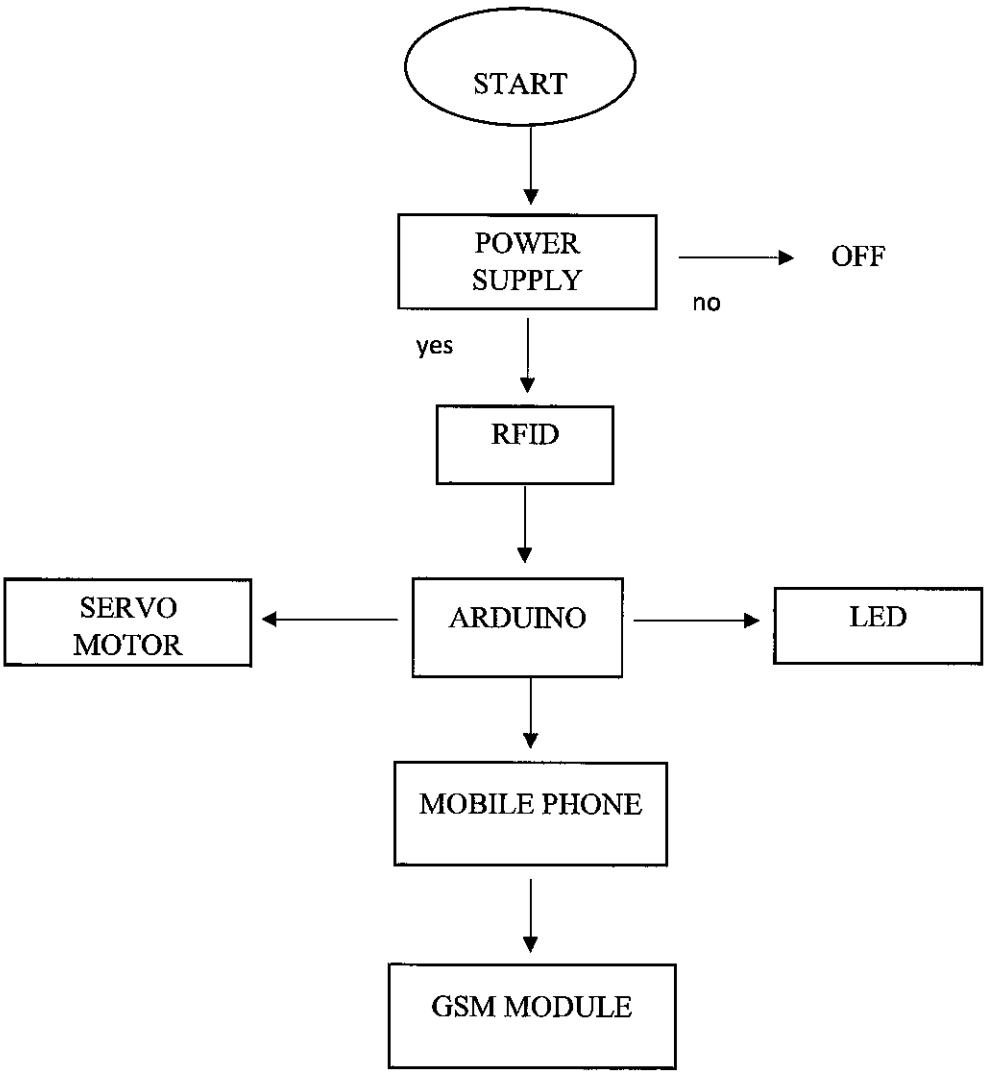


Figure 1 shows the block diagram of proposed system. The block diagram shows the components used in the system. Arduino UNO is used in this system. System also consist of sensor, LED, a limit switch and a GSM module. The arrow indicating the path of signal or data from Arduino to different modules. When the system is switch on, RFID and ARDUINO will be ON indicating that powers supplied to the circuit . when RFID is touched, the servo motor and LED will work. Next, when the limit switch is lifted, the GSM will send the signal information. This information will be sent to a mobile number through a message. This message will be received using GSM modem present in the circuit. The message will give the information of time, users and which key. Using these values, the position of the key can be estimated.

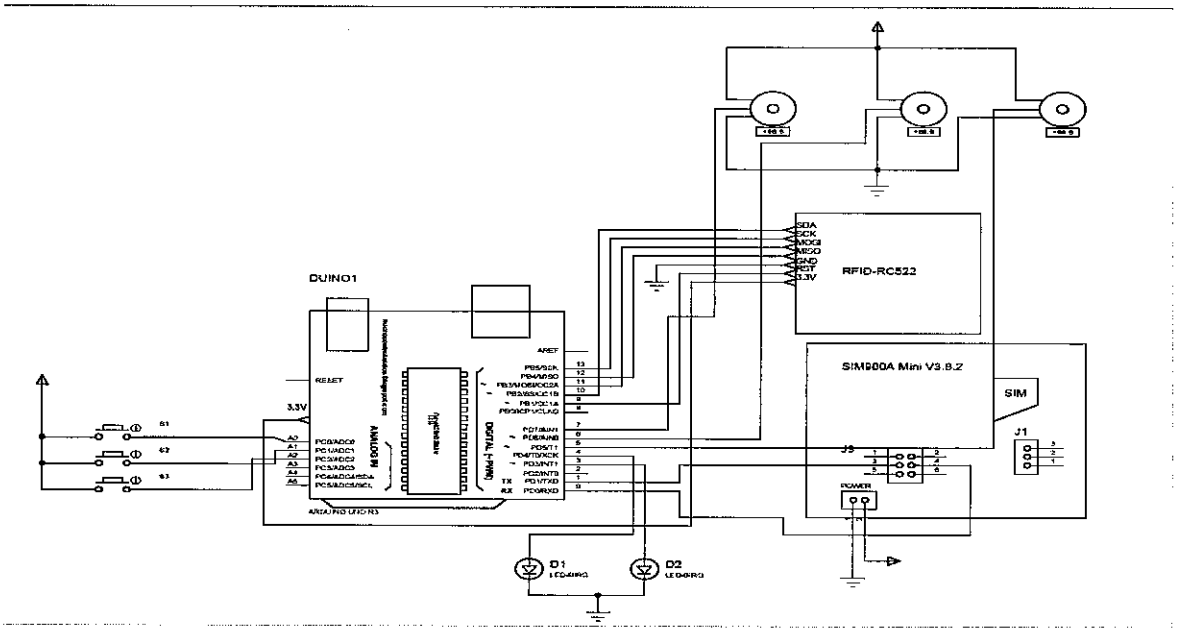
v) Flowchart



This figure shows a flow chart for Smart Key Detector. First, power supply must be turn on. If did not turn on power supply, the circuit did not function. After on the power supply, the RFID will be turn on. Next, when RFID be touched, servo motor and LED will be active. The servo motor will open the closet while the LED will indicate the presence of the lock in the closet. Next, when the limit switch is lifted, it sends a signal using GSM to the phone in sms.

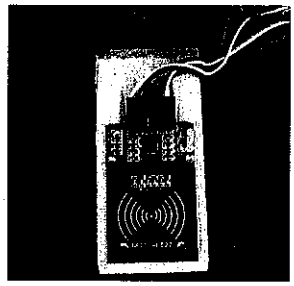
vi) Circuit Development

After purchasing the components for the circuit, we started to assemble the components to create a complete circuit. The system's circuit consists of Arduino Uno, GSM Module SIM900A , RFID , limit switch and Servo Motor.



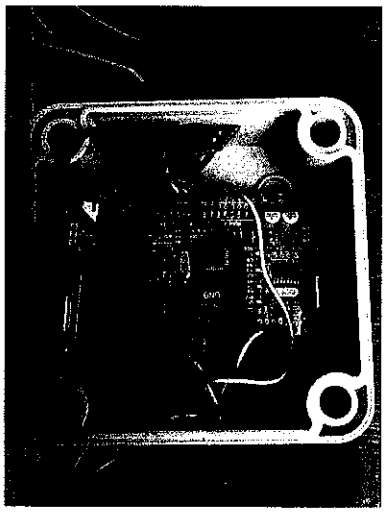
In this circuit diagram a microcontrollers (Arduino Uno) are the main components which are used for controlling other devices (RFID, GSM Module, , limit switch and Servo Motor) . We connected the RFID-RC522 with the Arduino on pin 10(SDA),pin 13(SCK), pin 11(MOSI),pin 12(MISO), GND, pin 9(RST) and 3.3V . The GSM module will only send the message once and it will need to be restarted again to send another. Pin 3 and pin 4 will be used to connect the reset

button to the Arduino board. The servo motor function to slide the door lock when an user want to open or close the closet. We use pin 8 from the Arduino pin.



vii) Main Project Assembly

We proceed with the components placement and cable management process. For the circuit, we decided to put it in a case to protect it from the surroundings. The case we put back the closet door position. The Arduino Uno and GSM will be put inside the case while limit switch and servo motor will be put outside of the case. The connection are soldered to ensure secure connection and to avoid any short components.



Circuit inside a case

Next , we attached the limit switch in the inside of closet door . This is because we want to put the key at there . Function we put the keys on the limit switch is because when we take the keys , limit switch will ON , so it will send the data through sms . And when we put the keys back , it also will send the data .

Figure keys with limit switch

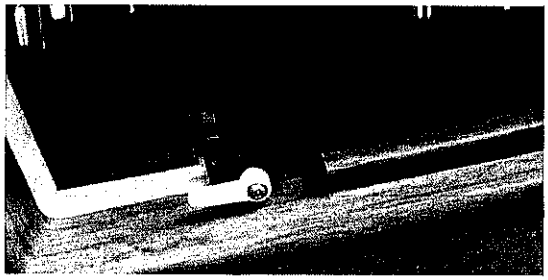
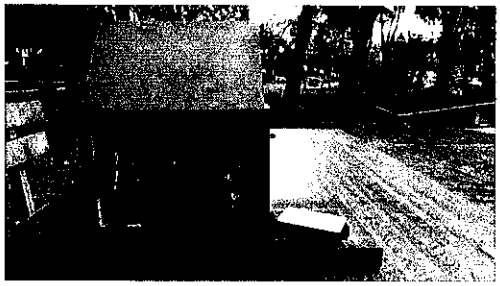


Figure servo motor

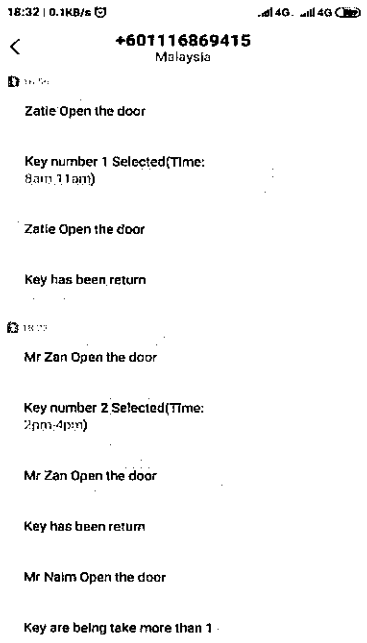
After connecting all the components, we organised all the components to make sure this project look nice and tidy. The figure below show finishing of the all whole circuit into a closet prototype .



Final finishing and placement for the whole circuit

viii) Application on Smartphone

Our system is using this application on smartphone that function to connect a smartphone. We designed this program to make an easy way to use our project by using IOT system that has been implemented worldwide by using GSM for communication part that send a messages to a keys user .



3.3 Methods of data collection

We apply a method of data collection techniques .This was done in order to collect adequate and relevant data to address onjectives of this study. Nonetheless ,we used qualitive research method.

Library Research

Library researching process dealing with analysis of evidences such as articles newspaper and documentary.Simirlary,it means gathering data from library material which includes textbook ,documentsuch as jurnal,dissertations and thesis.Library research also includes information gathered from internet research.

Data gathered via library research is categorized as the secondary data. Secondary data means the data is readily available and used by anyone beside researches .This means that secondary data is not originally collected but rather obtained from published or unpublished source.

In the research ,the secondary data is used in literature review and in chapter two .The literature view consists of data gathered from numerous jurnals regarding smart key detector activity, research and development all around the world.

SURVEY

For the Smart Key Detector ,the instrument need to be used in this project must be selected appropriately compatible with the function for the project .Each of detector components on the circuit play an important role and has its own function .The size of the components also be in accordance with the design and the space area that supposed to install it.

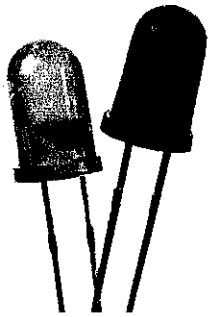
3.4 Study Instruments

In developed the Smart Key Detector, the instruments need to be used in this project must be selected appropriately compatible with the functions for the project. Each of the smart key detector components on the circuit plays an important role and has its own function. The size of the components also be in accordance with the design and the space area that supposed to install it.

a) Limit Switch

This is a limit switch. It operated by the motion of a machine part or presence of an object. They are used for controlling machinery as part of a control system, as a safety interlocks, or to count objects passing a point. A limit switch is an electromechanical device that consists of an actuator mechanically linked to a set of contacts. When an object comes into contact with the actuator, the device operates the contacts to make or break an electrical connection. Limit switches are used in a variety of applications and environments because of their ruggedness, ease of installation, and reliability of operation. They can determine the presence or absence, passing, positioning, and end of travel of an object.

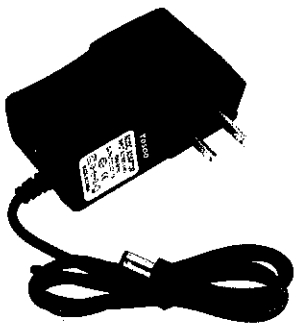
b) LED



In the simplest terms, a light-emitting diode (LED) is a semiconductor device that emits light when an electric current is passed through it. Light is produced when the particles that carry the current (known as electrons and holes) combine together within the semiconductor material.

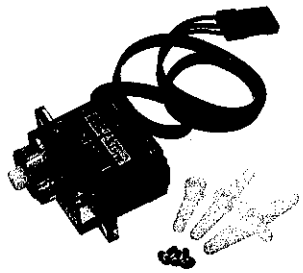
Since light is generated within the solid semiconductor material, LEDs are described as solid-state devices. The term solid-state lighting, which also encompasses organic LEDs (OLEDs), distinguishes this lighting technology from other sources that use heated filaments (incandescent and tungsten halogen lamps) or gas discharge (fluorescent lamps).

c) Adaptor



An adapter or adapto is a device that converts attributes of one device or system to those of an otherwise incompatible device or system. Some modify power or signal attributes, while others merely adapt the physical form of one connector to another.

d) Servo Motor



A servomotor is rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. Servomotors are not a specific class of motor, although the term servomotor is often used to refer to a motor suitable for use in a closed-loop control system. Servomotors also are used in applications such as robotics, CNC machinery or automated manufacturing.

3.5 Sampling Techniques

Sampling techniques related to the process of selecting the number of subjects from the problem encountered by the survey respondents.The study sample consisted of polytecnic students,lecturers and the public. A total of 10 respondent were selected between the the of respondent categories. This selection was created because everyone usually had their own problem when they are in public area and ran out of battery.

3.6 Data Analysis Methods

This final year project which is carried out through two semester needs a lot of researches. We findings all the procedure and process the previous chapter that we engaged. The researcher will look into the result for each of the question based on the responses given by the respondents of this survey. Statistical analysis was used to identify percentages to answer all of the questions in the questionnaire. Based on the amount of data were collected, the total amount of the key users is very much.

3.6.1 RESULT AND ANALYSIS FROM RESEARCHERS QUESTIONAIRE

For reseacher's questionaire, first section start with questions to obtain the information about the researchers themselve. This section consists of 4 question such gender, age, use the key frequently and is where the key is often used .

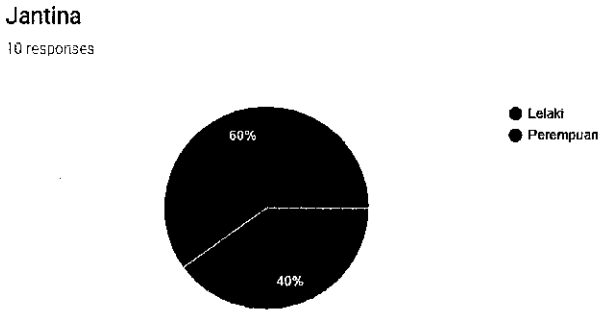
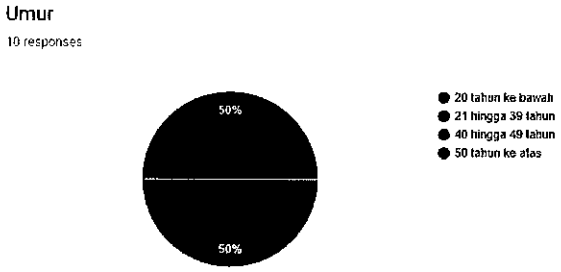


Figure 1

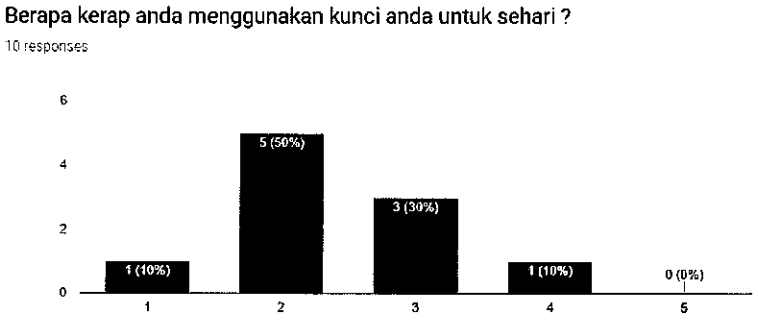
Gendre of response

The result shown that 60% from female and 40% from male. Most of the respondents are female.



Age of response

Form this graph, respondents from 21-39 years old is 50%, 20 and below years old is 50% . The age of respondents as shown in figure below shows that majority of respondents age is from 17 years old until 39 years old.



From this graph, the response of using keys only once a day is 10%, using keys 5 times a day is 50%, using keys 3 times a day is 30% and using keys 4 times a day is 10% . Most respondent use the keys 2 times in one day .

From this graph, respondents used the key in the office by 20%. Meanwhile, those who use the keys at home and at the factory make up 20%. Lastly, respondents using the key at the institution accounted for 40%. Majority of respondents use keys in institute.

3.7 Chapter Summary

Implementing a classroom locker system will greatly help the academic institutions or any organization and thereby prevent time-consuming process. The learning and teaching process will also work well. By using this laboratory closet system, everyone will have secure access to get the classes keys. This will increase the net productivity of the institution or any organization. The proposed system is reliable, safe, efficient and capable of replacing old methods and unreliable methods. The system ensures the security of the device and retrieves records of incoming and outgoing class locks. The proposed system can be improved through the use of RFID to improve security by using advanced IoT technology.

CHAPTER 4

RESULT REQUIRED

4.1 Introduction Chapter

By referring to the questioner result and data collected by implementation of the project. A statistical analysis were made to find out any problem and to resolve the problem. This enables us to know the effectiveness of implementing the laboratory closet system by knowing its potentiality.

4.2 Feedback Rate

The following diagrams illustrate the finding of the survey that given to Polytechnic Sultan Salahuddin Abdul Aziz Shah's student. Through this information we get knowing clearly about the 3 main aspect as described in our project objectives :

a) To construct and design a product that will remind the user and management towards the time they need to use the security service.

b) To designing mobile warning products and effective key systems.

c) To develop products with friendly consumer products.

Questions	Existing lock system	Smart Key Detector
More safety with the classes key closet system	unsatisfied	satisfied
Classes key are easy to getting lost	Yes	No
Satisfaction with the security system the way to take the key	Not satisfied	Satisfied
Do you always return the key on time	No	Yes
Do you know how to use the keys on that time	No	Yes
Does enhancing the safety of the keys is important	Yes	
Does a Smart Key Detector can protect the Keys	Yes	

4.3 Research Findings

The following diagrams illustrate for before and after our implementing this project . Through this information we get knowing clearly about the 3 main aspects as described in problem statements :

- Difficult to know which keys are missing
- Difficult to have a timely learning session
- Difficult to identify the identity of a particular class

Before	After
Classes keys get stolen or damaged	Classes keys are protected and kept safe
Cannot identify the usages data	Usage data can be identified
Uncontrollable usage	Usage rate become controlled

From, the observation based on the project we can collect some data about our project operate in the real condition when we set up the classes keys closet system as we has decided to implement our project. We observed that the closet system is user friendly to the students and the lecturer. So from the result shows on the table above, we can conclude that the closet system can protect and avoid the classes keys from being damaged or stolen.

4.4 Chapter Summary

In conclusion, the classes key closet system will be developed to replace the old method intake system that is now widely used by many Academic Institutions like colleges and universities. This project will be considered successful once the system is implemented by others. The system is designed to be more reliable, easy, efficient, and easy in the process of taking the key. In addition, with the implementation of this system data retrieval will be more accurate and can be arranged in a simpler way and errors will be minimized.

This project is designed to eliminate problems that arose during preliminary analysis. Problems detected include stolen, damaged or unsecured. This problem is a major problem facing most colleges and universities. In short, this means that most of the problems encountered are largely due to the use of old method procurement systems.

Therefore, this project is designed in effort to eliminate these problems. Some solution had been applied to eliminate these problems which includes the use of a secured using RFID security lock to avoid access of all irrelevant people and data can be collected more efficiently. With the proposed solutions, obviously seen not only can eliminate these spotted problems but at the same time also promote a very reliable ways in managing the protection of the keys time to time.

CHAPTER 5

QUESTION , CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction Chapter

In the previous chapter, the result of the study was tabled and the findings of the study were discussed in details. This chapter provide an overview of the study with the conclusion, discussion and resulting recommendation. The chapter conclude with a summary of the value of this research study.

5.2 Discussion

Our objectives is to design an excellent lab closet locking systems that contains many benefits for users especially for user that need to protected their keys. We hopes this smart key detector could be able to help managing to protected towards their keys. Also, we had achieves the objectives and we have found the solution to the problems that we had recognize before.

5.3 Conclusion

At the ends of this project we have learn a lot of thing about electronic and electrical components .This project has give knowledge and extra information for us .It also gives us chance to learn the process of making the electronic equipment and got experience on how to solve a problem using the knowledge that we achieved throughout this diploma time .We knew in all cases ,there are some basic rules for handling experiment over time ,to help avoid some problems which are often encountered with this type of circuit construction. We can conclude that there were many ways could be used to help user otherwise in manual step or short step. Each ways had different step and difference component.

From the project building, we also learned a lot of new topic as well as enhancing our technical skills. We also improved our software and programming skills during the building of this project. We learn how to use the Arduino software to code, interface the components to create a system.

5.4 Implications Project

- Using this door lock is very easy and the best part is that you don't have to worry about any security issues in the long run .
- This information is captured in the database, so everything is accurate and valid .
- Implement a digital security system that distribute secure zones where only authorized persons can be admitted .

5.5 Recommendation

Based on the findings of this study and the conclusion drawn above, the conclusion following recommendations are made:

1. Create a web application for the mobile application to sync alert logs and location logs and to back-up all the information in the mobile application.
2. Create a mobile application for alternative online monitoring and control of the system.

ATTACHMENT

Attachment A - programming

```
#include <SPI.h>
#include <MFRC522.h>

#include <Servo.h>
#include <SoftwareSerial.h>
SoftwareSerial GPRS(7,8);
Servo ikan;
int ayam;
int kira;
int last;

#define SS_PIN 10
#define RST_PIN 9
MFRC522 mfrc522(SS_PIN, RST_PIN);   // Create MFRC522 instance.

void setup()
  {
  kira=0;
   ayam=0;
   last=0;
   ikan.attach(5);
   ikan.write(0);
  ////////GSM/////////
  GPRS.begin(9600);
     GPRS.println("AT");
```

```
 delay(1000);
 ////////////////
 //////////barang/////////
 pinMode(A0,OUTPUT);
     pinMode(A1,OUTPUT);
     pinMode(A2,INPUT);
     pinMode(A3,OUTPUT);
     pinMode(A4,OUTPUT);
     pinMode(A5,OUTPUT);

     pinMode(A2,INPUT_PULLUP);
     pinMode(2,INPUT_PULLUP);
     pinMode(3,INPUT_PULLUP);
     pinMode(4,INPUT_PULLUP);

     ////////////rfid/////////
      Serial.begin(9600);   // Initiate a serial communication
      SPI.begin();      // Initiate  SPI bus
      mfrc522.PCD_Init();   // Initiate MFRC522
      Serial.println("Approximate your card to the reader...");
      Serial.println();

     }
     void loop()
     {
      while(GPRS.available()){
       Serial.write(GPRS.read());

 }
```

```
    // Look for new cards
    if ( ! mfrc522.PICC_IsNewCardPresent())
    {
     return;
    }
    // Select one of the cards
    if ( ! mfrc522.PICC_ReadCardSerial())
    {
     return;
    }
//Show UID on serial monitor
    Serial.print("UID tag :");
    String content= "";
    byte letter;
    for (byte i = 0; i < mfrc522.uid.size; i++)
    {
      Serial.print(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " ");
      Serial.print(mfrc522.uid.uidByte[i], HEX);
      content.concat(String(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " "));
      content.concat(String(mfrc522.uid.uidByte[i], HEX));
    }
    Serial.println();
    Serial.print("Message : ");
    content.toUpperCase();
    if (content.substring(1) == "19 23 DF 28") //change here the UID of the card/cards that
  you want to give access
    {
     ikan.write(90);
     Serial.println("Authorized access");
```

```
    Serial.println("Zatie");
    Serial.println();
    delay(1000);
   GPRS.println("AT+CMGF=1");                                    //
   delay(200);                                                  //
   GPRS.println("AT+CMGS=\"+60189625152\"");//Change the receiver phone number
  //
   delay(500);
   GPRS.print("Zatie Open the door");
   GPRS.write(0x1a);
   kerja();
   }
    else if (content.substring(1) == "2C AA 6A 60") //change here the UID of the card/cards
  that you want to give access
   {
    ikan.write(90);
    Serial.println("Authorized access");
Serial.println("Mr Zan");
    Serial.println();
    delay(1000);
   GPRS.println("AT+CMGF=1");                                    //
   delay(200);                                                  //
   GPRS.println("AT+CMGS=\"+60189625152\"");//Change the receiver phone number
  //
   delay(500);
   GPRS.print("Mr Zan Open the door");
   GPRS.write(0x1a);
   kerja();
   }
```

```
 else if (content.substring(1) == "90 B8 C7 53") //change here the UID of the card/cards
that you want to give access
 {
  ikan.write(90);
  Serial.println("Authorized access");
  Serial.println("Mr Naim");
  Serial.println();
  delay(1000);
 GPRS.println("AT+CMGF=1");                                          //
 delay(200);                                                  //
 GPRS.println("AT+CMGS=\"+60189625152\"");//Change the receiver phone number
//
 delay(500);
 GPRS.print("Mr Naim Open the door");
 GPRS.write(0x1a);
 kerja();
 }

 else  {
  Serial.println(" Access denied");
  delay(3000);
 }
}

void kerja(){
 if(digitalRead(A2)==LOW){
 ikan.write(0);
 delay(1000);
 GPRS.println("AT+CMGF=1");                                          //
 delay(200);                                                  //
```

```
  GPRS.println("AT+CMGS=\"+60189625152\"");//Change the receiver phone number
//
  delay(500);
  GPRS.print("Please return the key!!!");
  GPRS.write(0x1a);

}

          if(digitalRead(2)==LOW){
          sms1();
        digitalWrite(A1,HIGH);
        }
        else{
          digitalWrite(A0,LOW);
        digitalWrite(A1,LOW);
        }
         if(digitalRead(3)==LOW){
    sms2();
        digitalWrite(A3,HIGH);
        }
        else{

        digitalWrite(A3,LOW);
        }
         if(digitalRead(4)==LOW){
        sms3();
        digitalWrite(A5,HIGH);
```

```
        }
        else{
        digitalWrite(A4,LOW);
        digitalWrite(A5,LOW);
}
        if(digitalRead(2)==LOW && digitalRead(3)==LOW){
         Serial.println("Error");
         sms4();
        /*digitalWrite(A1,HIGH);
        digitalWrite(A3,HIGH);
        digitalWrite(A5,HIGH);
        delay(500);
        digitalWrite(A1,LOW);
        digitalWrite(A3,LOW);
        digitalWrite(A5,LOW);
        delay(500);*/
        }
        if(digitalRead(2)==LOW && digitalRead(4)==LOW){
         Serial.println("Error");
         sms4();
        /* digitalWrite(A1,HIGH);
        digitalWrite(A3,HIGH);
        digitalWrite(A5,HIGH);
        delay(500);
        digitalWrite(A1,LOW);
        digitalWrite(A3,LOW);
        digitalWrite(A5,LOW);
        delay(500);*/
        }
        if(digitalRead(4)==LOW && digitalRead(3)==LOW){
```

```
          Serial.println("Error");
      sms4();
          /*  digitalWrite(A1,HIGH);
          digitalWrite(A3,HIGH);
          digitalWrite(A5,HIGH);
          delay(500);
     digitalWrite(A1,LOW);
          digitalWrite(A3,LOW);
          digitalWrite(A5,LOW);
          delay(500);*/
          }
          if(digitalRead(2)==LOW && digitalRead(3)==LOW && digitalRead(4)==LOW){
           Serial.println("Error");
           sms4();
          /*  digitalWrite(A1,HIGH);
digitalWrite(A3,HIGH);
digitalWrite(A5,HIGH);
delay(500);
digitalWrite(A1,LOW);
digitalWrite(A3,LOW);
digitalWrite(A5,LOW);
delay(500);*/
}
if(digitalRead(2)==HIGH && digitalRead(3)==HIGH && digitalRead(4)==HIGH){
 Serial.println("Error");
```

```
 sms5();
/*  digitalWrite(A1,HIGH);
digitalWrite(A3,HIGH);
digitalWrite(A5,HIGH);
delay(500);
digitalWrite(A1,LOW);
digitalWrite(A3,LOW);
digitalWrite(A5,LOW);
delay(500);*/
}
}

void sms1(){
 ////////////owner//////////
 GPRS.println("AT+CMGF=1");
 delay(200);
 GPRS.println("AT+CMGS=\"+60189625152\"");//Change the receiver phone number
 delay(500);
 GPRS.print("Key number 1 Selected(Time: 8am-11am)");
 GPRS.write(0x1a);


}
```

```
void sms2(){
 GPRS.println("AT+CMGF=1");
 delay(200);


 GPRS.println("AT+CMGS=\"+60189625152\"");//Change the receiver phone number
 delay(500);
 GPRS.print("Key number 2 Selected(Time: 2pm-4pm)");
 GPRS.write(0x1a);
}
void sms3(){
 GPRS.println("AT+CMGF=1");
 delay(200);


 GPRS.println("AT+CMGS=\"+60189625152\"");//Change the receiver phone number
 delay(500);
 GPRS.print("Key number 3 Selected(Time: 9pm-11pm)");
 GPRS.write(0x1a);
}
void sms4(){
 GPRS.println("AT+CMGF=1");
 delay(200);
```

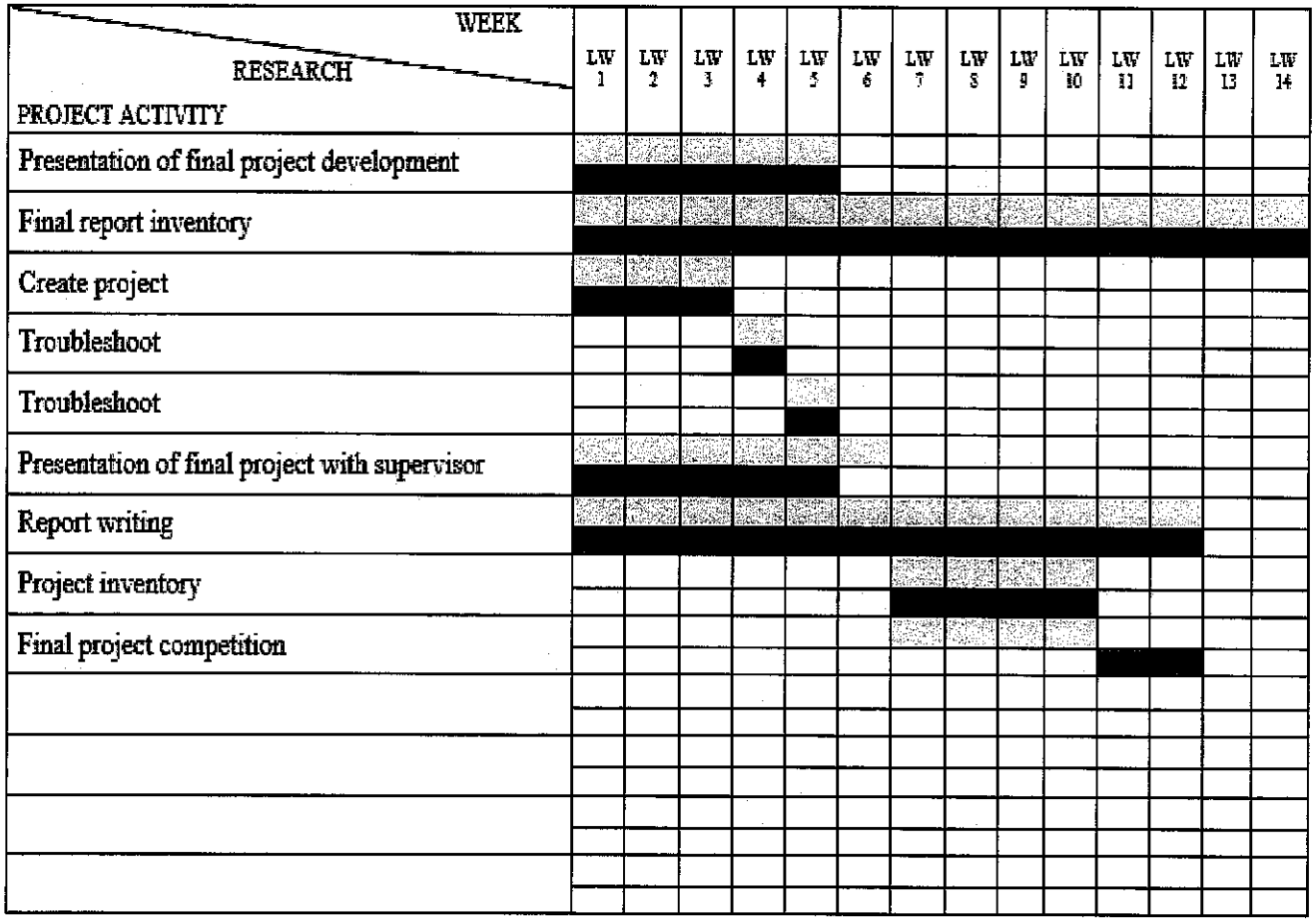
```
GPRS.println("AT+CMGS=\"+60189625152\"");//Change the receiver phone number
delay(500);
GPRS.print("Key are being take more than 1");
GPRS.write(0x1a);


 }
     void sms5(){
  GPRS.println("AT+CMGF=1");
     delay(200);


     GPRS.println("AT+CMGS=\"+60189625152\"");//Change the receiver phone number
     delay(500);
     GPRS.print("Key has been return");
     GPRS.write(0x1a);

    }
```

Attachment B – Gantt Chart

SEMESTER 4 PROJECT GANTT CHART

WEEK / RESEARCH / PROJECT ACTIVITY	LW 1	LW 2	LW 3	LW 4	LW 5	LW 6	LW 7	LW 8	LW 9	LW 10	LW 11	LW 12	LW 13	LW 14	LW 15
Project briefing															
Build a project															
Background study group presentation															
Presentation the characteristics of project															
Methodology															
Report earnings															
Project selection															
Identify project circuit															
Comparison and search for project items															
Production circuit and project code															
Project remake															
Project presentation															
Proposal submission															

SEMESTER 5 PROJECT GANTT CHART



Attachment C – References

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