GSM SECURE DOOR
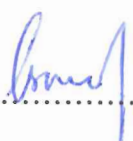
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DECLARATIONS

"We hereby declare that this report entitle "GSM SECURE DOOR" is the result of my own expect for quotes as cited in the references."

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Sufficient in terms of the scope and quality for the award of Diploma in

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Date   : 4 OCTOBER 2016

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Apart from that, we want to thank all our friends for helping us to finish this project. They have also helped us by giving an extra ideas for our project. The discussion about our final year project is a meaningful and useful moment it is because we have gathered a lot of ideas. Our mind are also open after gathered a lot of idea to make the project.

Next we want to thank to our parents for encourage us on this project. They support us very well for this project because they give us some money to buy the important material and component for our project.

Lastly, I offer my regards and blessings to my colleagues and all of those who supported us in any respect during the completion of the project.

ABSTRACT

The name of our final year project is GSM SECURE DOOR. We usually come across areas where a user needs to control his domestic or company door lock from wide distances. Here we propose a system that allow user to unlock a door by entering a password. We propose to use GSM technology ie through SMS. Our system allows user to send an sms with password in order to unlock a door. The door opens on receiving the right password. The system also alerts the user upon the status of locking or unlocking the door . The circuit consists of a gsm modem to receive sms data. It decodes the sms and sends it to an Arduino Uno. The arduino then reads the input and checks the password entered.When it receive the right password it opens the door by activating the motor.

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INTRODUCTION

1.1 Background of Project

Security describes protection of life and property. There are doors to keep people out, Key locks and chains reinforce the mode of security. Doors are being made of metals not just wood anymore. Influential persons in our society have bullet proof doors to ensure a good measure of security of self and family. The security sector is experiencing diversification as it has never seen before. This has brought about the need to review the reliability of already existing systems and look into the possibility of creating better systems that are smarter and more secure.

GSM based digital lock presented here is an access control system that allows only authorized persons to access a restricted area, this system is best suitable for corporate offices, automated machine (ATMs) and home security. It comprises of a small electronic unit which is in fixed at the entry door to control a solenoid-operated lock , when an authorized person sends predetermined user password via the global system for mobile communication (GSM) , the solenoid-operated lock will pull the latch so that the door can be open. At the end of preset delay time, the solenoid-operated lock is operated in reverse direction and the door gets locked again.The door only will open when we send the correct code to the GSM . The code only will be given to certain people , to avoid undesirable thigs happens . When the door is opened , a message will be sent to user . The same goes when the door is closed . With this the user can monitor the house even from far . The project intends to interface the arduino with the GSM modem and start/stop the engine by sending the predefined messages from the mobile phone to the controlling unit, The software application and the hardware implementation help the arduino read the messages sent by the user from a mobile phone or send messages to the mobile phone through the modem and accordingly .The measure

of efficiency is based on how fast the microcontroller can detect the incoming message and act accordingly.

1.2 Problem Statement

The safety of home is quite crucial because lack of safety awareness . Besides the traditional method door that used a key can be easily open by not authorized person or burglar if they have the right key. This will allows them to steal the entire valuable thing in the house . So the major reason to build this project is to increase the safety of home and to reduce usage of the key when opening the door.

1.3 Objective of Research

The project that was built has several objectives. These objectives describe bellow are mainly to improve the skill of learning and it will consist of skill of hardware and programming skills. The objectives of this project were as follows:

1.3.1 To facilitate people to open the door by sending SMS using their mobile phones

1.3.2 To reduce usage of key to open the door

1.3.3 To learn the programming skills and generate the creative thinking.

1.4 Scope of Project

The project scope involves a method of locking the main door of the house using a GSM module. The project starts from information research and research for reference whether printed or electronic. As well as information and advice from the supervisor is also very useful for the smooth running of the project. Then the project was sketched based on the information obtained. The circuit like the power supply circuit (12v, 5v) to be designed. After completion of the design of the circuit to be tested with simulations like multisim and then tested manually on board . After proven it is capable of functioning and then only its being mounted on the PCB. This project uses Solenoid lock. The project also has the additional

supply of dry cells (to avoid a failed operating system when a short circuit).The operation process of our project is starting from the users mobile phone . When the user sends a code to the GSM , then it will transmit the data received to the microcontroller . The microcontroller will then tell the solenoid-operated lock to open or close . Everytime the door is opened or closed , user will get a message .

1.4.1 Software

In order to work with this project, first the right of software implementation needs to be identified. The preliminary works for software searching are:

i.   Learn the usage of the assembly language and it criteria based on the project objectives.
ii.   Identified the software that will be used to load the program to the Arduino
iii. Check and explore the entire menu in the software used in order to achieve the project objectives.

1.4.2 Hardware

For the hardware part, there are several works that has been done before proceed to the project requirements.

i.   Design the door with the solenoid lock attached to it.
ii.   Searching for material that will be use such as wood, nail and solenoid lock.
iii. Built the prototype according to the design and the project requirements.

CHAPTER 2

LITERATURE REVIEW

2.1 PROJECT DESCRIPTION

Security describes protection of life and property. There are doors to keep people out,Key locks and chains reinforce the mode of security. Doors are being made of metals not just wood anymore. Influential persons in our society have bullet proof doors to ensure a good measure of security of self and family. The security sector is experiencing diversification as it has never seen before. This has brought about the need to review the reliability of already existing systems and look into the possibility of creating better systems that are smarter and more secure.

2.2 DEVICE USED

1) Arduino Uno
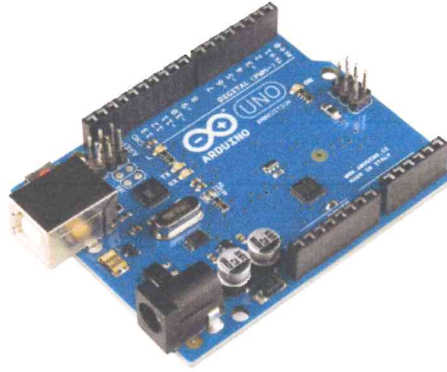
Figure 2.2.1 : Arduino

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P
(datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM
outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power
jack, an ICSP header and a reset button. It contains everything needed to support
the microcontroller; simply connect it to a computer with a USB cable or power it
with a AC-to-DC adapter or battery to get started.. You can tinker with your UNO
without worring too much about doing something wrong, worst case scenario you
can replace the chip for a few dollars and start over again.

General Features

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328P) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328P)
EEPROM	1 KB (ATmega328P)
Clock Speed	16 MHz
LED_BUILTIN	13
Length	68.6 mm
Width	53.4 mm
Weight	25 g

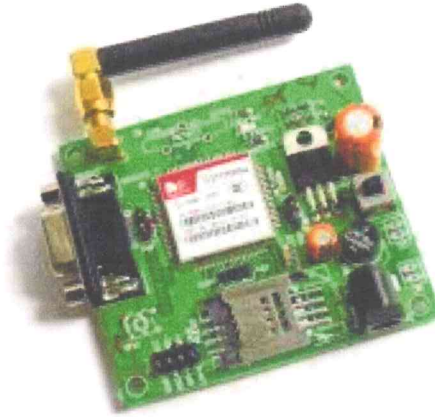**Table 2.2.1 : General Features of Arduino**

2) GSM MODULE

Figure 2.2.2 : GSM Module

GSM MODULE

GSM stands for Global System for Mobile Communication. It is a digital cellular technology used for transmitting mobile voice and data services.GSM is the most widely accepted standard in telecommunications and it is implemented globally.GSM is a circuit-switched

system that divides each 200 kHz channel into eight 25 kHz time-slots. GSM operates on the mobile communication bands 900 MHz and 1800 MHz in most parts of the world. In the US, GSM operates in the bands 850 MHz and 1900 MHz.GSM makes use of narrowband Time Division Multiple Access (TDMA) GSM provides basic to advanced voice and data services including roaming service. Roaming is the ability to use your GSM phone number in another GSM network.GSM digitizes and compresses data, then sends it down through a channel with two other streams of user data, each in its own timeslot.

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages. A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities

Advantages of GSM

- Improved spectrum efficiency
- International roaming
- Low-cost mobile sets and base stations (BSs)
- High-quality speech
- Compatibility with Integrated Services Digital
- Network (ISDN) and other telephone company

Features of GSM

- Short Message Service which allows you to send and receive 126 character text messages.
- Ability to use same phone in a number of network-related countries.
- Allows data transmission and reception across GSM networks at speeds up to 9,600 bps currently.
- Forwarding of calls to another number. More capacity, ensuring rapid call set-up.
- Place a call on Hold while you access another call.
- Encrypted conservations that cannot be tapped.
- Emergency Calls - In the majority of countries,the global 112 emergency number can be dialed free .
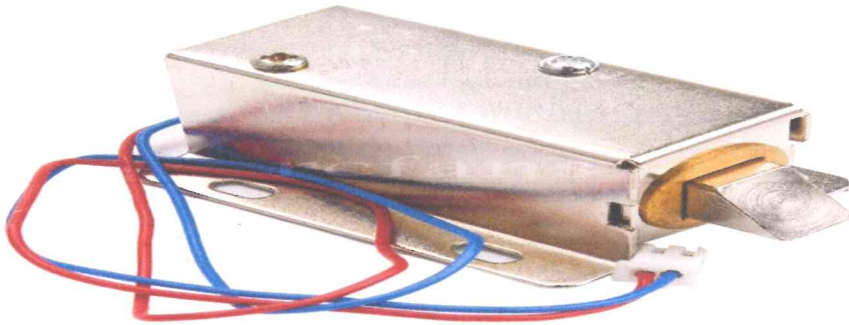- No-static connections

3)

Figure 2.2.3 : Solenoid lock

Solenoids are basically electromagnets: they are made of a big coil of copper wire with an armature (a slug of metal) in the middle. When the coil is energized, the slug is pulled into the center of the coil. This makes the solenoid able to pull from one end.

This solenoid in particular is nice and strong, and has a slug with a slanted cut and a good mounting bracket. It's basically an electronic lock, designed for a basic cabinet or safe or door. Normally the lock is active so you can't open the door because the solenoid slug is in the way. It does not use any power in this state. When 9-12VDC is applied, the slug pulls in so it doesn't stick out anymore and the door can be opened.

The solenoids come with the slanted slug as shown above, but you can open it with the two Phillips-head screws and turn it around so its rotated 90, 180 or 270 degrees so that it matches the door you want to use it with.
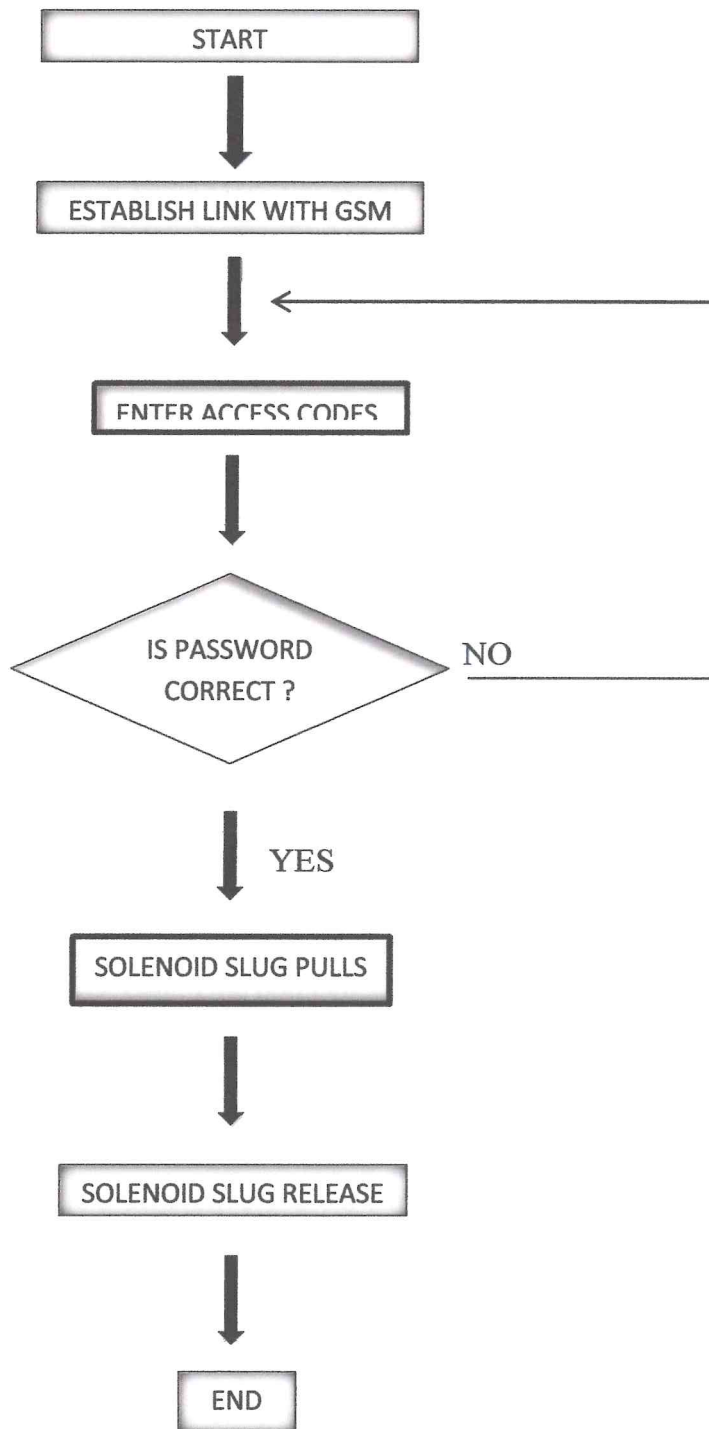
2.3 FLOW CHART OF PROJECT

Figure 2.3.1 : Flow chart of Project

2.4 FUNCTION OF COMPONENTS

1) BRIGDE RECTIFIER

A bridge rectifier is an arrangement of four or more diodes in a bridge circuit configuration which provides the same output polarity for either input polarity. It is used for converting an alternating current (AC) input into a direct current (DC) output. A bridge rectifier provides full-wave rectification from a two-wire AC input, therefore resulting in lower weight and cost when compared to a rectifier with a 3-wire input from a transformer with a center-tapped secondary winding.

2) CAPACITOR

A capacitor is a passive electronic component that stores energy in the form of an electrostatic field. In the most simple form, a capacitor consists of two conducting plates separated by an insulating material called a dielectric. Capacitance is directly proportional to the surface area of the plate, and is inversely proportional to the separation between the plates. Capacitance also depends on the dielectric constant of the material separating the plates.

3) TRANSFORMER

Transformers have a structure called the "core" which typically contain iron. Two coils wound around the core. One coil called the primary coil, and the other is called the secondary coil. The primary coil is connected to a source of electric current. It is important that the current source provides an alternating current in order to create a constant state of flux in the magnetic field. Changing magnetic fields cause another alternating current in the secondary coil, which is connected to a different electrical circuit. There are two types of transformers, depending on the voltage generated in the secondary coil relative to the primary coil voltage. Voltage produced in any balanced coil directly to the number of round wire for the coils. If the secondary coil has more turns than the primary, then the output voltage is higher than the input voltage. Transformer type is called an upward transformer. If the secondary coil has less turns than the primary coil, then the output voltage is lower than the input voltage. Transformers, transformer is called a step-down transformer. Transformers can be found in household appliances and equipment to ensure that the device receives the voltage required for operation.

4) DIODE

Active Electronic Components Diode is made of a semiconductor material and has a function to send electric current to one direction but prevent electric current from the opposite direction. Therefore, it is often used as a rectifier diode in series Electronics. Diodes in general have two electrodes (terminals) are Anode (+) and cathode (-) and has a working principle based on the technology of semiconductor pn junction can drain current of the p-type side (anode) to the n-type (cathode) but can not flow in the opposite direction.

5) IC 7805/7812

The **78xx** (sometimes **L78xx, LM78xx, MC78xx**...) is a family of self-contained fixed linear voltage regulator integrated circuit . The 78xx family is commonly used in electronic circuits requiring a regulated power supply due to their ease-of-use and low cost. For ICs within the family, the *xx* is replaced with two digits, indicating the output voltage (for example, the 7805 has a 5volt output, while the 7812 produces 12 volts). The 78xx line are positive voltage regulators: they produce a voltage that is positive relative to a common ground. There is a related line of **79xx** devices which are complementary negative voltage regulators. 78xx and 79xx ICs can be used in combination to provide positive and negative supply voltages in the same circuit.

2.5 PCB WIZARD

PCB Wizard is a highly innovative package for designing printed circuit boards. Offering unrivalled productivity through powerful design tools and an ultra-friendly user interface, PCB Wizard is the choice for all your project work. Add to that, a wealth of clever features that do away with the step learning curve normally associated with PCB packages, and PCB Wizard is hard to beat. It provides a comprehensive range of tools covering all the traditional step in PCB production, including schematic drawing, schematic capture, component placement, automatic routing, Bill of Materials reporting and file generation for manufacturing. The software is supplied on a CD-ROM and requires Microsoft Windows 95, 98, Me, NT 4.0(with SP6), 2000, XP, Vista or 7. User quide and instruction are included with the software.

PCB Wizard Standard :-

- Large database of components
- Schematic design and capture
- Manual PCB design
- Single sided auto-routing
- User-defined components
- Copper pour
- Bill of materials report generation
- Gerber and N.C drilling export
- Integrated publishing with next, graphics and spell-checking support
- Import circuit from Livewire, order code N29AJ

2.6 ARDUINO GENUINO 1.6.12

The open-source Arduino Software (IDE) makes it easy to write code and upload it into a board . It runs on Windows , MacOS , and Linux . The environment is written in Java and based on Processing and other open-source software

CHAPTER 3

METHODOLOGY

3.1 PROJECT METHODOLOGY

Automatic door lock systems have 3 main blocks of systems which is receiver, controller and door lock circuit. Receiver for this system is GSM module. This GSM acts as the signal receiver and received the short messaging system (SMS) from the user and sends the data to the Arduiono.

An Arduino is the major controller of the system. This Arduino has power supply connected to it which comes from the power supply circuit. The coding must be uploaded to Arduino by using Arduino software.

The solenoid lock is used as the door lock. This lock is using the electromagnetic principle which will act as an electromagnet when there is power supply feed to it.

3.2 FLOW CHART

A flow chart is defined as a pictorial representation describing a process being studied or even used to plan stages of a project. Flow charts tend to provide people with a common language or reference point dealing with project or process.
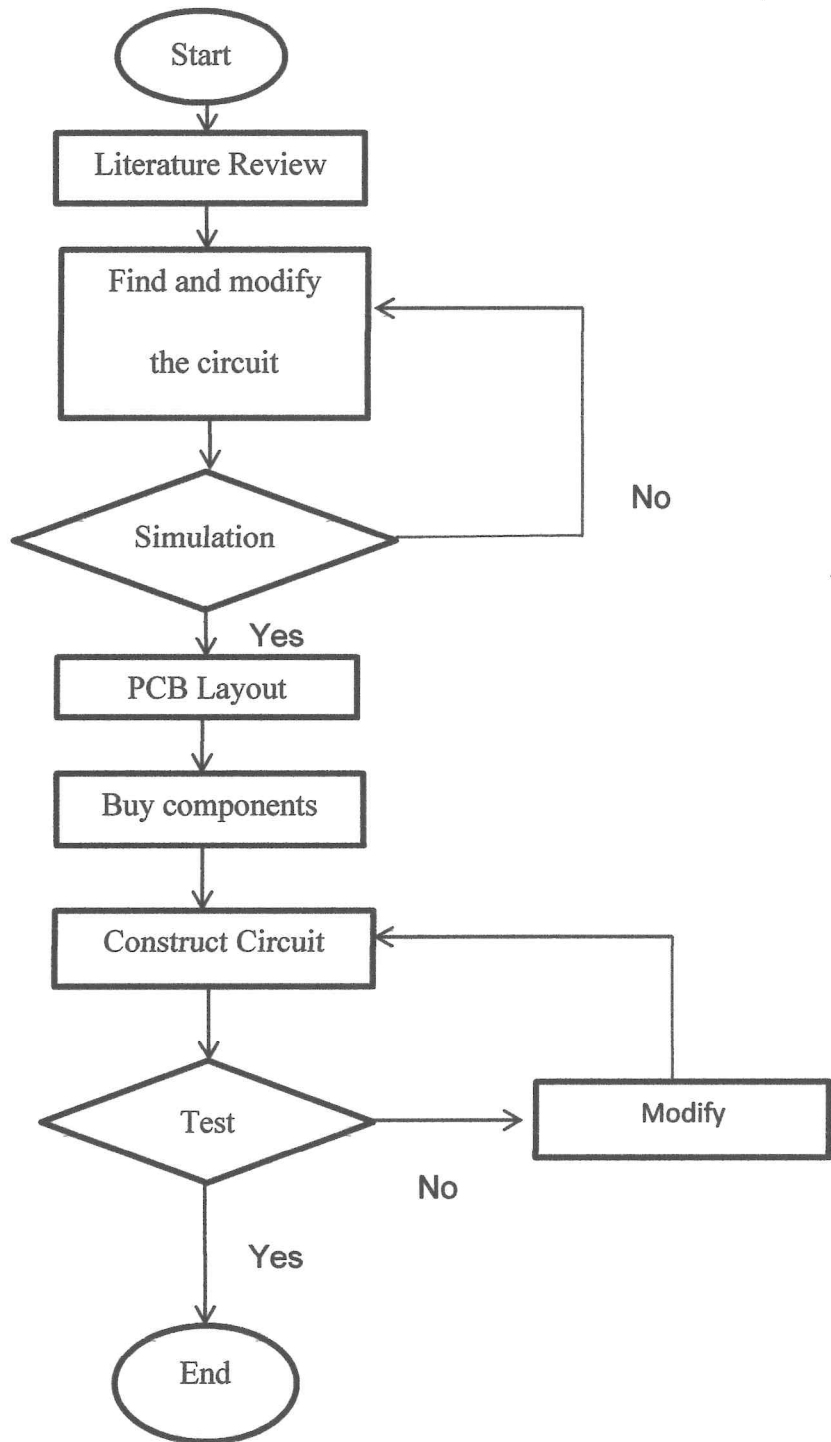
3.2.1 FLOW CHART OF PROJECT PLANNING

Figure 3.2.1.1 : Flow chart of Project Planning

3.3 MILESTONE TABLE

Other than that, we will explain about planning job table. According to planning job table topic, we will show our Gantt during development this project. Gantt chart also known as milestone table that is use to show time start and end time for project. The duration of each job or task can be display in Gant chart has become a common technique for represent the phase and activities of a project work breakdown structure, so they can be understood by a wide audience.

3.3.1 MILESTONE TABLE

Project Progress	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Finding project	■	■	■	■	■									
Project research						■	■	■	■					
Marking circuit										■	■	■		
Sketch program development													■	■
testing the circuit														■
Final model development														■

Table 3.3.1.1 : Project 1 Progress

Project Progress	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Project Ideas	■	■	■	■	■	■	■	■							
Finishing Relay Circuit				■											
Study Coding for Arduino			■	■											
Testing					■	■	■	■	■						
Troubleshooting									■	■	■				
Prototype										■	■	■			
Final Report											■	■	■		
Supervisor Presentation														■	
Project Presentation															■

Table 3.3.1.2 : Project 2 Progress

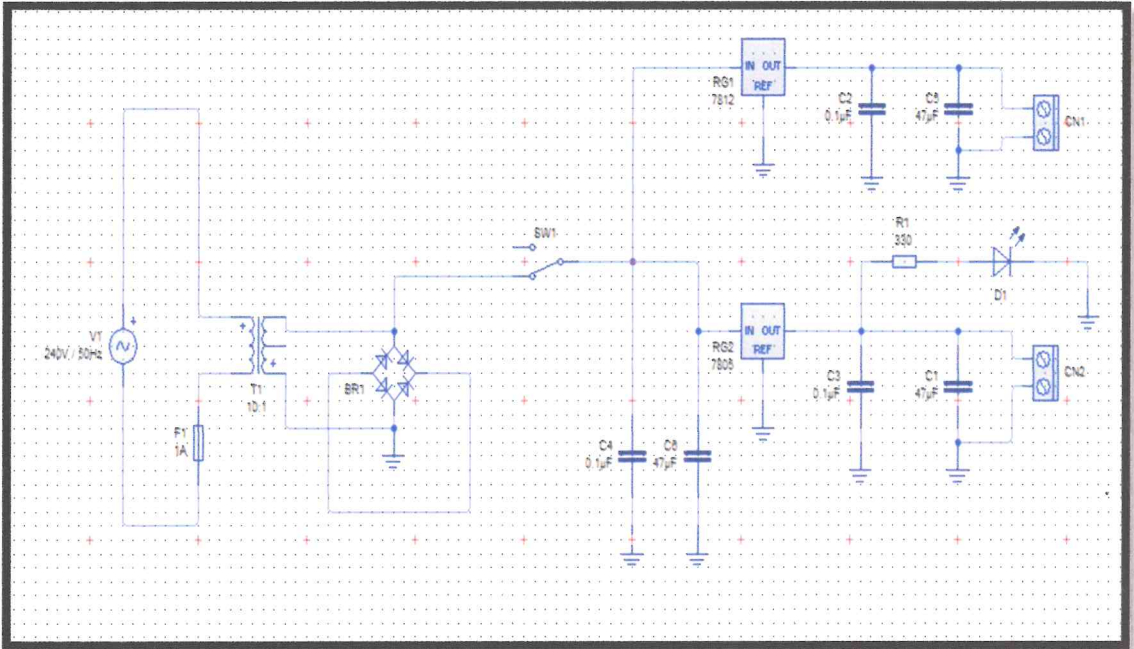## 3.4 CIRCUIT OF PROJECT

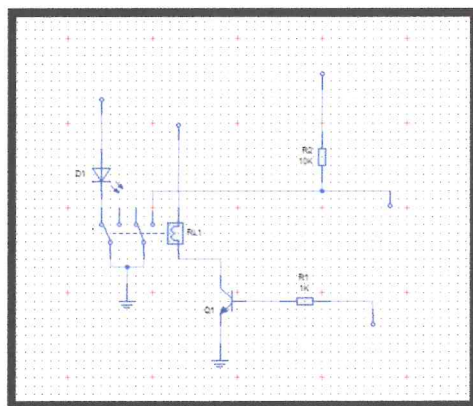**FIGURE 3.4.1: Circuit of power supply**

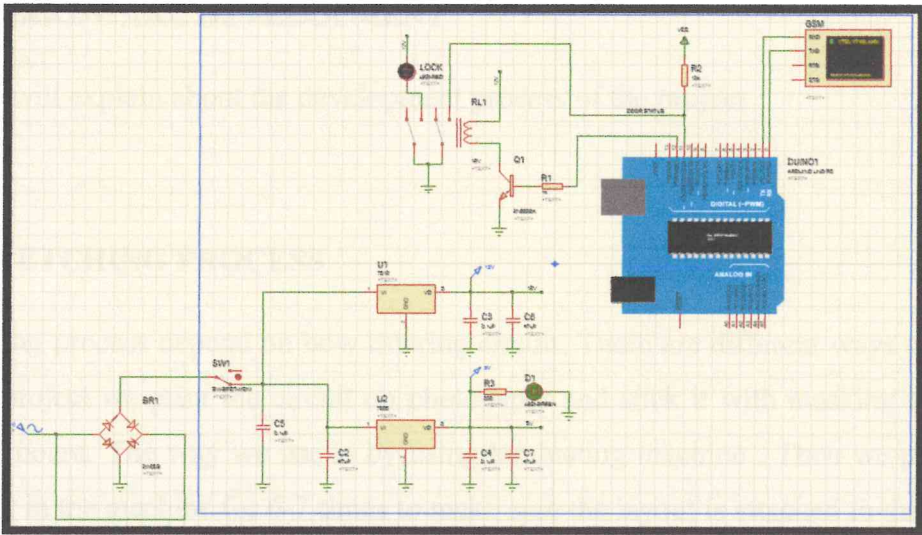**FIGURE 3.4.2 : Relay Circuit**

FIGURE 3.4.3 : Complete circuit

3.5 HARDWARE DEVELOPMENT

This will explain about the development process of the project

3.5.1 ETCHING PROCESS

Etching process depend on how littering circuit. There are different ways of it. In this project we print the circuit on photopaper and stick it with masking tape on PCB board. The way we use is by using laminating machine . Then we put the board in the machine for 6-7 times to make sure the layout is attached to the board . After that we put the board in cold water so that the photo paper come out easily . Finally the board is put in the etching machine to remove the useless copper from board .

Figure 3.5.1.1 : Laminating Process

**Figure 3.5.1.2 : Remove copper from board
with ferric chloride**