Final Year Project Report

SECURITY ALARM SYSTEM INCORPORATING MOBILE SYSTEM

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REGISTRATION NO: TLCM/M/0711/9/10

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The report is submitted to the department of Mathematics and Computing Sciences in partial fulfillment for the award of a degree of Bachelor of Science in Telecommunications
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DECLARATION

I hereby declare that this project is my original work. I also affirm that

This project has not even been presented in this or any other university or institution for exam or any other purpose.

KIPTUM KIPCHIRCHIR DUNCAN

SIGNATURE.......................... DATE.................................
CERTIFICATION

This is to certify that the above named student carried out the project
Work detailed in this report under my supervision.

MR. ROTICH

SIGNATURE.......................... DATE..........................
DEDICATION

To my dear family, lecturers, lab technician and friends for their support all through.

ACKNOWLEDGEMENT

I would like to thank the almighty God for his grace and love. I do

Appreciate the Department of Mathematics and Computing Sciences: Mr.Ojijo, Mr.Rotich, Mr.Otieno and Mr. Erick for the support and guidance I have received throughout my project exercise.

Special regards to my parents and my siblings for their full support.

Finally I do pass my gratitude to my supervisor Mr. Rotich for his support and encouragement all through.

GOD BLESS YOU ABUNDANTLY
ABSTRACT

Security is necessary of every of everyday use to continue with the required place tranquility. However, its absence does a great threat to people or things within a particular zone. As such a lot of resources and funds are usually spent in implementing and maintaining security measures. This in the long run leads to strenuous economic and monetary times to people who need to have security in their everyday undertaking the most common nature of risk falls on category of rules and intrusion to property by buglers and robbers. As such special measures need to be taken against them.

The most prominent factors which promote crime are:

(Darkness) This implies that the perpetrators are not seen at the dark hours.
(Silence) This implies that the perpetrators are not heard at other times.

Many of electrical system have been set up that cut down the insecurity risk but the success of any system is highly limited by the compromise between efficiency and cost.

Therefore, a cheaper system which is more efficient in operation is prone to be handing enough in taking the problem at hand.

The aim of the project is to enhance security in firms and also protect the individuals. Also the system will reduce the amount of power consumed by lighting of the security lights throughout the night. As there is increase in demand of Telecommunication equipment, for example, mobile phone. The other aim of the project is to utilize the mobile phone to provide security by monitoring the firm in a remote place, using the mobile phone.
CHAPTER 1

1.0 INTRODUCTION

Theft is a worldwide problem and threat. Its impacts are well known as it has proved to be a social and economic menace. This is especially higher in new and developing countries due to poor security and a high demand of cheap goods on the market which has been flooded by black market items. Homes and firms’ theft has been on the rise in the last decades all over the world. In Kenya alone, homes and firms items are stolen because of poor security measures. There are many alarm systems currently available in the market today. These alarms either have a vibration sensor, shock sensor or are just based on lock and key. However most of the alarms are prone to false alarms which are really irritating for the owner of the mobile. This is due to poor craftsmanship of the alarm, use of cheap components and also use of ineffective sensors in the circuit. Each owner wants their alarm to be sensitive enough to deter thieves or alert on theft, however if an alarm is too sensitive and has a high output of false alarms then it is not practical.

The purpose of this project is to improve what is currently in the market and to offer the best alarm for firm owners who work very hard to and can loose their precious asset within minutes if not prevented. The sensors to be used in this project are mercury tilt sensors. This is because they are very effective and easy to adjust when installing. They are also affordable and readily available.

1.1 Limitations of the convectional mobile alarm system

1. Distance at which the alarm can heard is negligible, as they operate at 90dB which is only heard 300 meters away. Alarms cannot be heard in buildings.

2. Most alarms have the same sound which makes them very noisy and annoying thus people have formed a habit to ignore them. People tend not to react because the alarms activate so frequently for reasons other than actual theft.
1.2 Problem Statement
Inefficiency of conventional alarms has proved to be more of an economic menace. Many people have lost their properties because of inefficient alarms that are cheaply priced and poor data or research on the alarms in the market so as to guide one in making choices. The alarms in the market are very unreliable and are not steady as there are a lot of false alarms and reset time take too long once the alarm is triggered. The introduction of the mobile phone alert is a cutting edge technique that reduces theft. This project seeks to improve what is there in the market and to reduce the cost by introducing a high end product that is affordable with great performance.

1.3 General Objectives
1. Identify the extent of use of advance systems in the market.
2. Investigate impact of the security systems based on their performance.
3. Improve current conventional security systems in the market.

1.4 Specific Objectives
1. To quantify and characterize use of mobile alarm system
2. To identify the benefits of use of mobile alarm systems in Kenya.
3. To investigate the pros and cons of mobile alarm systems in Kenya.
4. Develop through improvement at least one of the mobile alarm system in Kenya.
5. To investigate use of emerging technologies and their impact on mobile security system performance.
1.5 Hypothesis
1. Mobile alarms are not user friendly.
2. Few firms will be fitted with mobile security system due to cost.
3. Convectional mobile alarms are better than emerging alarms with cutting edge technology

1.6 Scope of the project
This project is worked on with the probability that people will soon adapt this approach of mobile alarm systems that are more effective and would be easier to integrate easily when future installments of a GPS system are put in place for those willing to go the extra mile as it may reduce insurance premiums. The ignition switch has also been wired through the alarm to breakdown in case of any attempt of theft hence rendering the mobile security system useless if any attempt to steal is made unless the owner disarms it.
CHAPTER TWO: LITERATURE REVIEW

2.0 INTRODUCTION
In this chapter, we will discuss about the information found by study and research that is critical and have an important value in the contribution of the whole project. It also gives some basic knowledge or theoretical base and is used as a foundation to successfully achieve the main objectives. Most of the literatures are from the related articles, internet, books and previous works of the same fields. These literatures are then compiled and used as a guidance to the work of this project.

This project is focused on mobile alarm security system. It will use an alarm, mobile, some sensors and an automatic immobilizer connected to the doors of the building. The early transistor based alarms, unfortunately, were extremely sensitive to electrical disturbances such as radiation, electrical storms and electrical disturbance which would destroy the circuit completely. Whichever alarm build, the circuit board and switches must be protected from the elements. Without the terminal blocks, the board is small. Ideally, try to fit the siren away from the alarm so as to avoid thief’s who can locate the wiring easily, also try to avoid wiring the alarm to the horn as it will just be too obvious.

2.2.1 POWER SUPPLY SECTION
This section would be providing power to the whole system. The 240v Ac will be rectified, filtered and then regulated to the required 12v Dc voltage.

2.2.2 TIMER
The timer will be providing the time for switching the relay and also directing the detector phone and disconnecting it. Timer A will be providing a later so that the relay will remain connected until you reset it.
2.2.3 RELAY
The relay is used to switch the alarm and the security light. The relay is used because it is used to switch high voltages using small voltages.

2.2.4 NORMALLY CLOSED SWITCH
This is a switch whereby when an intruder steps on it, the intruder will have activated the system hence the alarm and light will be activated.

2.2.5 SIREN
The siren will be used to provide sound which will send away the intruder or to alert the owner that there is an intruder in the firm.

2.2.6 THE RESET SWITCH
This is a switch that will be used by the owner of the system to reset the system when the alarm has gone on or when the matter has been solved by checking what had happened.

2.3 SPECIFICATION
The system will require the following specification.

240v AC power
Current of 1 Ampere
Regulated voltage of 12v dc

The system will require a transformer of 240v/12v 60/50Hz 1 Ampere. A speaker of 8.2 0.5w and a relay of 12v dc and a maximum of 30v dc which will switch on by 1 Ampere and a maximum of 10 Amperes.

24 THEORY OF THE PROJECT
The project will be including the power supply section where the step down of voltage will be done and then rectified, filtered and finally regulated to the required voltage. In the project there will be utilization of relays, use of timers and siren as also the switches.

2.4.1 POWER SUPPLY
The system will be using a regulated power supply. Regulated power is that dc supply whose terminal voltage remains almost constant regardless of the amount of current drawn from it.
The power supply consists of four stages.

### 2.4.1.1 Transformer
Its work will be to step down the ac supply voltage to suit the requirement of the solid-state electronic devices and circuit fed by the Dc power supply. It also provides isolation from the supply line.

### 2.4.1.2 Rectifiers
It is a circuit which employs one or more diodes to connect ac voltages into pulsating dc voltages.

The types of rectifiers are:

**Half-wave rectifier**
It uses one diode during the positive half-cycle of the input ac voltage. The diode is forward-biased (on) and conducts during the negative input half-cycle. The diode is reverse-biased (off) and so does not conduct. The negative input half-cycle is suppressed, that is, it is not utilized for delivering power to the load. The output is not a steady dc but only a pulsating dc wave having a ripple frequency equal to that of the voltage frequency.

**Full-wave rectifier**
It requires 4 diodes or 2 diodes. Both half-cycles of the input are utilized with the help of two diodes working alternatively for full-wave use of a transformer is essential.

2.4.1.3 Filters
The main function of a filter circuit is to minimize the ripple contact in the rectifier output. As output of various rectifiers’ circuit is pulsating, it has a dc value and some ac components called Ripples. This type of output is not useful for driving sophisticated electronic circuits required a very steady Dc output that approaches the............

The types of filters circuits
Series capacitor filters.
L.C filters (or L-type).
R-L-C filters.
Series inductor filters.
R.C filters.

2.4.1.4 Voltage Regulators
Its main function is to keep the terminal voltage of the Dc supply constant even when the Ac input voltage to the transformer varies or when the load varies.

The types of voltage regulators are:
Fixed positive linear voltage regulator.
Fixed negative linear voltage regulator.
Adjustable positive linear voltage regulator.
Adjustable negative linear voltage regulator.

2.4.2 RELAY
A relay is an electronic switch that opens and closes under the control of another electronic circuit. In the original form the switch is operated by an electromagnet to open or close one or many set of contacts.

The types of relays include:
2.4.2.1 Normally open (NO)
Contacts connect the circuit when the relay is activated; the circuit is disconnected when the relay is inactive. It is called FORM A contact or “make” contact.

2.4.2.2 Normally closed (NC)
Contacts disconnect the circuit when the relay is activated; the circuit is connected when the relay is inactive. It also called FORM B contact or “Break” contacts.

2.4.2.3 Change-over or Double-Throw Contacts control two circuits, one normally open contact and one normally closed contact with a common terminal. It is also called FORM C contact or “Transfer” contact. For this type of contact utilizes a “make” before “break” functionally then it is called a FORM D contact.

2.4.2.4 Buchhozz relay
It is a safety device sensing the accumulation of gas in large oil-filled transformers, which will alarm on slow accumulation of gas or shut down the transformer if gas is produced rapidly in the transformer oil.

2.4.2.5 Polarized relay
It is placed the armature between the poles of a permanent magnet to increase the sensitivity. Polarized relays were used in the middle 20th century telephone exchange to detect faint pulses and correct telegraphic distortion. The poles were on screws, so a technician could first adjust them for maximum sensitivity and then apply a bias spring to set critical current that would operate the relay.

2.4.3 TIMER
The timer is a 555 timer IC, which was introduced first in 1971 by a Signatic Corporation as the SE555/NE555 and was called the IC Timer machine.

Timers rely upon an external capacitor to determine the off-on time intervals of the output pulses. To determine the switching on and off time will be depending on the charging and the discharging of the capacitor through the resistor.

\[ t = R \times C \]

Time (t) R= Resistance and C=Capacitance
The pin determination for the 555 timer IC is as follows:

Pin 1 (Ground)

Most-negative supply potential of the device which is normally connected to circuit common (ground) when operated from positive supply voltages.

Pin 2 (Trigger)

It is in the input to the lower comparator and is used to set the latch, which in turn causes the output to go high. This is the beginning of the timing sequence in monostable operation.

Pin 3 (Output)

The output of the 555 comes from a high current totem pole stage made up of transistors. Provide driver for source-type load and then Darlington ‘connection’ provides a high state output voltage about 1.7 volts less than the positive supply level used. The output voltage available at this pin is approximately equal to the voltage applied to pin 8 minus 1.7 v.

Pin 4 (Reset)

This pin is also used to reset the latch and return the output to a low state. The reset voltage threshold level is 0.7 volts and a sink current of 0.1MA from this pin is required to reset the device.

Pin 5 (Control voltage)

This pin allows direct access to the 2/3 voltage divider point, the reference level for the upper ‘corporation’ It also allows indirect access to the lower comparator.

Pin 6 (Threshold)

This is one input to the upper comparator (the other being pin 5) and is used to reset the latter which causes the output to go low.

Pin 7 (Discharge)

This pin is connected to the open collector of a NPN transistor, the emitter of which goes to ground so that when the transistor is turned on pin 7 is effectively shorted to ground.

Pin 8 (Positive)

The positive pin is also referred to as vcc. It is the positive supply voltage terminal of the 555 timer IC, supply voltage operating range for the 555 7.5+4.5 volts minimum to positive 16 volts maximum and it is specified for operation between positive 5 volts and + 15 volts.

The types basically for the 555 timers are:
2.4.4 Switch
There are a number of types of switches. These are:

1. The normally open switch
This is a switch which goes high when the terminals are connected together but it remains open.

2.4.4.2 The normally closed switch
This is a switch whose contacts are connected and when the terminals have been broken then it will activate a circuit.

2.4.5 SIREN
A siren is a circuit which uses the 555 timer to produce a high frequency by using a speaker, the output of high frequency will be vibrating the speaker at high frequency hence producing a very sharply sound.

2.5 DATA COLLECTION METHODS
Primary data connection

- Data was collected though Interviews using structured and unstructured questionnaires. Questionnaires were designed and given to the intended interviewees. They gave their response according to the questions.
- Interviews.
This was a one on one conversation between the interviewer and the interviewee. Questions were asked orally and the respondents gave their feedback.

Secondary data collection

- Information from the journals.
  This included books and magazines written under the same title. They were of different authors.
- Information from the internet.
  This included various sites under the same title.
CHAPTER 3: METHODOLOGY

2.2.1 POWER SUPPLY SECTION
This section would be providing power to the whole system. The 240v Ac will be rectified, filtered and then regulated to the required 12v Dc voltage.
2.2.2 TIMER
The timer will be providing the time for switching the relay and also directing the detector phone and disconnecting it. Timer A will be providing a later so that the relay will remain connected until you reset it.

2.2.3 RELAY
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2.2.4 NORMALLY CLOSED SWITCH
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2.2.5 SIREN
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2.2.6 THE RESET SWITCH
This is a switch that will be used by the owner of the system to reset the system when the alarm has gone on or when the matter has been solved by checking what had happened.
First check that the building is secure and that the green LED is lit. Then move SW1 to the “set” position. The LED will light. You now have about 30 seconds, leave the building. When you return and open the door- the buzzer will sound. You then have about 30 seconds to move SW1 to the “off” position. If you fail to do so, the relay will energize and the siren will sound.
The maximum length of time the siren will sound is not fixed. The 15 min cut-off timer only starts to run when the normally closed loop has been restored. While the loop remains open, the siren will continue to sound.

If you want your siren to switch may be after 15 min, all that is required is a simple modification to trigger circuit. Then the cut-off timer will start to run the moment the alarm is activated. And the siren will stop after 15 minutes regardless of the state of the loop.

Because of manufacturing tolerances, the precise length of any delay depends on the characteristics of the actual components you have use in the circuit. But by altering the values of R3, R6 & R9 you can adjust the exit, entry and bell cut off times to suit your requirement. Increasing the values increases the time and vice versa.

3.0 HARDWARE DESIGN AND CONSTRUCTION
The hardware part will be consisting of siren circuit, mobile control unit, switching circuit and a power supply.

3.1 DESIGN AND CONSTRUCTION OF THE SIREN CIRCUIT
The siren will be using an Astable 555 timer to provide a high frequency output to the speaker.

The frequency of pulses generated will be depending upon the RC network values.

\[
F = \frac{1}{0.693 \times C \times (R1+2R2)}
\]

R1 and R2 are resistors in Ohms.
C is capacitor in farads

Time interval in relation to frequency

\[
\text{Freq (Hz)} = \frac{1}{\text{time (t)}} \quad \text{or} \quad \text{T}=\frac{1}{\text{freq (Hz)}}
\]

The on and off portion of the high and low output depends upon the values of R1 and R2 and the capacitance

Duty cycle (D) = \frac{\text{t1}}{\text{t}} = \frac{\text{R1+R2}}{(\text{R1+2R2})}

\[
t1 = 0.693(R1+R2) \times C
\]

\[
t2 = 0.693(R2 \times C)
\]
Duty factor

It is the ratio of high time to the ratio of high and low time

\[
\text{High} \quad \frac{t1}{t3} \quad \text{High + Low}
\]

Pulse repetition freq (PRF)

\[
\text{PRF} = \frac{1}{T3} = \frac{1}{T1 + T2}
\]

Taking high period to be one second and low time to be 0.5 second

\[
\text{PRF} = \frac{1}{T3} = \frac{1}{T1 + T2} = \frac{1}{1 + 0.5} = 0.66
\]

Freq = \(\frac{1}{T} = \frac{1}{1.5} = 0.66\text{Hz}\)

Freq = \(\frac{1}{0.693C} (R1 + 2R2)\)

Using R2 as a variable resistor (VR) by varying the two resistors and calculate for the capacitor.

Taking R1 to be fixed 2.2 kHz and varying VR2.

Freq \(\frac{1}{0.693C} (R1 + 2VR2)\)

Taking VR2 to maximum 50kOhms

Freq = 0.3 kHz

0.3 kHz = \(\frac{1}{0.693C} (2.2K + 2(50KOhm))\)

\[
C = \frac{1}{(0.3 \times 0.693 \times 102K)} \quad C = 47.06\text{micfarad}
\]
Preferred value=47 microfarad  C1=47microfarad

The output frequency is face to the other 555 timer. With a variable resistor VR2 and a fixed resistor R2 and a capacitor

Freq = 1/0.693C*(R2+2VR2)

Freq is from the first block.

Freq=0.3Hz

The second block should increase the freq by multiple of 5.

Frequency output = 0.3Hz * 5 = 1.5 Hz so as to drive the speaker.

Freq = 1.5 kHz

Freq=1.5 kHz = 1/0.693C*(2.2K+2100K)

Taking variable capacitor to maximum. 100Kohms and a affixed resistor which protect RJ to be 2.2 ohms

C=1/ (1.5*0.693*202K)

C = 4.762microfarads

Preferred value 4.7 microfarad

C=4.7 microfarad
3.1.1 THE CIRCUIT DIAGRAM OF THE CONSTRUCTED SIREN:
DESIGN AND CONSTRUCTION OF MOBILE SWITCHING CIRCUIT

The circuit will be using SSS timer which is a monostable (one short). It switches to one state for time duration of 2 second then back to its state until reset again. It consists of two resistors R1 and R2 and a capacitor as shown.
Voltage across the transistor = 0.07
Current across the transistor = 0.259 microampere
D1 is a fusing diode which protects the transistor from the 12v dc supply and when the relay is switching

THE DESIGN AND CONSTRUCTION OF SWITCHING CONTROL CIRCUIT

The circuit employs the NAND gates which are provided by the IC 4011
It operates as shown:
The circuit will be using 4 NAND gates. A set switch and a closed loop switch will determine the output of the alarm/mobile control.

The table below shows the operation required to be performed by the circuit:

**TABLE1:** When NC Normal closed switch is high (open)

<table>
<thead>
<tr>
<th>NC</th>
<th>SET SWITCH</th>
<th>MOBILE CONTROLL/ALARM $LIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPEN</td>
<td>SET(LOW)</td>
<td>HIGH(ON)</td>
</tr>
<tr>
<td>OPEN</td>
<td>OFF()</td>
<td>LOW(OFF)</td>
</tr>
</tbody>
</table>
TABLE 2: NC is closed (LOW)

<table>
<thead>
<tr>
<th>NC</th>
<th>SET SWITCH</th>
<th>ALARM/MOBILE PHONE/LIGHTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLOSED(LOW)</td>
<td>SET ON(LOW)</td>
<td>HIGH(ON)</td>
</tr>
<tr>
<td>CLOSED(LOW)</td>
<td>OFF(HIGH)</td>
<td>LOW(OFF)</td>
</tr>
</tbody>
</table>

The switching control circuit is as shown using the NAND gate inside the 4011

R1 and R2 are used to protect the LED

LED IF = 10mA VF = 2V \[ I = \frac{V}{R} \quad R = \frac{V}{I} = \frac{12V}{10*10^{-3}} = 1.200k \text{ohms} \]

R1 & R5 = 1k Ohm

To determine the exit time and the entry time using the resistor R3 and R6 respectively

The exit time
Taking capacitor C2 = 100uF,

Exit time = 22.9 seconds

Time (second) = 0.693(R1+R2) * C

Taking C2 = 100uF,

(R1+R2) = t1/0.693 * C

(R1+R2) = 22.9/0.693 * 100uF

(R1+R2) = 330447.33 = 330.45Kilo Ohms

Taking R2 = 1 Ohm,

R1 = 330.45-1kOhm = 329.447kilo Ohm

R1 preferred value = 330 k Ohms

R2 = 1kOhms

C2 = 100uF

The entry time

It is determined by the resistor R7 & R6 and C5

R7//R6

T2 = 0.693(R + C5)

T2 = 0.069 seconds

C5 = 100uF

0.069 = 0.693 (R7R6/R7+R7)*100uF

(0.069/0.93 * 10^-5) = R7R6/R7+R6

995.671 = R7R6/R7+R6

Taking R7 = R2 = 1 kilo Ohm,

995.671 = 1KR6/1K + R6

(1k Ohm + R6)995.671 = 1KR6

995670.996Ohms +995.671R6 = 1 * 10^3R6
$995670999 \text{Ohms} = R_6(4.329)$

$4.329R_6 = 99567.0996$

$R_6 = 99567.0996/4.329$

$R_6 = 99569.0996/4.329$

$R_6 = 230k\text{Ohms}$

$R_6$ used 330 Ohms

$R_7 = 1 \text{K} R_6 = 330 \text{Ohms}$

Reset time is determined by the resistor $R_5$ and capacitor $C_3$

The alarm will reset after 11 minutes after been activated to achieve this, we use resistor $R_9$ to vary the time and capacitor $C_3$ and resistor $R_8$

Time (seconds) = $0.693(R_8 + R_9)C$

Taking $C = 220\mu\text{F}$

$(R_8+R_9) = 660/0.693*220\mu\text{F}$

$R_8+R_9 = 4.329*10^6$

Taking $R_8$ to be 1kilo Ohm,

$R_9 = 4.328\text{m Ohms}$

$R_8 = 1k \text{Ohm}$ and $R_9 = 4.3\text{M Ohms}$.

To find the biasing, resistor $R_2$ and $R_{10}$, the resistor voltage = 0.07V

The resistor current = 26mA

$R_2$ and $R_{10}$

$I = \frac{V}{R}$

$R = \frac{V}{I} \quad R = 0.07/26\text{mA}$

$R_2 = 2692.31$

$R_2, R_{10} = 2.692k \text{Ohms}$

$R_2$ and $R_{10}$ preferred value is 2.7k Ohms

$R_2$ and $R_{10} = 2.7k \text{Ohms}$
4.0 CHAPTER FOUR

4.1 DESIGN

4.1.1 THE HARDWARE SUBSYSTEMS
The project included the power supply section where the step down of voltage was done and then rectified, filtered and finally regulated to the required voltage. In the project there will be utilization of relays, use of timers and siren as also the switches.

4.1.1 BUDGET ESTIMATE

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>AMOUNT (KSHS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bread Board</td>
<td>1</td>
<td>600</td>
</tr>
<tr>
<td>1k resistor</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>2k7 ohm resistor</td>
<td>4</td>
<td>40</td>
</tr>
<tr>
<td>320k resistor</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>4m7 resistor</td>
<td>1</td>
<td>60</td>
</tr>
<tr>
<td>Transistors BC547</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Diodes 1N4148</td>
<td>6</td>
<td>60</td>
</tr>
<tr>
<td>Ceramic capacitor 63v 0.1 uF</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>220uF capacitors</td>
<td>2</td>
<td>20</td>
</tr>
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<td>100uF capacitor</td>
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<tr>
<td>Item</td>
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<td>Relay</td>
<td>2</td>
<td>500</td>
</tr>
<tr>
<td>Circuit Board</td>
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<td>200</td>
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<tr>
<td>Buzzer</td>
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<td>300</td>
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<td>HEF 4011 IC</td>
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<td>70</td>
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<td>555 timer</td>
<td>3</td>
<td>150</td>
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<tr>
<td>Soldering wire</td>
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<td>200</td>
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<tr>
<td>Soldering gun</td>
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<td>300</td>
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<tr>
<td>12v power adaptor</td>
<td>1</td>
<td>350</td>
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<td>TOTAL</td>
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### 4.1.3 SCHEDULE

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<th>Jan</th>
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<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
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<tbody>
<tr>
<td>Proposal writing and submission</td>
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<td>Implementation</td>
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CHAPTER 5: TESTING

RESULTS

After the project was completed, the testing was done to all parts. Testing was done in module way. Each individual part was working well but when I combined all modules, it failed due to the problem which occurred in my IC (it was overheating) and also the circuit went through short. Therefore the test I carried was based on individual modules (before combining all modules). The testing tools provided were:

- Voltmeter (digital)
- Oscilloscope (to measure frequency)

Voltmeter was used to measure the output voltages and the triggering voltages and also the resistance and current across the components.

The oscilloscope was used to measure the frequency of switching and also the frequency used to drive the speaker.

5.1 TESTING OF SWITCHING CIRCUIT

The switching circuit after construction was found running properly. The switching circuit was supposed to provide the switching of the two relays. Also, provide a delay in switching. The two relays was supposed to: one to switch on the lights and another one to switch the mobile phone circuit and the alarm (siren)
The time delay was a delay from when the switch is moved to set position. The circuit should provide a delay time for intended person to close the door or connect the normally close switch. The testing results are as shown:

5.2 TESTING OF MOBILE CONTROL CIRCUIT

After the construction of the mobile circuit, it was found to provide the switching time delay as follows:

- When triggered, hold time = 5 seconds
- Ad switches off
- Without any delay = 0 seconds

The transistor switching voltage is 0.83V. This voltage is required to switch on the transistor so as to trigger the relay.
5.3 TESTING OF THE SIREN CIRCUIT

After the construction of the siren circuit, it was found to be working. The sound from the siren was heard at maximum of 30 meters but for a clear sound, it was heard at 10 meters radius.

<table>
<thead>
<tr>
<th>RESET/SET SWITCH POSITION</th>
<th>NORMAL CLOSED SWITCH</th>
<th>TIME DELAY</th>
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<tr>
<td>RESET TO SET</td>
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<td>20 SECONDS</td>
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<tr>
<td>SET TO RESET</td>
<td>NOT CLOSED(OPEN)</td>
<td>0 SECOND</td>
</tr>
<tr>
<td>SET TO RESET</td>
<td>CLOSED</td>
<td>0 SECOND</td>
</tr>
<tr>
<td>RESET TO SET</td>
<td>CLOSED</td>
<td>20 SECOND</td>
</tr>
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</table>

The switching voltage required to switch on the transistor, after measuring using the voltmeter, it was found to be as follows:

- Voltage to switch transistor to light the bulb = 0.8V
- Voltage to switch transistor to trigger relay to connect the siren/mobile phone = 0.8V
- The voltage across the normally closed switch is measured and found to be 9.8V
CHAPTER 6: CONCLUSION

The project has helped me a lot in practical. I have come to learn that it requires both theory and practices to be a computer technical person. I am confident that I can be able to put my theory into practical use in order to come up with working system in the society. Furthermore, I have gained skills in fault finding. Therefore it is my pleasure that I wouldn’t be idle after this institution.

PROBLEM ENCOUNTERED

During the construction of this project, it was a tedious exercise. I encountered problems as I would not manage to obtain the exact values of the components that the project was designed for. Hence the components close to the exact values were used thus causing some changes in the test results for example the delay of switching of the two relay was supposed to be 30 seconds but during measurement, it was found to be 20 seconds. Some components were not functioning well. For example when I combined the whole modules, the IC overheated thus giving undesired results.

CHOICE OF COMPONENTS

Present day technology has provided numerous types of components. The choice of components depends mainly on applications and circumstances. For example the transistors used must be of highly switching. They should not fail to work because they provide switching of the relays.

The following factors should be considered in the selection of the components. The relative importance of each factor depends on the applications.

- **Accuracy**: The components used in the system should be of high accuracy.
- **Frequency response**: The transistor and capacity used in this circuit has wide of switching voltage. While the capacitor should provide a wide of frequency for the siren circuit.
- **Range**: The components used are in wide range which means in case of failure of the original components, an equivalent components may be available in market for replacement.
- **Sensitivity**: the components used are very sensitive to variation in temperature and frequency for example the IC 4011 and the transistor.

Reliability: The components used are reliable and can withstand small changes in the environmental changes.
Ease of application: the components used are easily applied in this type of security system

**RECOMMENDATION**
If an attempt is made to design such a system in future, it is recommended that the system should be made to operate automatically with or without the help of the computer using the timer IC 4000 or using the programmed DIC DIC1684A so as to make the system more efficient.

**REFERENCE**

<table>
<thead>
<tr>
<th>BOOK TITLE</th>
<th>AUTHOR</th>
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<tbody>
<tr>
<td>ELEMENTS OF ELECTRONICS</td>
<td>F.A WILSON</td>
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<td>ELECTRONIC COMMUNICATION SYSTEM</td>
<td>WILLIAM STANLY</td>
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<td>MODERN ELECTRONIC AND INTEGRATED CIRCUIT</td>
<td>B.J STANLEY</td>
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<td>ELECTRONIC LEVEL II</td>
<td>D.C GREEN</td>
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