DESIGN AND CONSTRUCTION OF CAR- DOOR ALARM WITH REMOTE CONTROL

BY

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DECLARATION

I Jibril Dauda Madugu with matric no 2001/12026EE declares that the work (Design and Construction of Car Security System with Remote Control) was done by me and has never been presented elsewhere for the award of a degree and under the supervisor of Mr. J.G. Ambafi also hereby relinquish the copyright to the Federal University of Technology Minna.

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External Examiner	Date and Signature

DEDICATION

This project is dedicated to my Late Father ALHAJI JIBRIL MADUGU, my Mother HAJIYA AISHATU JIBRIL and my beloved wife SUMAYYAH NUHU D.

ACKNOWLEDGEMENT

Glory is to Allah the primal Originator and sustainer of all creation, whose guidance from His divine messages through prophet Muhammad (S.A.W) led me to the path of true.

I will like to acknowledge the effort and support of my guardian Mal Nuhu Sani Imam and my wife Sumayyah Nuhu for their financial and moral support to my academic programme, may Almighty Allah reward them abundantly.

I sincerely appreciate the effort of my supervisor, Mr. J.G. Ambafi, for his time, suggestion and careful scrutiny of this project work. I will like to thank my HOD, Dr. Y.A. ADEDIRAN and the lectures of the department. My big thanks to all my friends: AbdulGaffar, Kasim, Faruk, Ismaila, Shabaz, Aliyu, all Kandaherians Ssulaiman I A Rabiu isa Yahaya M S, all my childhood friends, others too numerous to mention for their advise, support and prayers toward the success of my academic program.

ABSTRACT

This project is concerned with the design and construction of car-door alarm with remote control, which provide a reliable security lock for our cars.

The project is composed of transmitter and receiver units, the receiver consist of sensor, an amplifier, triggering circuit, Monostable and alarm circuit. The transmitter is compactable with the receiver at close range.

Several security measures were considered and the probability of an intruder getting access to remote control unit has been checkmated.

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CHAPTER ONE

1.1 GENERAL INTRODUCTION

The need for an electronic lock with alarm has become imperative for security in our nation because of the rate of theft, there has been a high demand for a reliable security system that serves as monitor for unauthorized users.

Before now, security was provided through various means such as padlock. door lock with keys, were inform of hardware, this later proved to be inadequate because of the great number of duplicate keys and master keys that can be used to easily unlock any door lock or padlocks.

A period of extra-ordinary growth in the development of the electronic industry began whit the application of security codes, where it was suggested to key in a code or codes remotely, the locking and unlocking end, the codes would be decoded and the system incorporated with an opening alarm system which is activated when an intruder is trying to access the door forcefully. On opening, the door triggers on a loud audio alarm, which alert the owner.

The only person with the infra red key (Remote Control) get access to the door. deactivate the alarm system, before opening the door, we stand at the threshold of a new era in the long history of security systems.

1.2 AIMS AND OBJECTIVES

The aim of this project is to Design and Construct a Car-door alarm with Remote control which provide a reliable security lock for our cars in particular and door in general. Also as a means of correcting the inefficiency of the earlier mentioned devices.

1.3 METHODOLODY

The design is composed of Two Units, The Transmitter and The Receiver Units; the Transmitter is the Remote control (The Key) which is the generator.

The Receiver consist of six sub-units

The sensor, signal amplifier, the triggering circuit, the monostable stage, the gate switch and alarm circuit unit. Each of these stages is to designed separately.

This project is build using Integrated Circuit (IC) and discrete components.

The circuit diagram of the transmitter has a standard 555 IC used as Astable Mutltivibrator circuit having the values of the timing components (R_1, R_2 and C_1) chosen to give a suitable operating frequency. The output waveform of the 555 Astable is to be connected to the PNP transistor, which will drive the Infrared (IR) LED.

Figure 1.0 is the block circuit diagram of the transmitter and the receiver (detector) circuit.

Infrared (IR) signal sent by the transmitter are received be the infrared detector (phototransistor) which serves as a sensor.

The infrared (IR) signals are very weak, these require amplification. So the signals are to be amplified by the amplifier stage comprising transistor T_3 and T_4. The Amplified signals are fed to the triggering circuit comprising transistor T_5, T_6 and T_7 to trigger the Monostable multi-vibrator wired around IC_2. IC_2 (555) is triggered at Pin 2 its output Pin 3 goes high for 5 to 10 seconds. Time delay can be set by a $1M\Omega$ pre-settable variable resistor (V.R).

During this time transistor T_8 conducts to keep reset Pin 4 of Astable Multi-vibrator IC_3 low. Then the alarm gets disabled.

Within the present time period if somebody opens the door, the Normally open switch is open (S_2). Pin 4 of IC_3 goes low due to the condition of the transistor T_8 and hence the alarm is not activated.

After completion of the preset time period, if somebody opens any of the doors. The Normally open switch S_2 also gets opened and Pin 4 of IC_3 goes high due to non-conduction of transistor T_8 and hence the alarm is activated.

The actual use of the remote control is that you can disable the alarm while you open the door, which last for about 5 to 10 seconds time delay. After this time duration completes whoever tries to open the door, the alarm will sound.

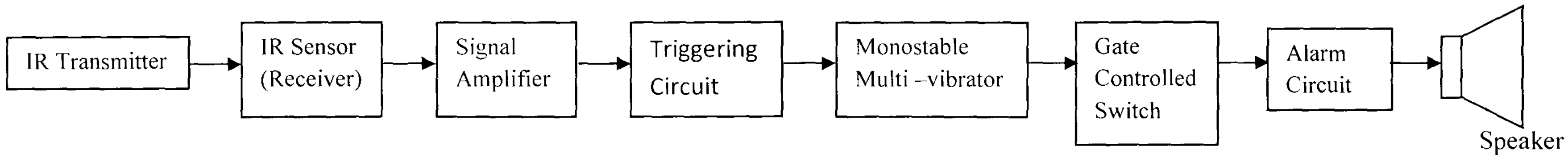


Figure 1.1 Block diagram of door-opening alarm using IR remote control

CHAPTER TWO

2.1 LITERATURE REVIEW

Man has always had a tremendous quest for security from time to time. Man has always devised several means to ensure the security of his live and property. People have always been concerned with protecting their property from theft.

Initially, locks were considered to be items for the very wealthy ones as they were usually the only was that possesses assets which can be stolen such as; gold, diamond, e.t.c. usually they have hired guards for the job, but, due to human nature, it has been ineffective. They are susceptible to bribery or their Security Network can broken no matter how professional or trustworthy they are.

As time went by, ropes and cords were used in various ways to fasten doors and for other measures of security, then there was the wooden latch on the inside face of a door which would be lifted or drawn back from the outside by a cord passing through a hole in the door. To prevent opening of the door from outside, the cord must be pulled in. the search goes on for man to get perfect lock, this brought about some discoveries, which are highlighted below.

2.1.1 MECHANICAL LOCK

Various means were adopted to make the lock secure, there have been throughout the centuries only two mechanical principles by which security in key operated locks is obtained. One is by means of fixed obstruction to prevent wrong key from entering or turning in the lock. The other, which is superior, employs one or more movable detainer, which must be arranged in pre-selected position by the key before the bolt will move.

2.1.2 ELECTRONIC CODE LOCK

With the advent of technological advancements and the gain use of electronic security systems, electronic door hardware enables door to be lock and unlock by a peripheral device. The device may be a electronic push button, a motion sensor or metallic touch security, or may be an elaborate access control device such as card reader or digital keypad or infrared with a programmed computer system for its operation i.e. computer aided code lock.

2.1.3 ECONOMIC IMPORTANCE

The Design and construction of the locks reviewed above are relatively reliable and inexpensive if we have to estimate the cost and compare with the performance, it will be discovered that it cost virtually little to install it for the performance is tremendous and it makes locking simple yet effective.

Therefore, because of the near to perfection of most of these locks, they are gaining popularity in this era. It helps in reducing the cases of theft to the barest minimum and crime investigation easier for law enforcement agents.

CHAPTER THREE

3.0 INFRARED TRANSMITTER UNIT.

The pulse generator in figure 3.0 below is a circuit of a Remote control transmitter unit. Its working principle is very simple NE555IC, operating as Astable Multivibrator. At the instance of switching the power supply on, the voltage across capacitor C_1 is zero, the output is High and the infrared LED comes on. The voltage across C_1 immediately begins to rise, as it changes through the resistor R_1 and R_2 as the voltage across the C_1 reaches $2/3V_{cc}$ the internal transistor switch closes and C_1 discharges through R_2 and Pin 7 of the timer. The output Pin 3 goes Low and the infrared LED goes off.

The output remains low as the voltage across C_1 falls to $1/3V_{cc}$. At the instance the internal transistor switch opens. The output goes High once again, the infrared LED and the capacitor charges through R_1 and R_2 using the values of components in the circuit diagram.

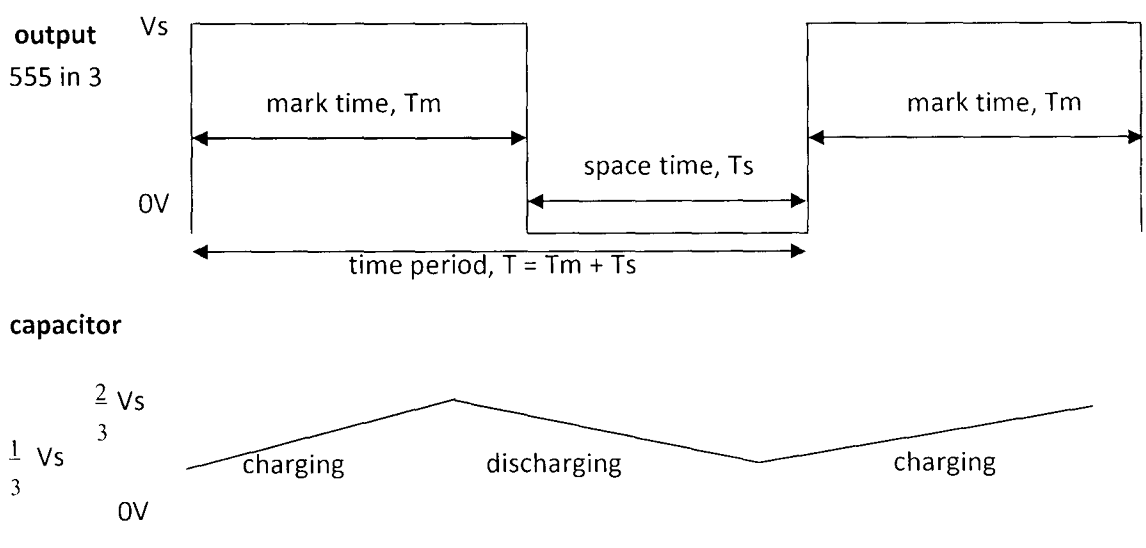
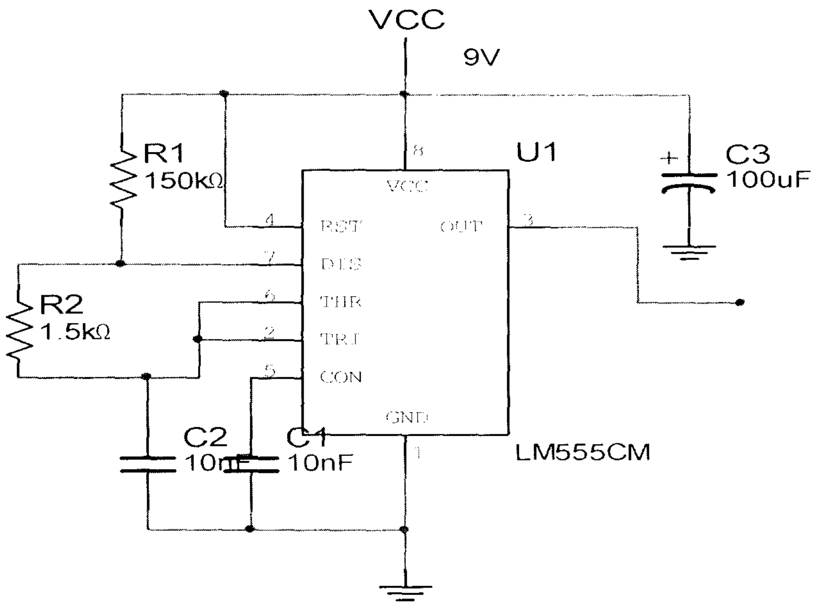


Fig3.0



The resistor R_1, R_2 and capacitor C_1 are responsible for determining the frequency of the transmitter

CALCULATION

T_1 (mark) $= 0.693C_1 (R_1 + R_2)$

$= 0.693 \times 0.01 \times 10^{-6} (150000 + 1500)$

$= 0.693 \times 0.01 \times 10^{-6} (151500)$

$= 1.049895 \times 10^{-3}$sec

$\simeq 1.049 \times 10^{-3}$

T_2 (space) $= 0.693 \times C_1R_1$

$= 0.693 \times 0.01 \times 10^{-6} \times 1500$

$$= 1.0395 \times 10^{-5} \text{sec}$$

$$T = T_1 + T_2$$

$$= 0.00106029$$

$$\simeq 0.001 \text{sec}$$

$$\text{The Frequency} = \frac{1}{T}$$

$$= \frac{1.4}{C1\,(R1 + R2)}$$

$$F = \frac{1}{0.001}$$

$$= 1\text{kHzk}$$

A NPN 2N4400 (T_1) drives the infrared is used at the output of NE555IC timer as a switch.

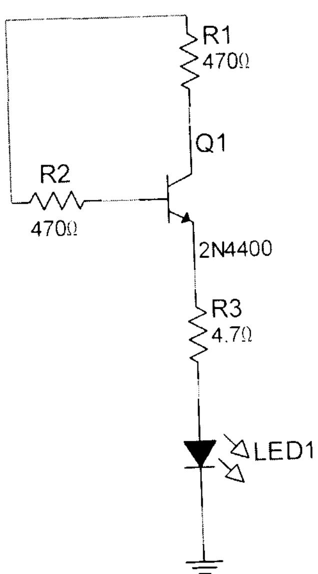


FIG3.0.1

In practice, it is best to calculate about 30% more current than we will need to guarantee our transistor switch is always saturated. In this case we will use 1.3mA. We must also select our voltage

Maximum current required = 100mA

Supply voltage = 9volts

$$R_1 = \frac{supply\ voltage}{(\frac{maximum\ current}{minimum\ life} \times 1.3)}$$

$$R_1 = \frac{9}{\frac{1}{1000} \times 1.3}$$

$$R_1 = \frac{9}{0.013} = 692.3\Omega$$

But 470Ω is used in the circuit

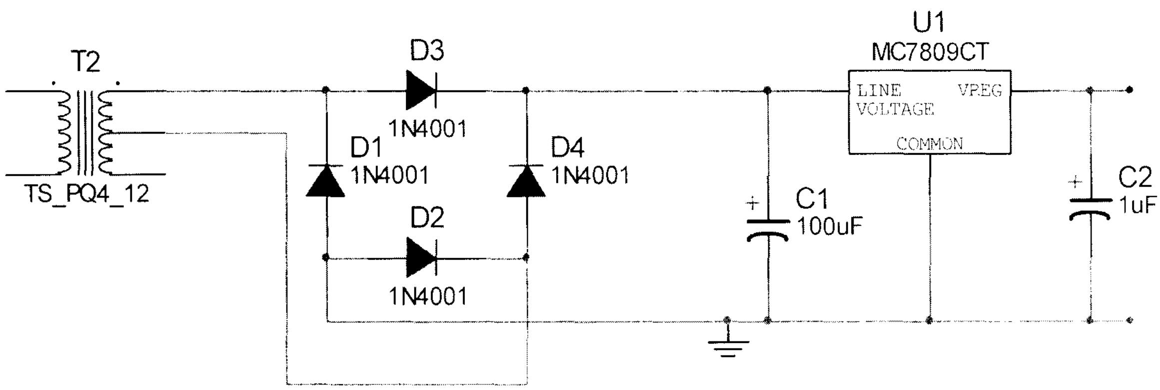
To turn on our transistor switch all that is needed is to short resistor R_1 to ground.

3.1 POWER SUPPLY UNIT

The power supply used for the project is a linear type making use of a step down transformer, rectifier, a filter capacitor and voltage regulations (9 and 12V).

The 9-volt and 12-volts were used as the positive voltage potential for the circuitry of the project. The supply is from the main delivering 220V AC, 50Hz. This is step down via a 220V – 12V step down transformer. From the secondary of the transformer, the AC 12V being supplied now sent through a full wave rectifier circuit comprised of four 1N4001 diodes. This DC (rectifier AC) is sent to 7809 and 7812 voltage regulators, to get the desired 9V and 12V for entire circuit.

A filtering capacitor C_1 (with value 2200µf) was connected between the rectifier and regulator to filter off the ripple accompanying the rectifier AC voltage. Also power LED was connect to supply circuit is shown below.



Legend

$D_1 - D_4$ 1N4001 Diode

C = 2200µf filtering capacitor

To determine the value of the filtering capacitor let dv be the ripple voltage for time dt, where dt depend on power supply frequency.

For rms voltage of 12V

$$V_{peak} = 12\sqrt{2}$$

$= \quad 16.97V$

Hence $\quad 1/C = dv/dt$

$C = dv/dt$

$= 10ms/3.4V$ (dt = 10ms for 50Hz)

$= 2941\mu f$

A preferred value of 2200µf was used. 7809 and 7812 voltage regulators were used to generate to 9V and 12V respectively.

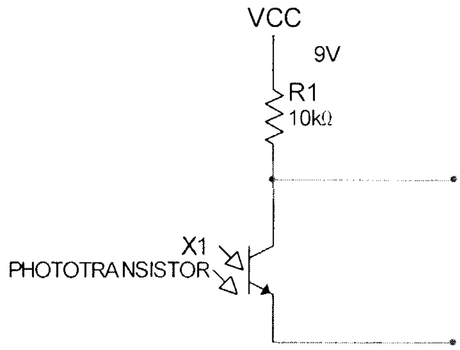
3.2. RECEIVER UNIT

3.2.1. SENSOR

The receiver units starts with an infrared detector which acts like some sorts at sensors. it detects the infrared beam from the transmitter and then current passes the signal to the receiving configuration. Figure 3.1 below shows the sensor detector (phototransistor) unit. The infrared detector is basically a phototransistor which reserves the infrared beam and has the capability of converting the infrared beam into its equivalent electrical signal value.

The Receiving configuration consist of one resistors of 10kohm, current limiting resistor

Figure 3.2



The base-emitter junction is usually left disconnected and high radiation is made to fall on the base-collector junction.

Hole-electron pairs are generated from the beam of the light, electrons attracted to the collector and holes to the emitter consisting a photoelectric current I_{PH} more or less proportion to the intensity of amplifier in the normal way and may be many times larger than the output current of a photodiode there is a leakage current I_O so that the collector current I_C i.e.

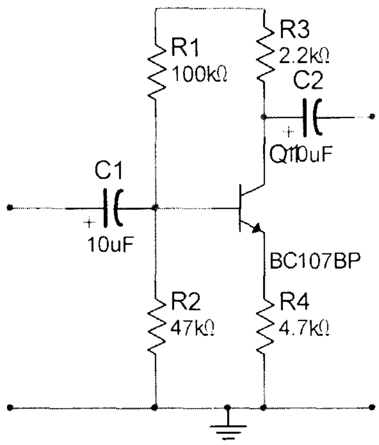
$$I_C = h_{fc}I_{ph} + I_O$$

3.3. SIGNAL AMPLIFIER

This circuit design consists of RC-couple two stage amplifier. The two stage RC – couple amplifier using the Common-Emitter (CE) configuration is shown in figure 3.2 below. The signal from the infrared detector is received by the amplifier which is amplified and passes it to the triggering circuit.

Resistor R_1 and R_2 are for biasing .

Fig 3.3



Parameters of the transistor

$RC = 2.2k\Omega$, $V_{CC} = 9V$, $V_{BE} = 0.7V$, $I_1 = 10I_B$

Base current $I_B = \frac{Ic}{\beta}$

$= \frac{1mA}{240}$

$= 4.2\mu A$

Current through R_1 and R_2 is

$I_1 = 10\ x\ I_B$

$= 10 \times 4.2mA$

$I_1 = 4.2 \times 10^{-5}A$

Now

$$I_1 = \frac{Vcc}{R1+R2}$$

$$R_1+R_2 = \frac{Vcc}{I1}$$

$$= \frac{9v}{4.2 \times 10^{-5}}$$

$$= 214285.7$$

$$R_1+R_2 = 214.3k\Omega$$

Applying Kirchhoff's voltage law to the collector side of the circuit, we get

$$V_{CC} = I_C R_C + V_{CE} + I_E R_E$$

Or $$V_{CC} = I_C R_C + V_{CE} + I_C R_E \qquad (I_C \approx I_E)$$

$$R_E = \frac{9 - 1 \times 10^{-3} \times 2.2 \times 10^{-3} - 2.2}{1 \times 10^{-3}}$$

$$R_E = \frac{9 - 2.2 - 2.2}{1 \times 10^{-3}}$$

$$R_E = \frac{4.6}{1 \times 10^{-3}}$$

$$R_E = 46000$$

$$R_E = 4.6k\Omega$$

But 4.7kΩ is used which is available at the commercial shops.

Voltage across R_2

But $V_2 = V_{BE} + V_{CE}$

$= 0.65 + 2.25$

$V_2 = 2.9V$

Therefore

$$2.9 = \frac{R2 \times 9}{R1+R2}$$

$$= \frac{R2 \times 9}{214.3k\Omega}$$

$$R_2 = \frac{2.9 \times 214.3k\Omega}{9}$$

$$R_2 = \frac{621470}{9}$$

$R_2 = 69052.5$

$R_2 = 69.0k\Omega$

$R_1 = 214.3K\Omega - R_2$

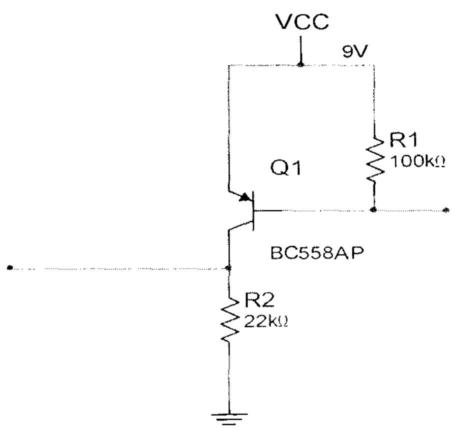
$R_1 = 145300\Omega$

3.4. TRIGGERING UNIT

3.4.1 TRIGGERING CIRCUIT

The triggering circuit consists of a switch Darlington pair and an edge triggering. Figure 3.3.1 shows the switch. PNP transistor is used to design the switch. When a transistor is used as a switch it must be either OFF or fully ON. In the fully ON state the voltage V_{CE} across the transistor is almost zero and the transistor is said to be saturated because it cannot pass any more collector current I_C.

Figure 3.4.1



The output device switched by the transistor is very small.

In the state: Power = $I_C \times V_{CE}$

But $I_C = 0$, so power is zero.

In the full ON state: Power = $I_C \times V_{CE}$

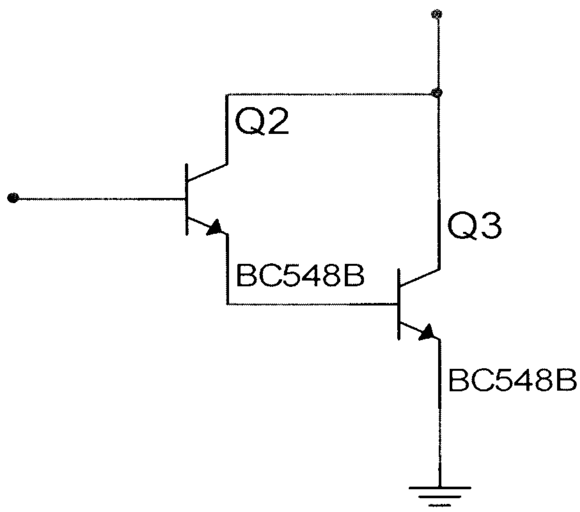
But $V_{CE} = 0$ (almost), so the power is very small.

This means the transistor should not become hot in use and you do not need to consider its maximum power rating.

The output is then fed to the Darlington pair NPN transistor which further amplifier the signal.

3.4.2 DARLINGTON PAIR

Figure 3.4.2 below is a NPN Darlington pair.



A Darlington pair essentially place one transistor as the common-collector load for another transistor, thus multiplying their individual current gains. Base current through the upper-left transistor is amplified through that transistor's emitter, which is directly connected in the base of the lower right transistor, where the current is again amplified. The overall current gain is as follows

$$A_I = (1 + \beta_1)(1 + \beta_2)$$

Where β_1 = Beta of first transistor

β_2 = Beta of second transistor

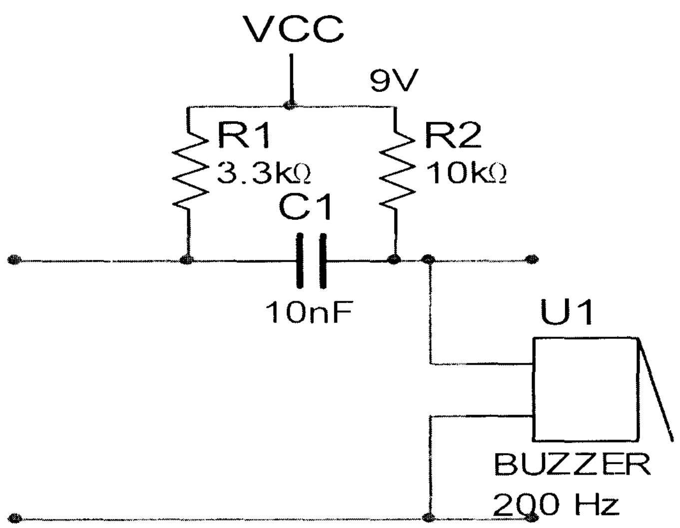
The consequence amplified signal is fed to the edge triggering.

If the triggering inputs is still less than $1/3V_S$ at the end of the time period the output will remain high until the trigger is greater than $1/3V_S$.

The situation can occur if from an ON-OFF switch or sensor.

The Monostable is made edge triggered responding only to changes of an input signal by connecting the trigger signal through a capacitor to the trigger input. The capacitor passed sudden changes (AC) but blocks a constant (DC) signal.

Figure 3.4.3 Show the edge triggering circuit



The edge triggering circuit triggered the Monostable multi-vibrator and at the same time on Piezo to sound for indication, that the security is disable, the sound in form of beep.

3.5 MONOSTABLE

A Monostable circuit produces a single output pulse when triggered. It is called a Monostable because it is stable in just one stage, output low. The output high state is temporary.

The duration of the pulse is called the time period (T) and this is determined by resistor R_1 and capacitor C_1.

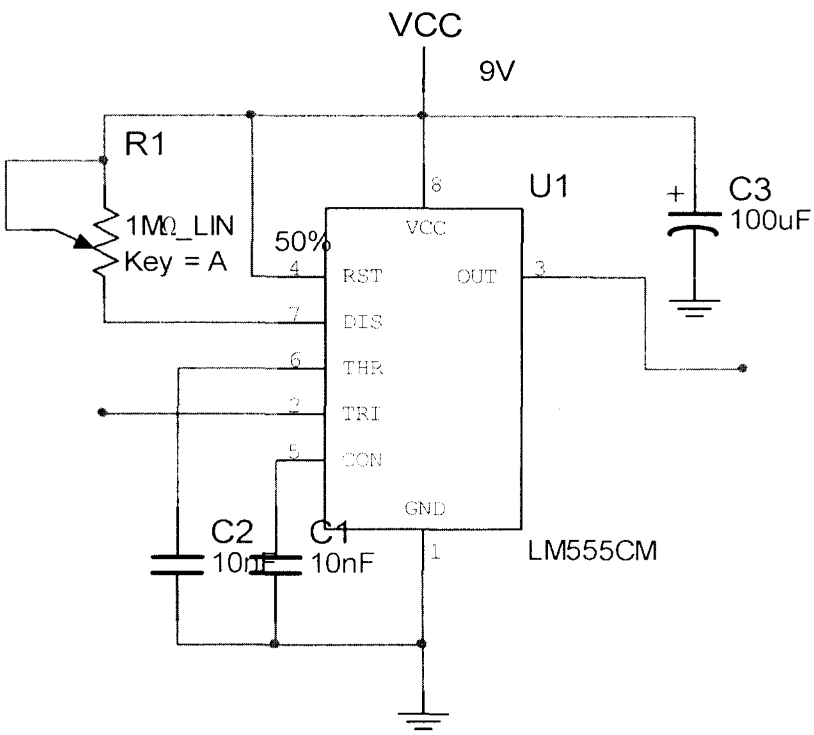
3.5.1 MONOSTABLE OPERATION

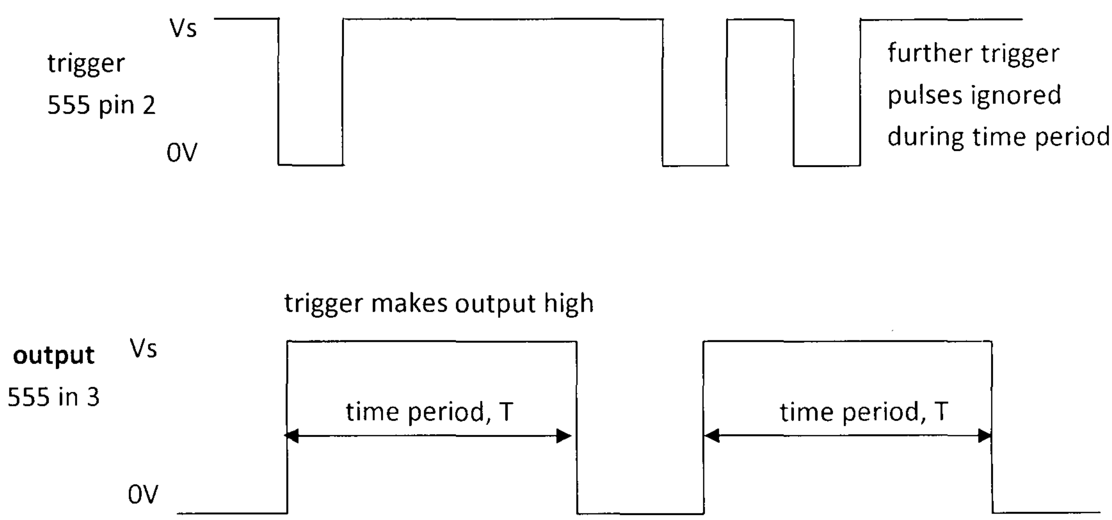
The timing period is triggered (started) when the trigger input (555 Pin 2) is less than $1/3V_S$, this makes the output high ($+V_S$) and the C_1 starts to charge through resistor R_1. Once the time period has started further trigger pulses are ignored.

The threshold input (Pin 6) monitors the voltage across C_1 and when this reaches $2/3V_{CC}$ the time period is over and the output becomes low. At the same time discharge (Pin 7) is connected to 0V discharging the capacitor ready for the next trigger.

Therefore the signal from the triggering circuit triggered the Monostable multi-vibrator unit which is delayed for about 5 to 10 seconds. The time delay is controlled by Resistor R_1

Fig 3.5 below show the circuit diagram of monostable multivibrator





The signal is passed through a diode 1N4148 with limiting resistor which switches the transistor

The duration of the pulse is called the time period (T) and this is determined by resistor R_1 and capacitor C_1.

Time period, $T = 1.1 \times R_1 \times C_1$

T = time period in seconds (s)

R_1 = resistance in ohms (Ω)

C_1 = capacitance in farads (f)

The maximum reliable time period is about 10 minutes

Time period, T for the above circuit diagram is

$$= 1.1 \times 1 \times 10^6 \times 10 \times 10^{-6}$$

$$= 1.1 \times 10^6 \times 10 \times 10^{-6}$$

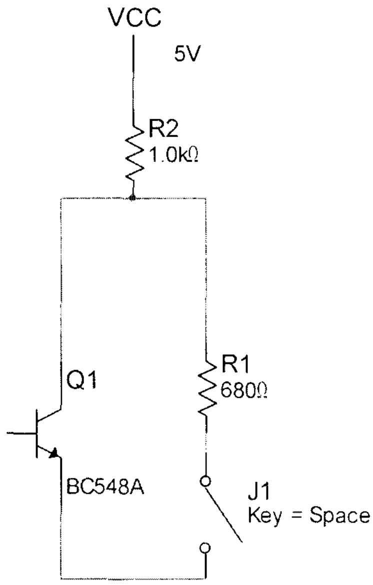
$$= 11sec$$

3.6. GATE SWITCH

The gate switch consist of a NPN common-emitter mode transistor. During the time delay of Monostable multi-vibrator for the transistor conducts to keep Reset Pin 4 of Astable multivibrator IC3 low.

The diagram below is a gate switch for the receiver unit

Figure 3.6 Circuit diagram of a gate circuit

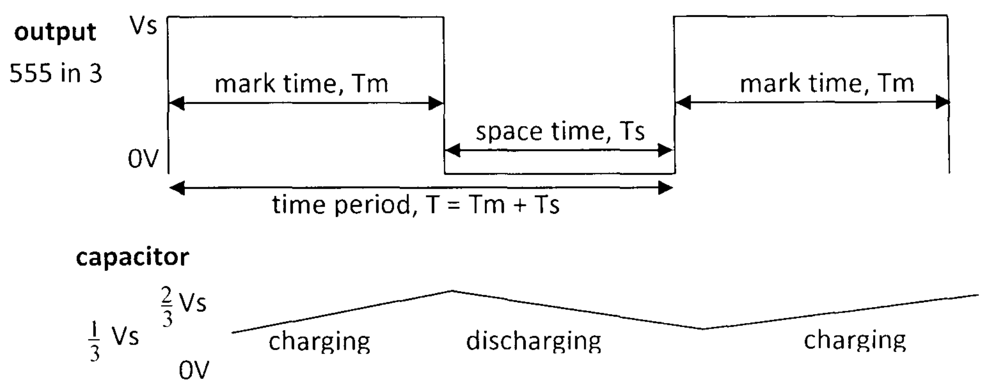


3.7. ALARM CIRCUIT

Figure 6.0 show the diagram of the alarm circuit. The alarm circuit consist of IC3 (NE555). In Astable multivibrator mode with speaker at the output terminal which produces a square wave, this is a digital waveform with sharp transistors between low (0V) and high ($+V_S$).

The duration of the low and high states may be different.

The time period (T) of the square wave is the time for one complete cycle, but it is usually better to consider frequency (f) which is the number of cycles per seconds.



CALCULATION

$$T = 0.693 \times (R1 + 2R2) \times C_1$$

$$f = \frac{1}{(R1+2R2)\times C1}$$

T = time period in seconds

f = frequency in Hertz

R_1= resistance in ohms (Ω)

R_2 = resistance in ohms (Ω)

C_1 = capacitance in farads (F)

T (mark time) = T_m = 0.673 × (1k + 47k) × 0.047μF

$$T_m = 0.693 \times 48k \times 0.047\mu F$$

$$T_m = 1.56 \times 10^{-3} sec = 1.56 msec$$

T (space mark) = T_S = 0.693 × 47k × 0.0047μF

$$T_S = 1.53 \times 10^{-3} sec = 1.53 msec$$

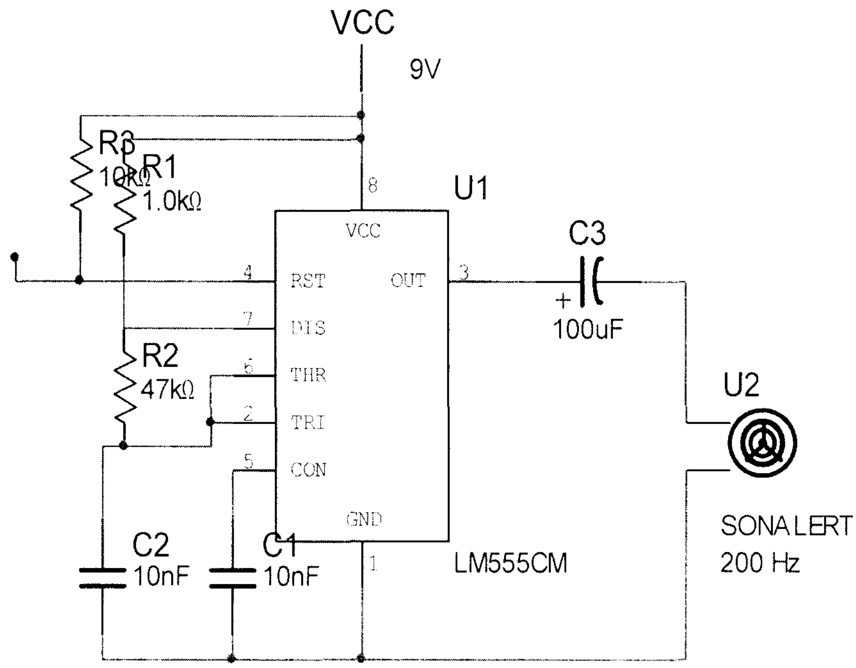
$$T = 0.00309$$

$$F = 1.4/T_M+T_S$$

$$F = 1.4/1.56\times10^{-3}+1.53\times10^{-3}$$

$$F = 453Hz$$

Figure 6.0 the diagram of the alarm circuit



CHAPTER FOUR

4.0 CONSTRUCTION PROCEDURES AND RESULT ANALYSIS

4.1 CONSTRUCTION

Construction is the process of putting the various components of the project together on a vero board, in constructing the system of all the various units that made up the system were followed in an orderly manner. This starting point was the transmitter, the receiver unit, signal amplifier unit, triggering circuit, Monostable unit, and the alarm unit and lastly the power unit.

All the stages involved in this project were initially tested on a breadboard for soldering. All stages worked properly. The individual components of the circuit were carefully picked and their rating carefully calculated before assembling them together.

4.2 SOLDERING

Soldering is the act of using a soldering iron and soldering lead to stick each component to the vero board. Safety is very important while soldering, hence low voltage soldering iron of 40watt was used. In order to obtain good joint, a hot soldering iron is essentially required. Caution should however be exercised while soldering the joints as they are to be hot and not over heated. Over heating poses a threat and thus may result in damaging the components being soldered.

It takes some amount of skill to solder the components to the vero board, the soldering was positioned in such a way that it makes proper contact with the lead to be soldered and the copper track on the vero board to which it should be joined. A few seconds later the solder was applied to the track and the components to be soldered simultaneously, the lead then melts onto the track and flows around the base of the components pin forming a strong band thereby joining the component to the copper track on the vero board. These steps and processes were repeated in order to solder each component leg(s) or pin(s) to the vero board.

It is a known fact that solders flows from cold region to hot region. therefore if the lead is cold, no solder will flow. This led to the formation of bob. Similarly when the copper track is cold, the solder also could result to a dry point if the solder is not hot enough. When much solder is applied to a joint it constitutes a problem to overcome. Avoiding the solder bridge from linking the track together could prevent it.

A special attention is given while soldering ICs (Integrated Circuit). The tracks between the pins were broken in order to avoid short-circuiting or bridging of the pins which adversely affects the normal functioning of the IC.

4.2.1 SOLDERING PRECAUTIONS

1. Low wattage soldering iron was lessened to prevent excessive heating of components. which may result to their permanent damage.
2. Caution was exercised by making sure that too much solder was not applied to a joint in order to avoid bridging or short-circuiting of the copper tracks.
3. In order to avoid short-circuiting or bridging of the pins, the tracks between the IC socket pins were broken. Short circuit leads to the malfunctioning of the IC.
4. The soldering iron was made hot enough to avoid the making of tiny joints.
5. The pins of the ICs were well straightened to ensure that the fitting is properly done.

4.3 TESTING

On the completion of the construction a thorough test was carried out on the circuit to make sure that all the components were done appropriately and there was continuity in wires used. This is to say that the circuit was made free from wrong connections as these may lead to the bridging of components before it is powered.

There are test also carried out after the circuit has been powered in order to confirm the working condition of the system. Visual and equipment test constitute tests ran in order to ascertain a proper working condition of the circuit. The former relate to test done before power was connected to the circuit while the later relates to test done when power was connected to the circuit.

4.4 RESULTS

The following results were obtained on completion and testing of the system. The transmitter was tested and found properly with the receiver but they work at close point. The transistors, which are common-emitter transistors, were in good order and therefore the RC two-stage amplification was carried out effectively.

Problems encountered include setting of the Monostable time units, providing appropriate shielding for the infrared receiver (sensor).

Another problem encountered was range, that is distance between the receiver and the transmitter is too close, the receiver suppose to use a phototransistor Darlington but is not available in the market phototransistor is used instead.

4.5 CASING

The transmitter unit was enclosed in a small rectangular wooden box with an opening through which the infrared beam transmits.

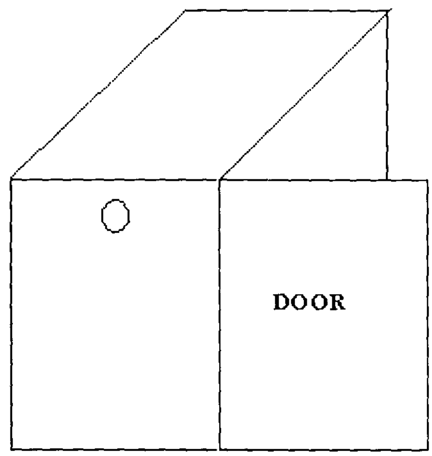


Figure 4.5a: RECEIVER CASING

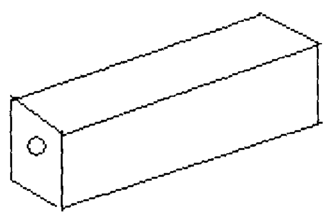


Figure 4.5b: INFRARED TRANSMITTING CASING

The main receiver unit was enclosed in a bigger rectangular wooden box and provision was also made for the infrared sensor to be able to receive the infrared beam transmitting. This provision goes by the way of the miniature apartment, which aids in providing shielding.

CHAPTER FIVE

5.0 CONCLUSION, RECOMMENDATION AND SUGGESTION

5.1 CONCLUSION

The aim and objective of this project work has largely been achieved that is to Design and Construct A Car-Security Door Alarm with Remote Control. The system provide an excellent protection against the theft. It is different from other door locks and alarm systems. It is operated through a Remote Control activator.

One interesting thing about the system is, its automatic mode of deactivation of the security alarm through a signal from the remote control.

This shows the wide range of the application of infrared in our daily lives apart from the remote control.

5.2 RECOMMENDATION

Bearing in the mind the fact that the use of automated system in our everyday lives have come to stay, the car security door alarm cannot be emphasized other sophisticated port could be introduced in future design to demarcate level of output by the use of advanced technology. Based on this success and challenges this project work, the following recommendation should be considered

1. Students should be encouraged to undertake research in the numerous ways of application of infrared to activate different systems.
2. As per the design in question, I suggest the use of voice censoring or scanning fingerprint sensing devices for the coding aspect of the system.

3. Making the system to be interfaced with a computer system may make further improvement

5.3 SUGGESTION FOR FURTHER RESEARCH

My suggestion for further research is really on how to translate a fingerprint into codes or ones eyes iris or skull. If this can be translated into a code that can be encoded and decoded by a multiplexed integrated circuit. Then it would become very complex for an intruder to break into the system. I still strongly believe that there are areas, which can still seriously be improved on though thorough research

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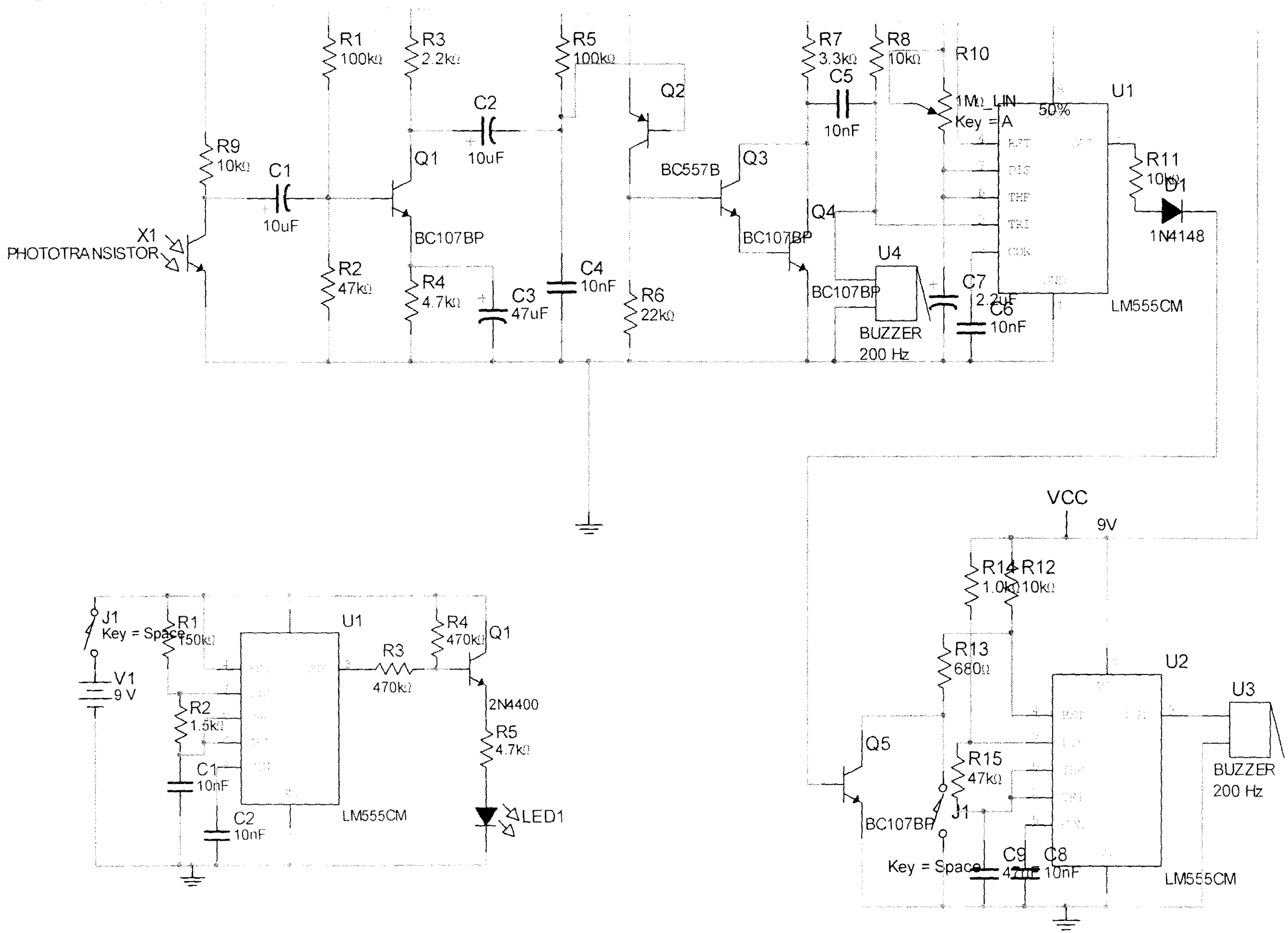

CIRCUIT DIAGRAM OF CAR-DOOR ALARM WITH REMOTE CONTROL