ACCIDENT PREVENTION SYSTEM FOR U- PIN BENDS

PROJECT REPORT

SUBMITTED IN PARTIAL FULFILLMENT OF REQUIREMENTS FOR THE AWARD OF

Diploma

In

Electronics Engineering

Submitted by

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CERTIFICATE

This is to certify that the project work entitled **" Accident Prevention System for U- Pin Bends"** being submitted by students of Diploma in Electronics Engineering VI Semester **Tanvi Prachandia & Nivedita Majumdar** in partial fulfilment of the requirements for the award of Certificate of three years course of Diploma in Electronics Engineering in University Women's Polytechnic, Faculty of Engineering and Technology, Aligarh Muslim University, Aligarh for the academic session 2019-2020 is the record of candidate's own original work carried out under my supervision and guidance.

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It is a matter of great satisfaction and pleasure that we have completed our project work and report successfully. First and foremost, we offer our gratitude to Almighty God whose blessings have brought success.

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ABSTRACT

Rash driving is one of major reasons for road accidents especially occurs very frequently on the highways (curved roads) due to over speed. Most of the road accidents can be prevented if the rash driving or the speed of the vehicle is controlled. Here, a system called **Accident Prevention System for U- Pin Bends** has been developed. The project explains how we can avoid collision between vehicles at curved roads. Daily we can see lots of accidents at curved roads. This is due to negligence in driving or visibility problems on the road. In curved roads, the people ride their vehicles as usual as on straight road without reducing the speed and when suddenly another vehicle come in front of them, they get confused and cannot control their vehicle and accident happens. So, to avoid this type of accident we have developed a warning system which will give a visual indication to the drivers. As you can see the curved road in the model, it is having a LED board on the opposite side of each road now we have placed metal contacts at the starting of the road and an electronic circuit is fitted below the board. The circuit continuously produces some signal which is disconnected by the metal plates on the road. The LEDs are connected to the circuit through the metal plates. When any vehicle passes on the metal plates, the connection happens between plates and LED then the LED glows. The same thing happens on another side. Here LED works in the opposite direction, when any vehicle comes in right side road the Left side road LED will glow to indicate that there is a vehicle on the right side of the road so you have to reduce your speed.

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1. INTRODUCTION

1.1 Project Introduction

Our topic is ***"Accident prevention system for* U *pin bend".*** It is a device that is used to prevent the accidents occurring at U shaped roads, or in simple words, we can say that in hilly areas. In hilly areas, we have seen that there are U shaped roads and people drive very fast at U shaped turns which results in hazardous accidents in which people even lose their life, and another main reason for occurring accidents is that the people on one side of the road is not able to see the people coming from another side of the road and hence both are on their high speed, and they crash with each other and accidents occur. So, this circuit is installed especially on the hilly road to prevent these types of accidents. Its works with two sensors and LEDs are installed on the two sides of the road. So, when the vehicles are coming from both sides of the road, the sensors give signals to each other in a criss-cross manner. By seeing signal both the vehicles can slow down their speed and prevent the accident from happening.

1.2 Project Objective

Driving is a complex process that involves several perceptual and motor tasks. All over the world, India bangs the topmost position in accidental deaths. Nearly 1.2 lakh of people killed every year on Indian roads. Rollover accidents are now responsible for almost 1/3 of all highway vehicle occupant fatalities. Rollovers tend to be more severe than other types of accidents. For light trucks and SUVs, the percentage of occupant fatalities associated with rollovers is about 50%. For heavy trucks, the number is about 60%.

The common causes of vehicle accidents are driver distraction or negligence, urban location-heavily populated areas, or small areas with insufficient transport facilities, vehicle handling problems, and weight distribution problems. Accident in the curved road mainly occurs when the centrifugal force is more than the

direction and momentum force which makes the vehicle move in a straight line instead of a curved path. By implementing this project the driver gets a warning through LED that the vehicle is coming from another side.

2. COMPONENTS USED & THEIR SPECIFICATIONS

2.1 LIST OF COMPONENTS USED

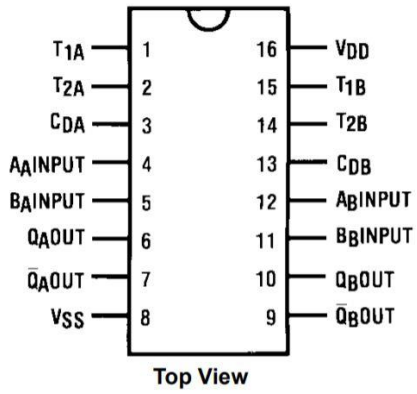
SEMICONDUCTORS:	
IC1	CD4538
IC2	7805
IC3	NE555
D1	1N4001
D2-D5	1N4007
T1-T2	BC548
LED1	IR LED1
LED2	GREEN LED
LED3	RED LED
IRX1	TSOP 1738
RESISTORS:	
R1,R6	180Ω
R2	1.5K Ω
R3	4.7K Ω
R4	680 Ω
R5	1M Ω
R7,R8	470 Ω

R9	1K Ω
R10	18K Ω
R11	18 Ω
CAPACITORS:	
C1	47µf ,16v
C2	0.1µf
C3	4.7µf ,16v
C4	100µf ,16v
C5	220µf ,16v
C6	470µf ,16v
C7	1000µf ,25v
C8	0.001µf
C9	0.01µf
MISCELLANEOUS	
X1	X1= 230V AC PRIMARY TO 9V AC,250mA SECONDARY TRANSFORMER
RL1	5V, 1C/O RELAY

2.2 IC-CD4538

The CD4538 is a dual, precision monostable multivibrator with independent trigger and reset controls. The device is retriggerable and resettable, and the control inputs are internally latched. Two trigger inputs are provided to allow either rising or falling edge triggering.

Connection Diagram



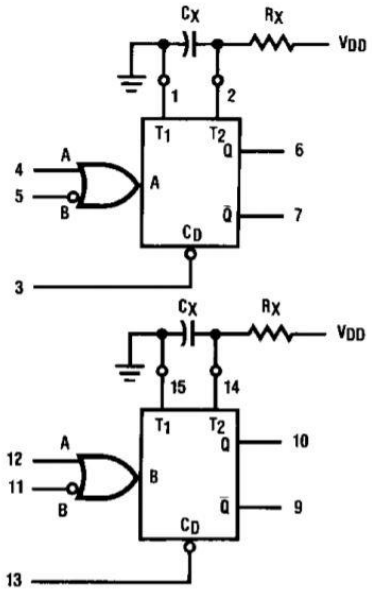
Top View

Truth Table

Inputs			Outputs	
Clear	A	B	Q	$\overline{Q}$
L	X	X	L	H
X	H	X	L	H
X	X	L	L	H
H	L	↓	⎍	⎎
H	↑	H	⎍	⎎

H = HIGH Level
L = LOW Level
↑ = Transition from LOW-to-HIGH
↓ = Transition from HIGH-to-LOW
⎍ = One HIGH Level Pulse
⎎ = One LOW Level Pulse
X = Irrelevant

Block Diagram



R_X and C_X are External Components
V_{DD} = Pin 16
V_{SS} = Pin 8

The reset inputs are active LOW and prevent triggering while active. Precise control of output pulse-width has been achieved using linear CMOS techniques. The pulse duration and accuracy are determined by external components RX and CX. The device does not allow the timing capacitor to discharge through the timing pin on power-down condition. For this reason, no external protection resistor is required in series with the timing pin. Input protection from static discharge is provided on all pins.

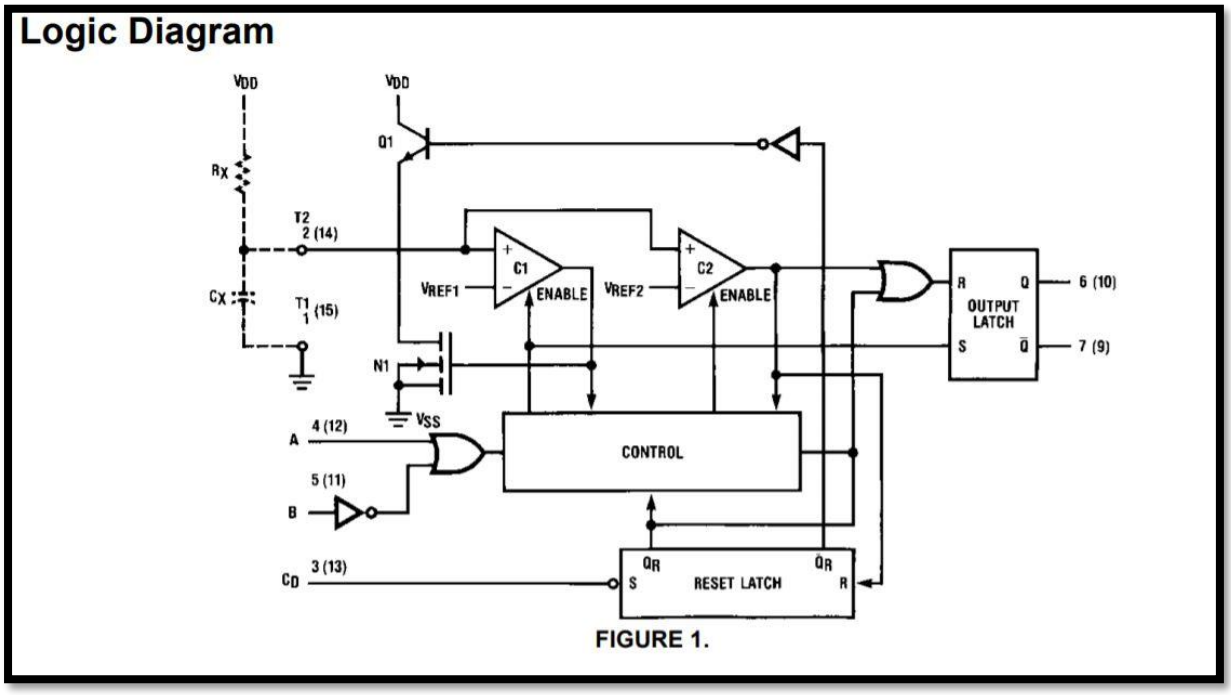


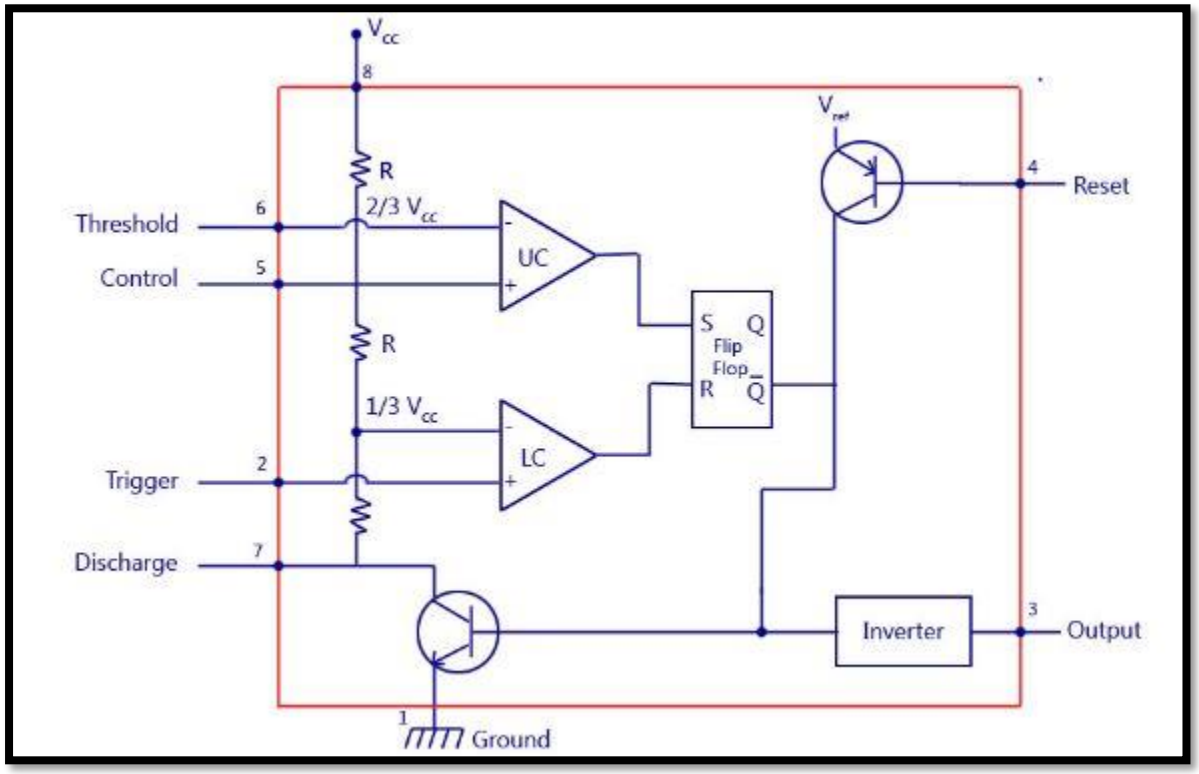
FIGURE 1.

2.3 IC-NE555

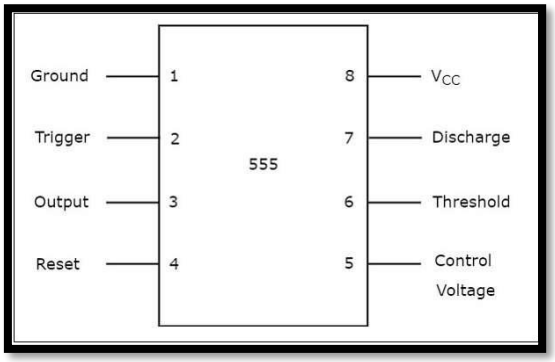
The 555 timer IC is an integral part of electronics projects. Be it a simple project involving a single 8-bit micro-controller and some peripherals or a complex one involving system on chips (SoCs), 555 timer working is involved. These provide time delays, as an oscillator and as a flip-flop element among other applications.

Introduced in 1971 by the American company Signetics, the 555 is still in widespread use due to its low price, ease of use and stability. It is made by many companies in the original bipolar and low-power CMOS types. According to an estimate, a billion units were manufactured back in the year 2003 alone.

Depending on the manufacturer, the standard 555 timer package includes 25 transistors, 2 diodes and 15 resistors on a silicon chip installed in an 8-pin mini dual-in-line package (DIP-8). Variants consist of combining multiple chips on one board. However, 555 is still the most popular. Let us look at the pin diagram to have an idea about the timer IC before we talk about 555 timer working.



Pin Diagram and Description



Pin	Name	Purpose
1	GND	Ground reference voltage, low level (0 V)
2	TRIG	The OUT pin goes high and a timing interval starts when this input falls below 1/2 of CTRL voltage (which is typically 1/3 *V*cc, CTRL being 2/3 *V*cc by default if CTRL is left open). In other words, OUT is high as long as the trigger low. Output of the timer totally depends upon the amplitude of the external trigger voltage applied to this pin.
3	OUT	This output is driven to approximately 1.7 V below +*V*cc, or to GND.
4	RESET	A timing interval may be reset by driving this input to GND, but the timing does not begin again until RESET rises above approximately 0.7 volts. Overrides TRIG which overrides threshold.
5	CTRL	Provides "control" access to the internal voltage divider (by default, 2/3 *V*cc).

6	THR	The timing (OUT high) interval ends when the voltage at threshold is greater than that at CTRL (2/3 *V*cc if CTRL is open).
7	DIS	Open collector output which may discharge a capacitor between intervals. In phase with output.
8	*V*cc	Positive supply voltage, which is usually between 3 and 15 V depending on the variation.

The 555 generally operates in 3 modes:

1. A-stable
2. Mono-stable
3. Bi-stable modes.

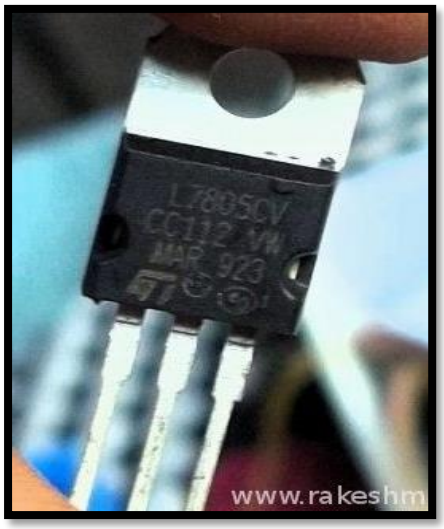
Astable mode

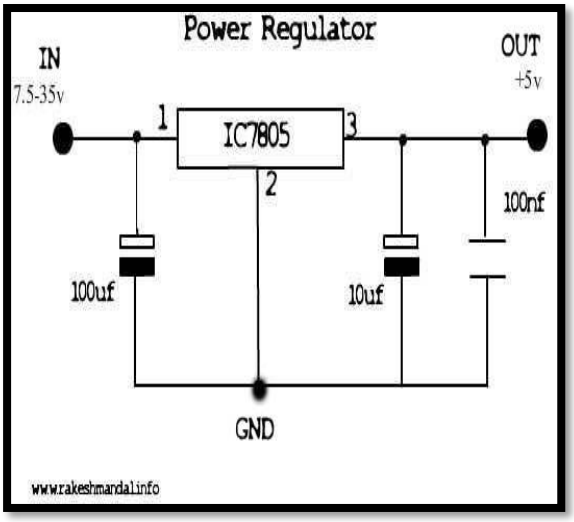
This means there will be no stable level at the output. So, the output will be swinging between high and low. This character of unstable output is used as a clock or square wave output for many applications.

2.4 IC7805

IC 7805 is a **5V Voltage Regulator** that restricts the output voltage to **5V output** for various ranges of input voltage. It acts as an excellent component against input voltage fluctuations for circuits, and adds an additional safety to your circuitry. It is inexpensive, easily available and very much commonly used. With few capacitors and this IC, you can build pretty solid and reliable voltage regulator in no time. A **Circuit diagram** with pinout is given. It also comes with provision to add heatsink.

The maximum value for input to the voltage regulator is 35V. It can provide a constant steady voltage flow of 5V for higher voltage input till the threshold limit of 35V. If the input voltage is near to 7.2V to 12V then it does not produce any heat and hence no need of heat sink. Higher the input volts - the more it gets heated up, and excess electricity is liberated as heat from 7805. Hence the provision of heatsink.IC7805 also comes as smaller SMD component as well.

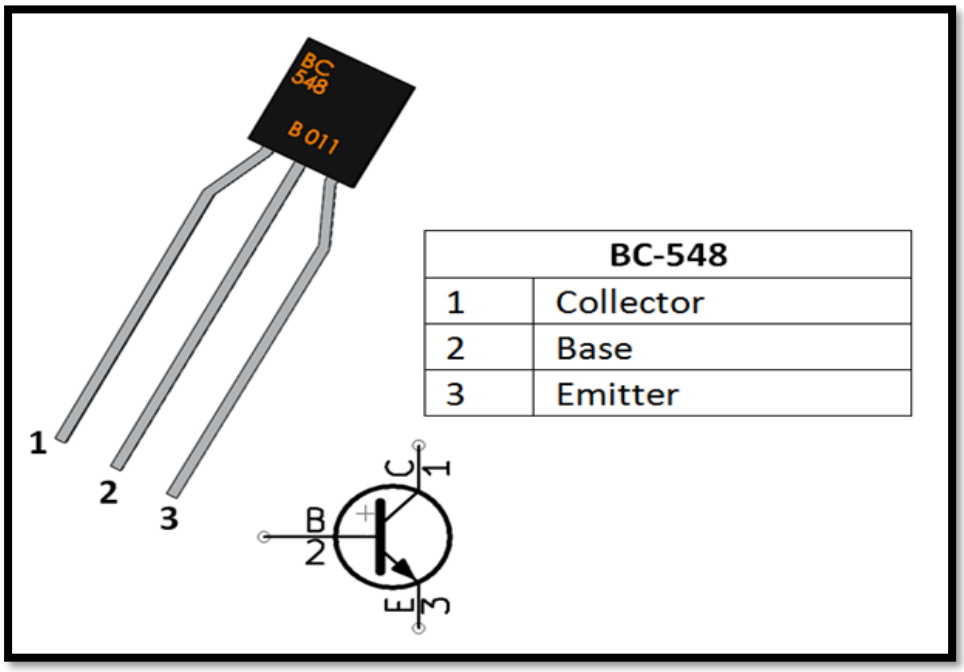




2.5 BC548

BC548 is an NPN transistor so the collector and emitter will be left open (Reverse biased) when the base pin is held at ground and will be closed (Forward biased) when a signal is provided to base pin. **BC548 has a gain value of 110 to 800**, this value determines the amplification capacity of the transistor. The maximum amount of current that could flow through the Collector pin is 500mA, hence we cannot connect loads that consume more than 500mA using this transistor. To bias a transistor, we have to supply current to base pin, this current (I_B) should be limited to 5mA.

When this transistor is fully biased, it can allow a maximum of 500mA to flow across the collector and emitter. This stage is called Saturation Region and the typical voltage allowed across the Collector-Emitter (V_{CE}) or Base-Emitter (V_{BE}) could be 200 and 900 mV respectively. When base current is removed the transistor becomes fully off, this stage is called as the Cut-off Region and the Base Emitter voltage could be around 660 mV.



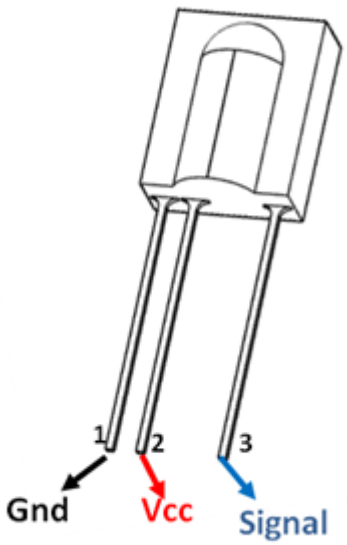
BC-548	
1	Collector
2	Base
3	Emitter

BC548 - NPN Transistor
BC548 Transistor Pinout

BC548 Pin Configuration

Pin Number	Pin Name	Description
1	Collector	Current flows in through collector
2	Base	Controls the biasing of transistor
3	Emitter	Current Drains out through emitter

2.6 TSOP1738 IR Receiver



Pin Configuration

Pin Number	Pin Name	Description
1	Ground	Connected to the Ground of circuit
2	Vcc	Typically connect to +5V, maximum of 6V can be given

3	Signal	The signal pin gives out the sequence based on the IR signal detected

TSOP-1738 Characteristics

- Minimum and Maximum Input Voltage is -0.3 and 5V respectively. Typically +5V is used.
- Can detect IR signals from Remotes (38kHz)
- Operating current: 5mA
- High Range and wide coverage area.
- Will respond only to IR signals, due to high immunity against ambient light
- Low power consumption
- Has in-built pre amplifier
- TTL and CMOS compatible

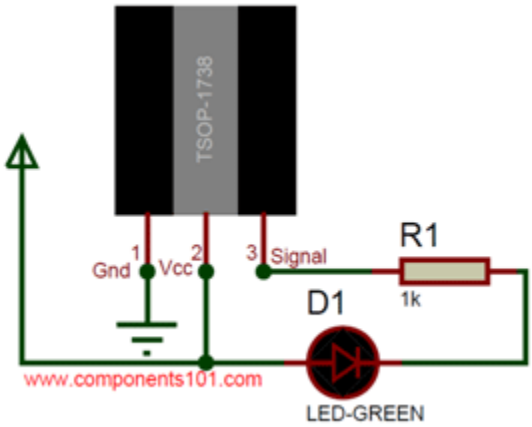
Where to use TSOP-1738 Sensor

The **TSOP sensor** has the ability to read the output signals from home remotes like TV remote, Home theatre remote, AC remote etc.. All these remotes will work with a frequency of 38kHz and this IC can pick up any IR signals process them and provide the output on pin 3. So if you are looking for a sensor to analyse, re-create or duplicate the functions of a remote then this IC will be the perfect choice for you.

Also keep in mind that this series TSOP-17**38** will receive only 38Khz IR signals. All remotes in India will operate in 38Khz, kindly ensure if it is the same in your country.

How to test and use TSOP-1738 Sensor

The **TSOP-1738** is an **IR Receiver Sensor**, which can be used to receive IR signals of 38Khz. The sensor operates on 5V and consumes around 5mA to operate. Normally the signal pin (pin 3) IC is connected to a microcontroller to analyse the IR signal received. But let's consider that you just purchased the IC and you want to check it is working. To do those just connect your TSOP as shown in the test circuit below

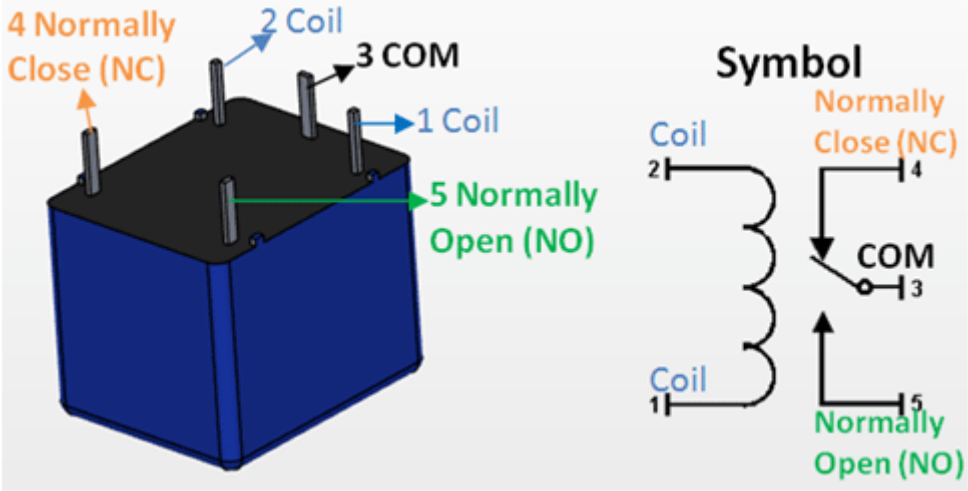


Now use any IR remote that's lying around in your home and press any button on it. You should notice the Green Led blinking each time you press any button. This is just to ensure that the sensor is working as it has to be. Now, you can proceed with any MCU or MPU to decode the received IR signal. Once the IR signal is decoded you can re-create it using an IR Blaster.

TSOP-1738 Applications

- Receive IR signals
- Decode Remote signals
- Analyse, re-create or duplicate remote Signals
- Wireless control applications
- Receiver circuit for IR remote controls
- IR Remote tester circuits

2.7 Relay



Relay

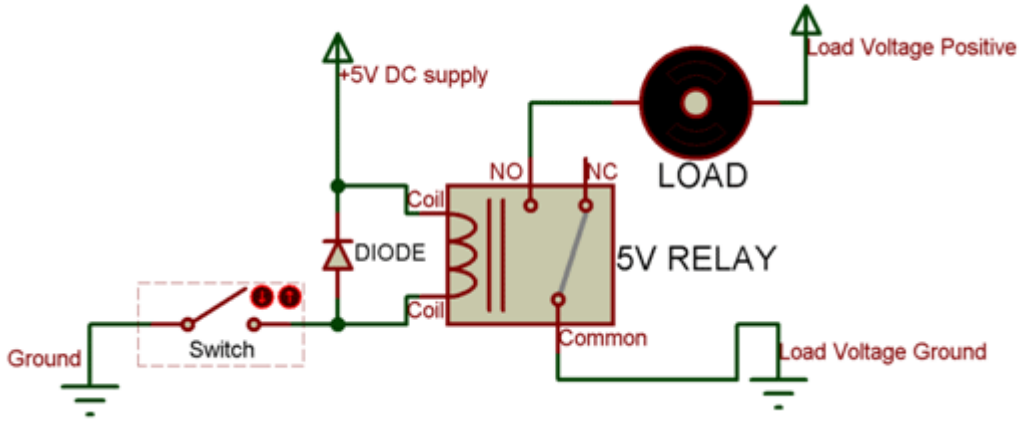
Pin Configuration

Pin Number	Pin Name	Description
1	Coil End 1	Used to trigger(On/Off) the Relay, Normally one end is connected to 5V and the other end to ground
2	Coil End 2	Used to trigger(On/Off) the Relay, Normally one end is connected to 5V and the other end to ground
3	Common (COM)	Common is connected to one End of the Load that is to be controlled
4	Normally Close (NC)	The other end of the load is either connected to NO or NC. If connected to NC the load remains connected before trigger
5	Normally Open (NO)	The other end of the load is either connected to NO or NC. If connected to NO the load remains disconnected before trigger

Relays are most commonly used switching device in electronics. Let us learn how to use one in our circuits based on the requirement of our project.

Before we proceed with the circuit to drive the relay we have to consider two important parameter of the relay. Once is the **Trigger Voltage**, this is the voltage required to turn on the relay that is to change the contact from Common->NC to Common->NO. Our relay here has 5V trigger voltage, but you can also find relays

of values 3V, 6V and even 12V so select one based on the available voltage in your project. The other parameter is your **Load Voltage & Current**, this is the amount of voltage or current that the NC,NO or Common terminal of the relay could withstand, in our case for DC it is maximum of 30V and 10A. Make sure the load you are using falls into this range.



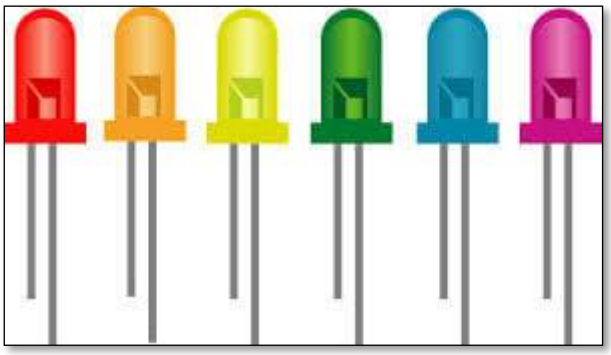
The above circuit shows a bare-minimum concept for a relay to operate. Since the relay has 5V trigger voltage we have used a +5V DC supply to one end of the coil and the other end to ground through a switch. This **switch** can be anything from a small transistor to a microcontroller or a microprocessor which can perform switching operating. You can also notice a diode connected across the coil of the relay, this diode is called the **Fly back Diode**. The purpose of the diode is to protect the switch from high voltage spike that can produced by the relay coil. As shown one end of the load can be connected to the Common pin and the other end is either connected to NO or NC. If connected to NO the load remains disconnected before trigger and if connected to NC the load remains connected before trigger.

Features of 5-Pin 5V Relay

- Trigger Voltage (Voltage across coil) : 5V DC
- Trigger Current (Nominal current) : 70mA
- Maximum AC load current: 10A @ 250/125V AC
- Maximum DC load current: 10A @ 30/28V DC
- Compact 5-pin configuration with plastic moulding
- Operating time: 10msec Release time: 5msec
- Maximum switching: 300 operating/minute (mechanically)

2.8 Light Emitting Diode (LED)

Light Emitting Diodes (LEDs) are the most widely used semiconductor diodes among all the different types of semiconductor diodes available today.



Light emitting diodes emit either visible light or invisible infrared light when forward biased. The LEDs which emit invisible infrared light are used for remote controls. A light Emitting Diode (LED) is an optical semiconductor device that emits light when voltage is applied. In other words, LED is an optical semiconductor device that converts electrical energy into light energy.

When Light Emitting Diode (LED) is forward biased, free electrons in the conduction band recombines with the holes in the valence band and releases energy in the form of light.

The process of emitting light in response to the strong electric field or flow of electric current is called electroluminescence.

A normal p-n junction diode allows electric current only in one direction. It allows electric current when forward biased and does not allow electric current when reverse biased. Thus, normal p-n junction diode operates only in forward bias condition.

Like the normal p-n junction diodes, LEDs also operates only in forward bias condition. To create an LED, the n-type material should be connected to the negative terminal of the battery and p-type material should be connected to the

positive terminal of the battery. In other words, the n-type material should be negatively charged and the p-type material should be positively charged.

The construction of LED is similar to the normal p-n junction diode except that gallium, phosphorus and arsenic materials are used for construction instead of silicon or germanium materials.

In normal p-n junction diodes, silicon is most widely used because it is less sensitive to the temperature. Also, it allows electric current efficiently without any damage. In some cases, germanium is used for constructing diodes.

However, silicon or germanium diodes do not emit energy in the form of light. Instead, they emit energy in the form of heat. Thus, silicon or germanium is not used for constructing LEDs.

2.9 Resistor

Resistors of all types are used in vast quantities in manufacturing electronic equipment. In fact, the resistor is probably the most common type of electronic component used in electrical and electronic circuits.

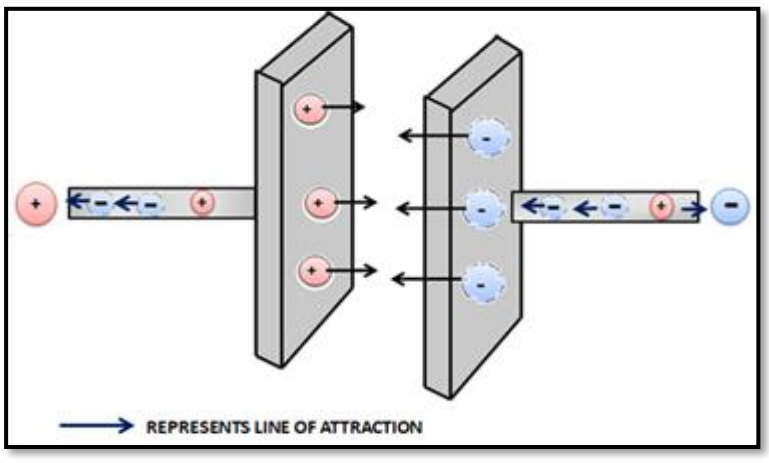
There is a large number of different types of resistor that can be bought and used. The properties of these different resistors vary, and it helps to obtain the right type of resistor for any given design to ensure that the best performance is obtained.

Although many resistors will work in a variety of applications the type of resistor can be important in some cases. Accordingly, it is necessary to know about the different resistor types, and in which applications each type of resistor can be used.

Resistors are used in virtually all electronic circuits and many electrical ones. Resistors, as their name indicates resist the flow of electricity, and this function is key to the operation most circuits.

2.10 Capacitor

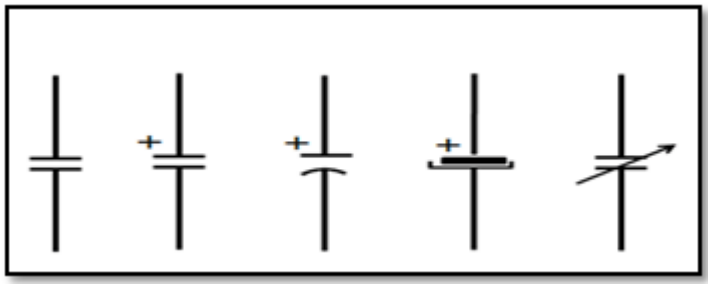
A capacitor in its most primitive form consists of two conductive plates separated by a dielectric medium. The term dielectric is just a fancy word for an insulator that can be polarized, i.e. form negative and positive charges on opposite faces. When voltage is applied across these two plates, current flows through the conductive plates. One side gets positively charged (lack of electrons) and the other side gets negatively charged (excess electrons). We're all familiar with the fact that unlike charges attract, so since the plates are oppositely charged, the charges on the plates attract.



It is to be noted that there's an insulator between the plates, so the charges cannot 'flow' to equalize each other and are (ideally) stuck in a state of mutual attraction and stay put. And that is how capacitors carry out their most basic function – retention or storage of charge.

Symbol of Capacitors

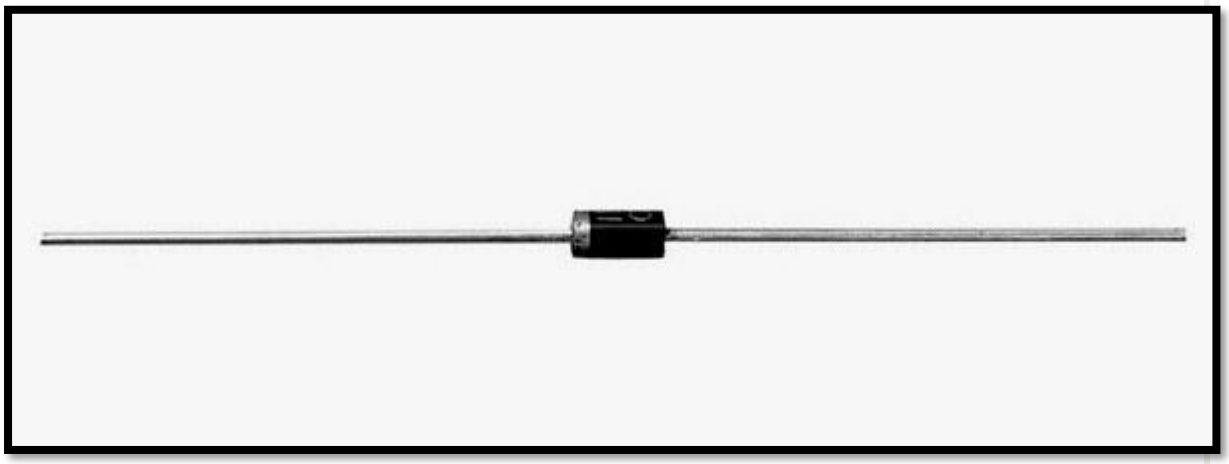
Since the capacitors have two parallel metal plates as discussed above, their symbol kind of represents the same.

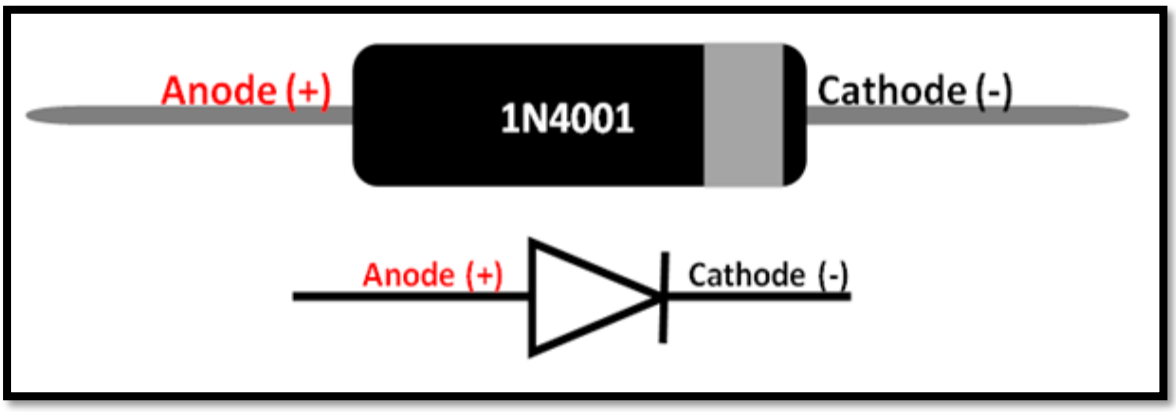


In a practical case, Capacitors are no longer just two plates with a gap between them, in the case of aluminum electrolytics the two plates take the form of metal foil rolled up with a spacer between them in a tube.

The second set of symbols stand for polarized capacitors, meaning ones which have defined positive and negative terminals by internal design. Accidentally reversing these terminals will almost certainly result in a spectacular failure (especially for larger specimens), ejecting bits of foil and paper meters from the site of failure and most of the time smelling very bad.

2.11 1N4001 Diode





1N4001 Diode

1N4001 Diode Pinout

Pin Configuration

Pin No.	Pin Name	Description
1	Anode	Current always Enters through Anode
2	Cathode	Current always Exits through Cathode

Description

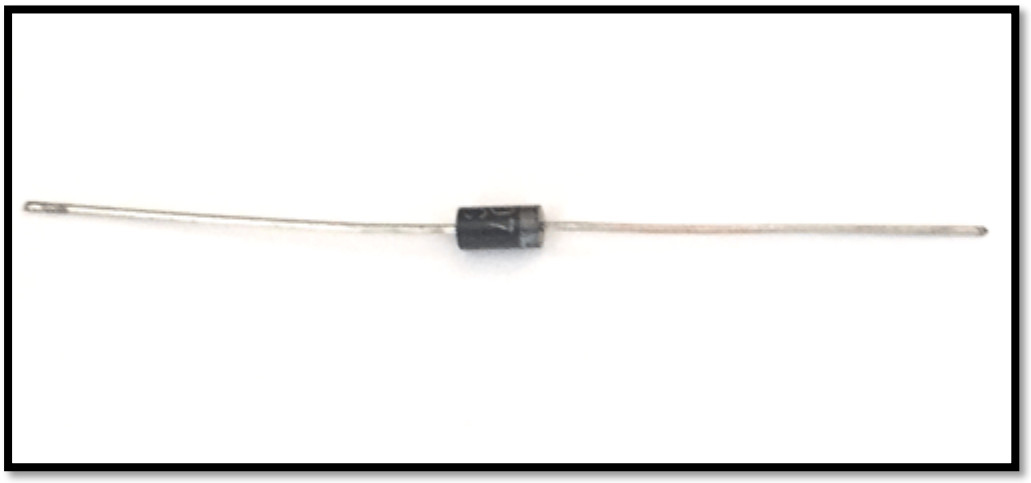
A diode is a device which allows current flow through only one direction. That is the current should always flow from the Anode to cathode. The cathode terminal can be identified by using a grey bar as shown in the picture above.

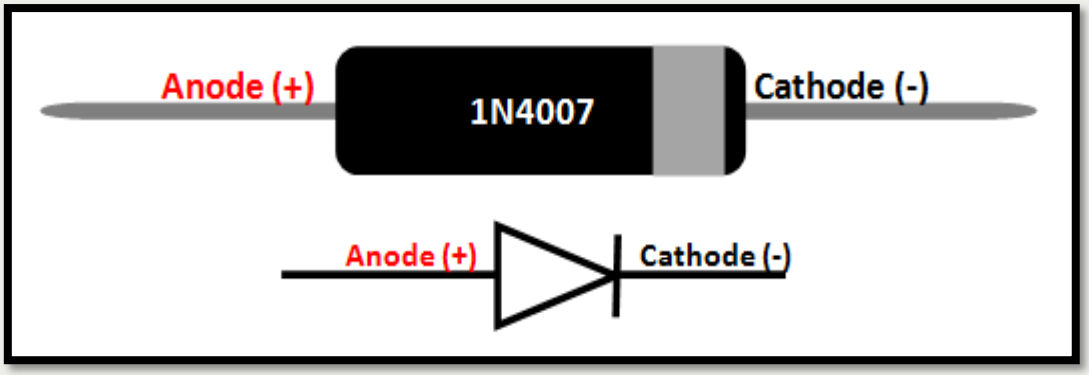
For **1N4001 Diode**, the maximum current carrying capacity is 1A it withstands peaks up to 30A. Hence, we can use this in circuits that are designed for less than 1A. The reverse current is 5uA which is negligible. It can withstand reverse voltage peak up to 50V.

2.12 DIODE 1N4007

A diode is a device which allows current flow through only one direction. That is the current should always flow from the Anode to cathode. The cathode terminal can be identified by using a grey bar as shown in the picture above.

For **1N4007 Diode**, the maximum current carrying capacity is 1A it withstands peaks up to 30A. Hence, we can use this in circuits that are designed for less than 1A. The reverse current is 5uA which is negligible. The power dissipation of this diode is 3W.





1N4007 Diode

1N4007 Diode Pinout

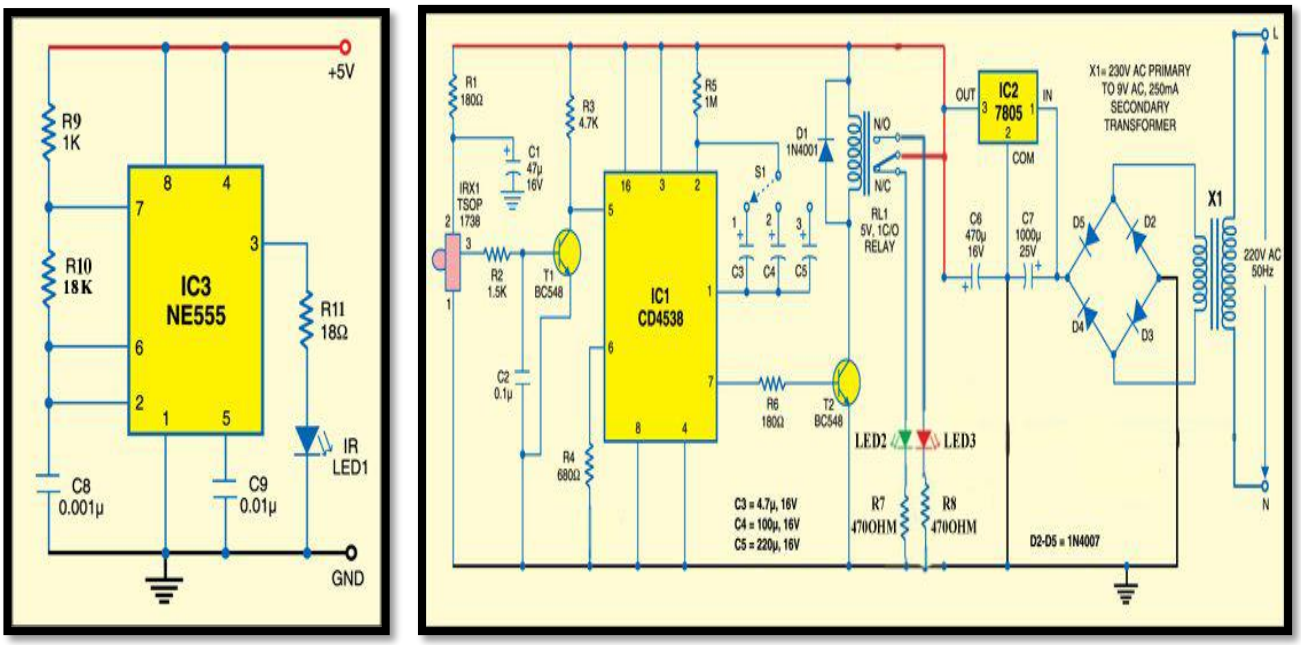
Pin Configuration:

Pin No.	Pin Name	Description
1	Anode	Current always Enters through Anode
2	Cathode	Current always Exits through Cathode

3. DEVELOPMENT OF THE CIRCUIT

3.1 Circuit Diagram

The circuit diagram of the Accident Prevention System for U- Pin Bends is shown in figure 3.1.



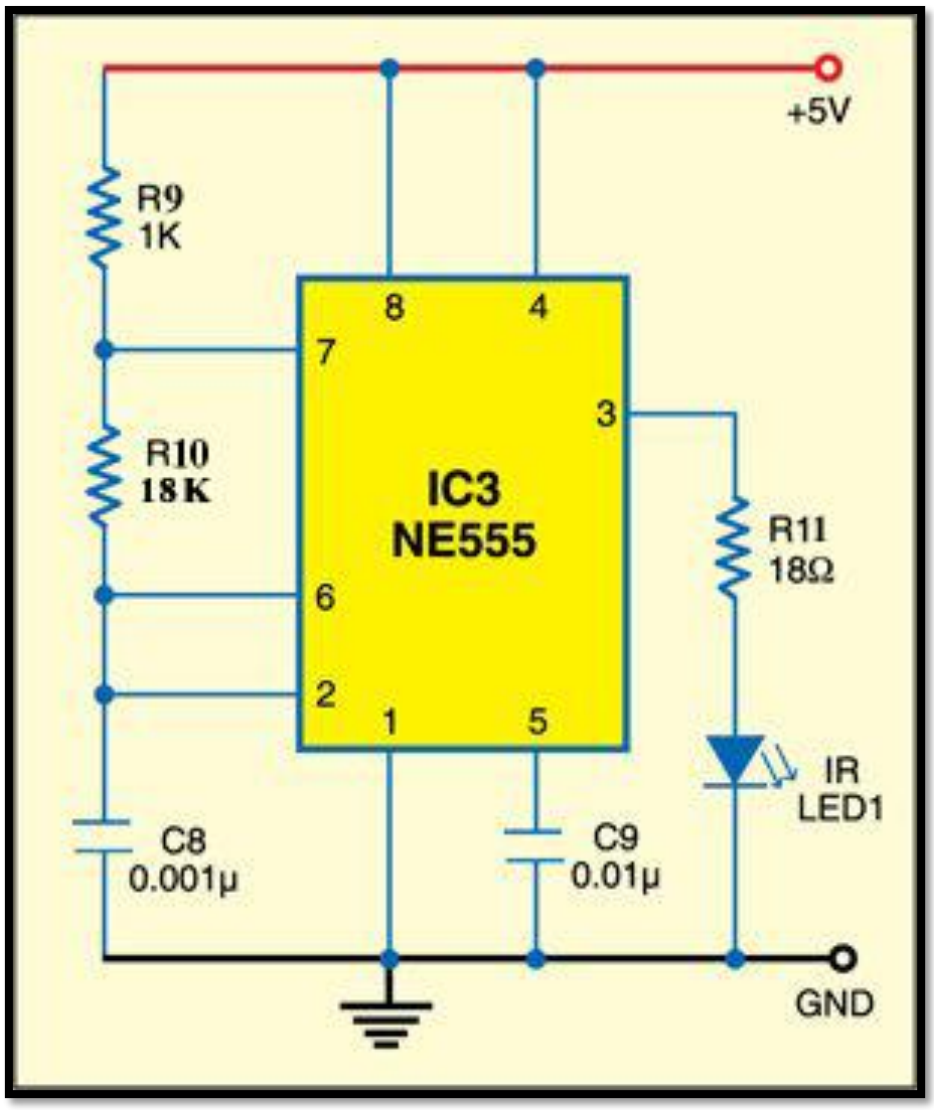
TRANSMITTER **RECEIVER**

Fig. (3.1). Circuit diagram of Accident Prevention System for U- Pin Bends

The system consists of a transmitter receiver pair along with a switching circuit. The transmitter and the receiver are mounted face to face on the opposite sides of the road such that the IR (infrared) beam produced by the transmitter falls directly on the IR sensor of the receiver. The system gets activated when car passes through the road to interrupt the IR beam falling on the sensor.

3.2 Circuit Description

Transmitter



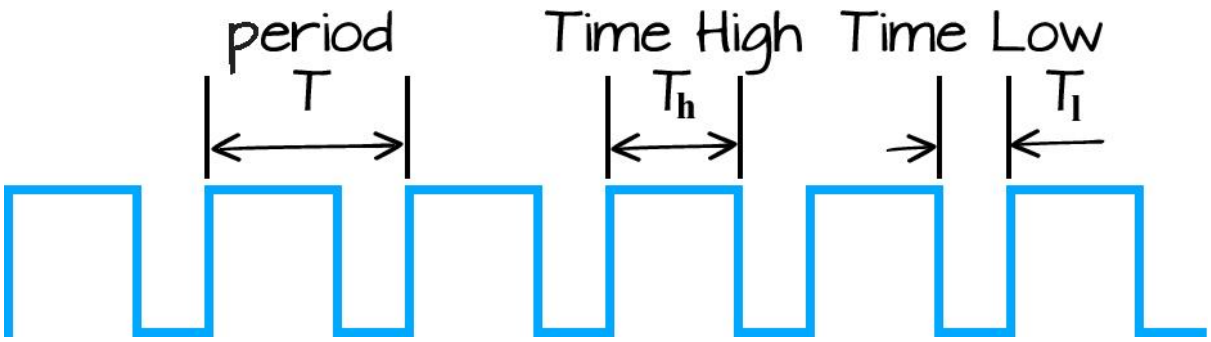
Transmitter circuit

Fig. 1 shows the transmitter circuit. It consists of an infrared (IR) LED and an NE555 timer (IC3), which is wired as an astable multivibrator producing a frequency of around 38 kHz. The 38 kHz infrared beam is transmitted through IR LED1.

CALCULATION OF FREQUENCY

The period (time to complete one cycle) of the square wave is the sum of the output high (Th) and low (Tl) times. That is:

T = Th + Tl



where T is the period, in seconds.

We can calculate the output high and low times (in seconds) using the following formulas:

Th = ln 2 * (R9 + R10) * C8
Tl = ln 2 * R10 * C8

or, using the formula below, you can calculate the period directly.

T = ln 2 * (R9 + 2*R10) * C8

T = 0.69 * (R9 + 2*R10) * C8

To find the frequency, just take the reciprocal of the period or use the following formula:

$$\mathbf{f} = \frac{\mathbf{1}}{\mathbf{T}} = \frac{\mathbf{1 \cdot 44}}{(\mathbf{R9} + \mathbf{2} \times \mathbf{R10}) \times \mathbf{C8}}$$

$$f = \frac{1 \cdot 44}{(1K\Omega + 2 \times 18K\Omega) \times 0.001\mu f}$$

$$f = 38918.91Hz$$

$$f \approx 38KHz$$

Receiver

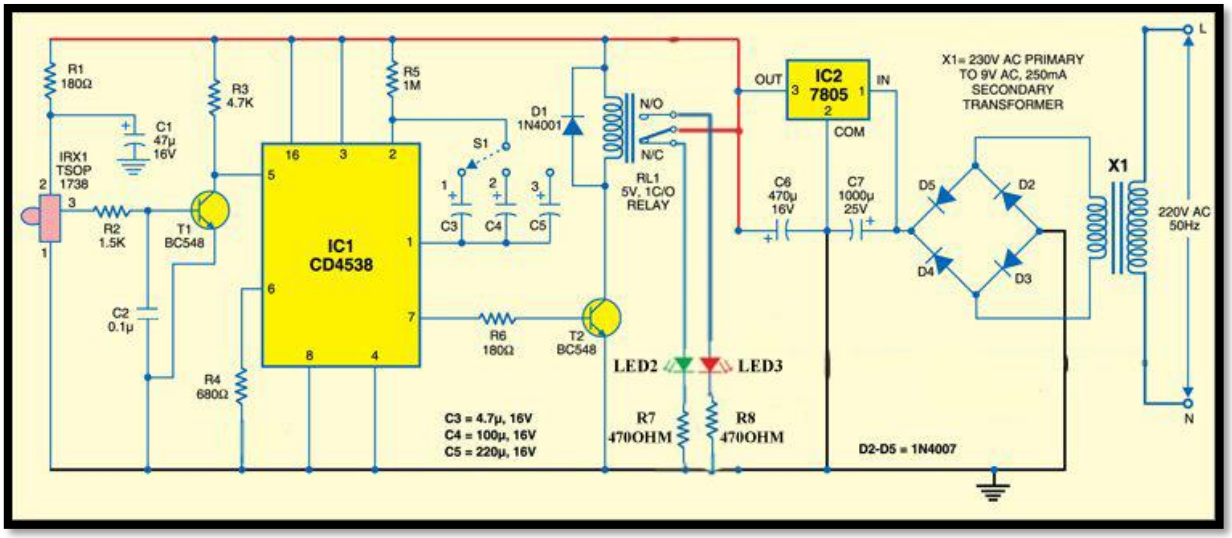


Fig. 2 shows the receiver circuit. It consists of IR sensor TSOP1738, dual monostable multivibrator CD4538 (IC1) and a few discrete components.

When the IR beam falls on the sensor, its output pin 3 remains low and transistor T1 conducts to make pin 5 of IC1 high.

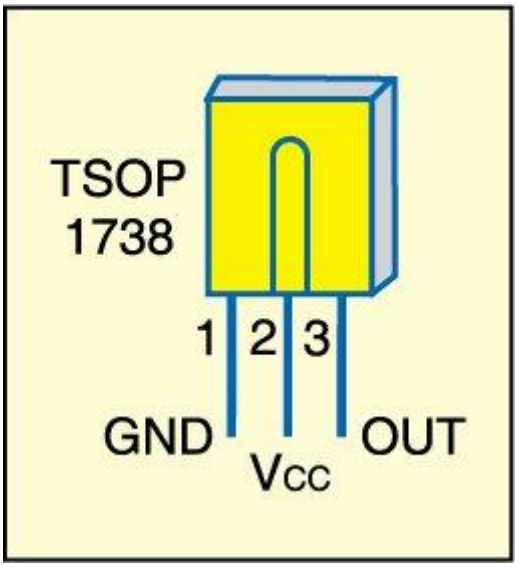


Fig. 3: Pin configuration of TSOP 1738

When anyone interrupts the IR beam falling on the sensor, its output pin 3 goes high to trigger IC1 (at pin 5) through transistor T1. As a result, output pin 7 of IC1 goes high for the preset time period. Transistor BC548 (T2) conducts to energise relay RL1.

The time period of IC1 can be increased or decreased by selecting a proper value for the capacitor connected between pins 1 and 2 of IC1. A three-position small rotary switch along with capacitors C3, C4 and C5 is used to select the time period of IC1.

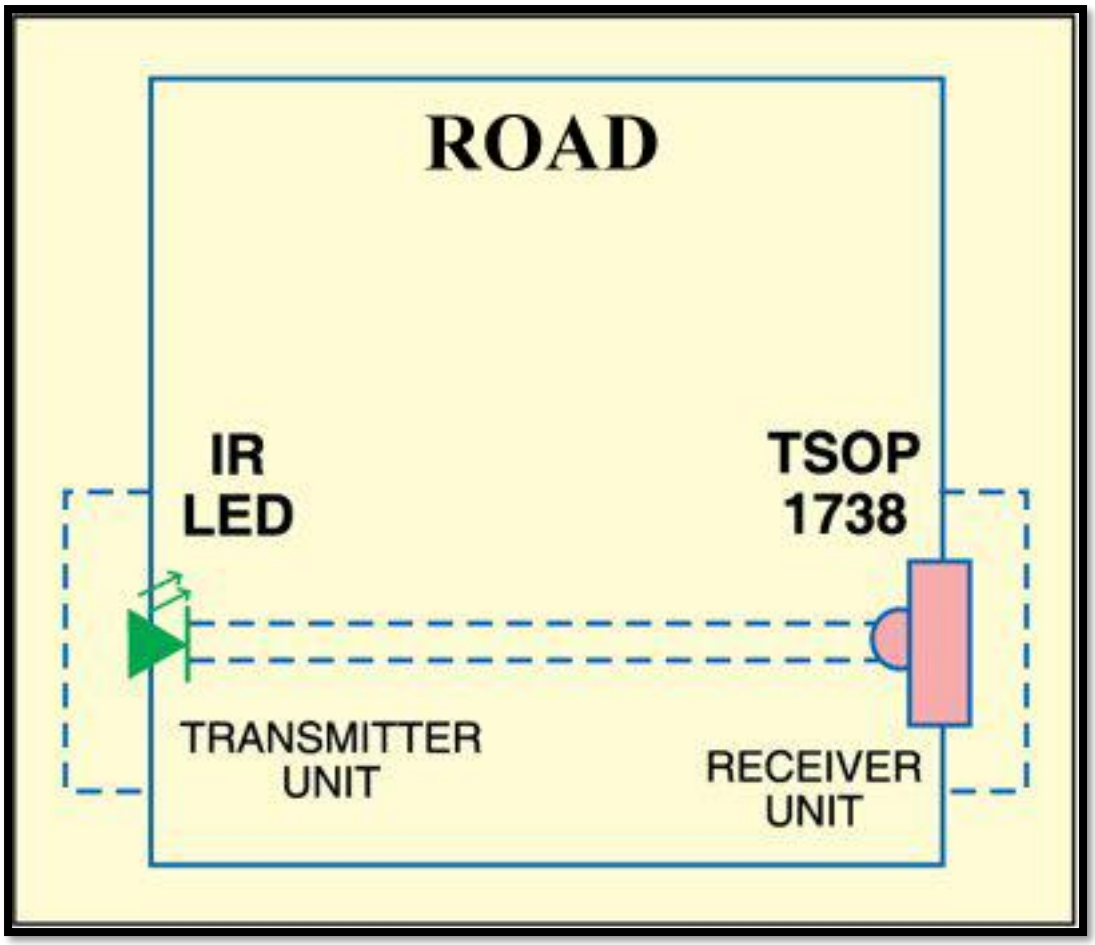


Fig. 4: Arrangement of transmitter and receiver on road

Diode 1N4001 (D1) acts as a freewheeling diode. The green LED to be switched on and off is connected between the pole of relay RL1 and neutral terminal of AC mains. It connects to the live terminal of AC mains supply via normally-closed (N/C) contacts of the relay when the relay is not energised/de-energised or coil of the relay is at rest.

The red LED to be switched on and off is connected between the pole of relay RL1 and neutral terminal of AC mains. It connects to the live terminal of AC mains supply via normally-opened (N/O) contacts of the relay when the relay energises or coil of the relay is not at rest.

Regulated 5V power supply for the transmitter and receiver units is derived from AC mains through step-down transformer X1, bridge rectifier (consisting of diodes D2 through D5) and regulator IC 7805 (IC2).

3.3 Construction & testing

Assemble the transmitter and receiver circuits on two separate general-purpose PCBs and enclose in suitable cabinets. Fig. 3 shows the pin configuration of sensor TSOP1738. Mount the transmitter and receiver units on the opposite pillars of the gate as shown in Fig. 4. The proposed circuit can be easily assembled and tested.

4. EXPECTED RESULT & DISCUSSION

4.1 Result & Discussion

- Here, the IR LED is installed in such a way that they point towards the IR sensor installed on the other side of the road. The IC3 NE555 works as ASMV, it has automatic built in triggering which switches it continuously between its two unstable states both set and reset and it generates a continuous IR beam through IR LED.

- **When the vehicle crosses the IR LED 1**, the light falling on the IR sensor 1 at receiver section is obstructed, and MSMV (IC1) is triggered. In this condition, the output of IC1 goes high due to which the red LED (LED1) glows for the set time. On the opposite side, a similar pair of transmitter and receiver works in the same way. The LEDs are installed in a criss-cross manner, and that's how the driver gets the signal/warning.
- In the proposed system, the outputs of the IC1 MSMVs on both sides are fed to the relay via Transistor (T2). In this way, the relay energizes and current starts flowing between common and normally open N/O contact due to which red LED starts glowing.

4.2 Advantages

1. There are many accidents due to inability to see the vehicle coming from the other side of the curved road, so by using this technology on curvy roads, we can stop these types of accidents.
2. Though the major application is for **Accident Prevention System for U- Pin Bends**, it can be used to turn on the lights at portico, car parking, or other areas when a motorbike or car enters through the gate to cross the sensing area. It can also be used as an electronic watchdog for your house by activating an alarm simultaneously.
3. Avoid possibilities of accident on hair pins.
4. Provide safe journey to the passengers.
5. Provide comfort to the driver on hair pins.

4.3 Limitation

1. The proposed circuit can only be implemented and successfully work for single lane roads.
2. This system will not work in winters due to snow weather.
3. In dense and foggy weather, it will be difficult for the sensor to detect vehicle.

5. CONCLUSION

Since number of accidents on curved roads increases day by day so it is necessary to warn the driver about forthcoming vehicle so as to reduce accident cases and to provide a safe journey by controlling high speed of the vehicle. The proposed Accident Prevention System for U- Pin Bends will work fairly as per our design. This particular system can be used to minimize the difficulties of traffic police department and make ease to control the rash driving on hilly roads. The police can perform their duties while sitting in control room and can provide their service with more ease and accuracy. This concept can be extended in future by integrating a camera with the system which could capture the image of the number plate of the vehicle to send that to the traffic authorities. Hence, the driver can be caught and punished if he ignores the signal and occurrence of accidents can be reduced to a large extent.

6. FUTURE SCOPE

As far as future development is concerned, following features can be added in the developed circuit:

1. A CCTV Camera can be placed on the curved road. The driver can be caught and punished if he ignores the signal then this camera will be triggered to take a picture of the vehicle.
2. A voice announcement system can be added which will intimate the driver that a vehicle is coming from another side.

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