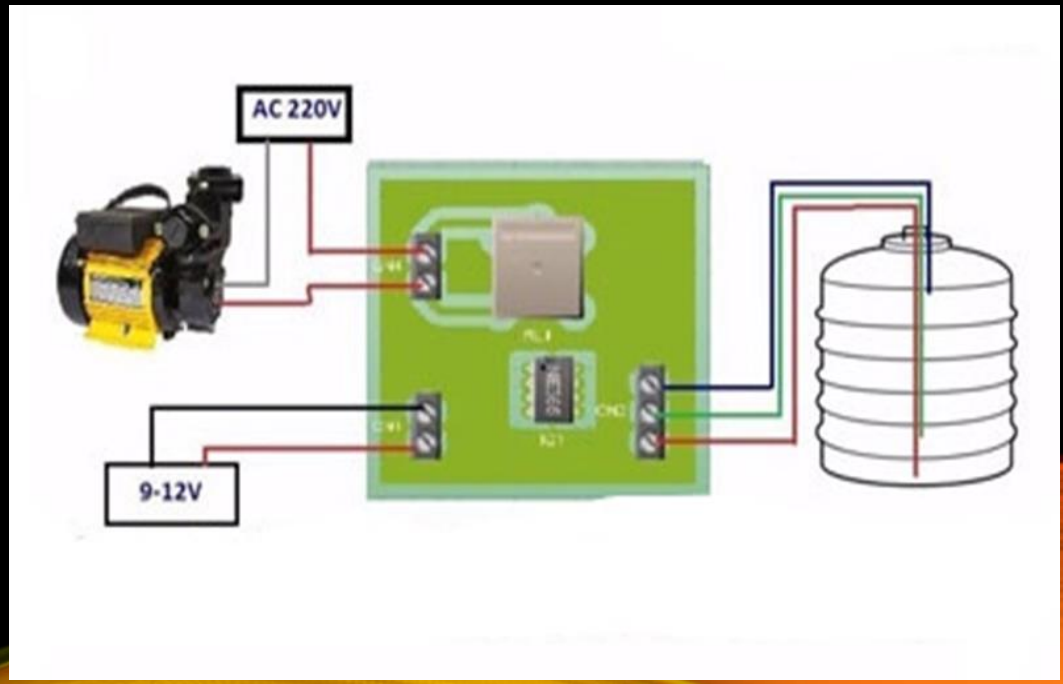
"Water Pump Controller"

Department:Computer Engineering
Subject:Digital Logic Design
Subject Teacher :Sir Dr. Zohaib
Lab Teacher;Sir Abbas Ali Shah
Name of Students:Syed Yousaf Shah
Syed Muhammad Shahir ul haq



PRESENTATION OUTCOME

- Introduction to the project
- Components used in making of project
- Functions of different components
- Circuit design
- Functions of different components in circuit
- Working
- Applications of water pump controller
- Problems faced during making of the project
- Learning experience
- conclusion

INTRODUCTION

- Water level controller is a device that manages water levels on a variety of systems such as water tanks ,pumps and swimming pools. The basic function of a water level controller is to regulate water flow and optimize system performance.
- It can save time and energy. Not just electrical energy but also reduce human efforts

REQUIRED LOGIC

High	Low	Pump
0	0	on
0	1	on
1	0	invalid
1	1	off

COMPONENTS

- Ne555 timer ic
- Bc 547 transistor
- Resistors
- 2 leds
- 12 v relay
- 0.1micro farad capacitor
- Breadboard
- Connecting wires

PURPOSE OF COMPONENTS

- Why 555 timer ic?
- Astable (free-running) mode – The 555 can operate as an electronic oscillator

In this mode, the circuit of the IC 555 timer produces the continuous pulses with exact frequency based on the value of the two resistors and capacitors.

- Monostable (one-shot) mode – In this mode, the 555 functions as a "one-shot" pulse generator.

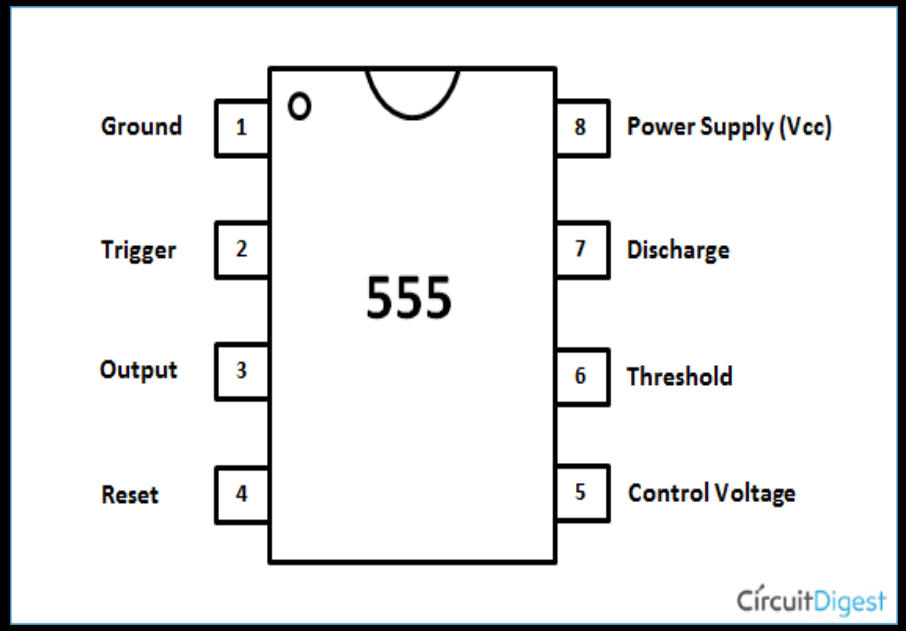
In this mode, the circuit generates only single pulse when the timer gets an indication from i/p of the trigger button

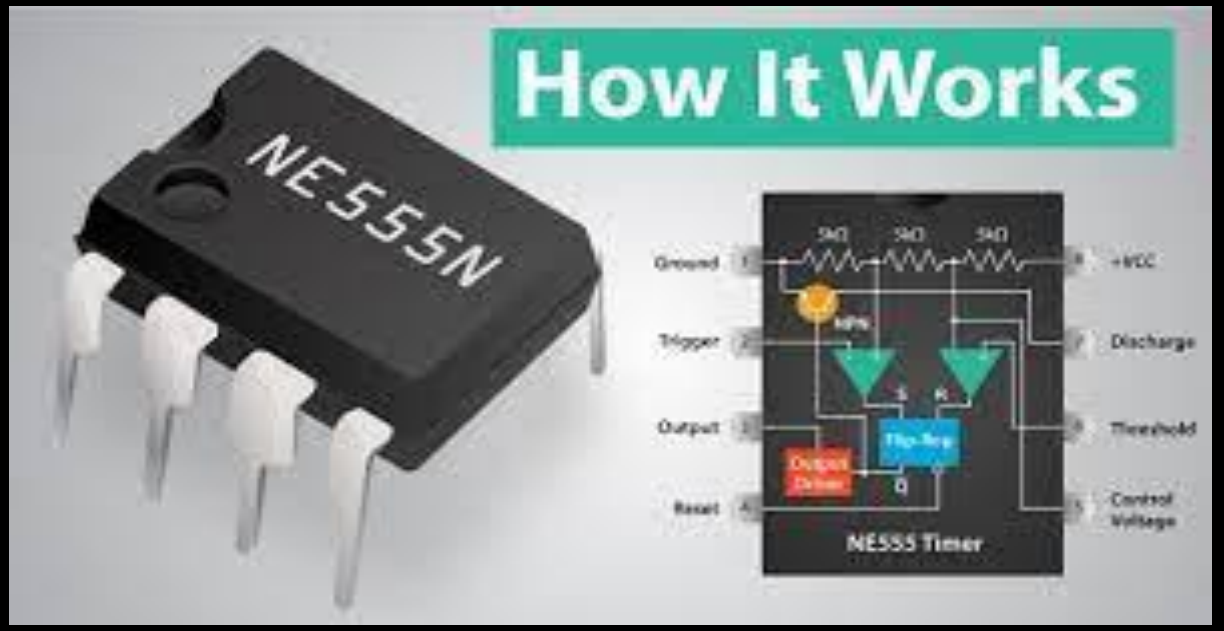
- Bistable (flip-flop) mode – The 555 operates as an SR flip-flop

In this mode, the circuit produces 2-stable state signals which are low and states. The output signals of low and high state signals are controlled by reset & activate the input pins, not by the charging & discharging of capacitors.

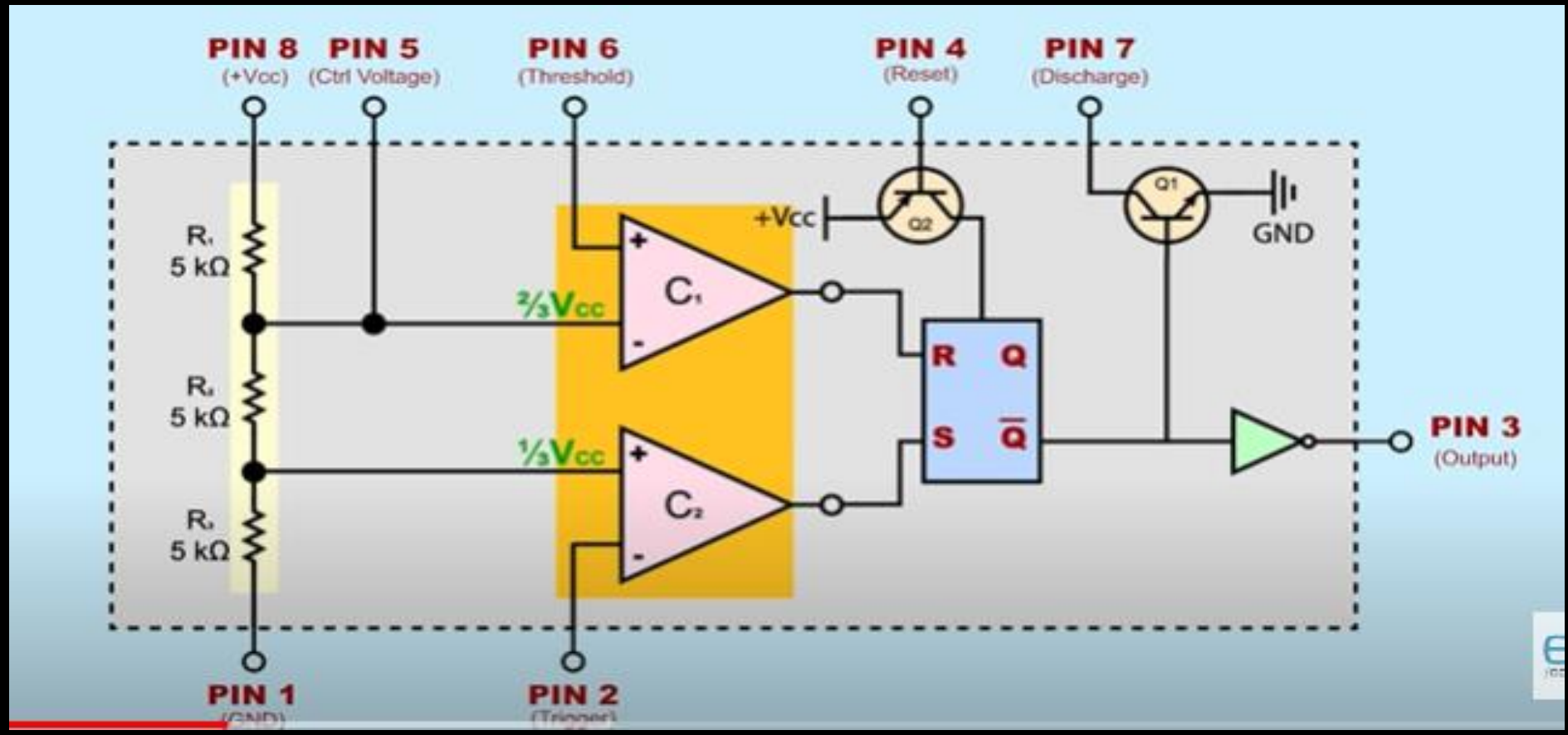
- By giving vcc(invert to ground) at reset external pin we can use the threshold and trigger pins only for giving inputs.

555 TIMER IC


Ground
1
Trigger
2
Output
3
Reset
4
555
8
Power Supply (Vcc)
7
Discharge
6
Threshold
5
Control Voltage
CircuitDigest


How It Works
NE555N
NE555 Timer

555 TIMER IC BLOCK DIAGRAM

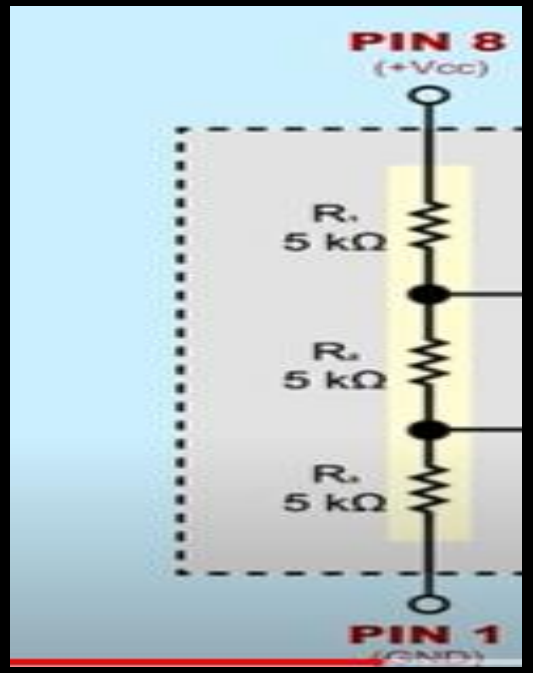


BLOCK 1

- In this block voltage is divided and then given to comparators as an input
- By using VDR at 1st point we

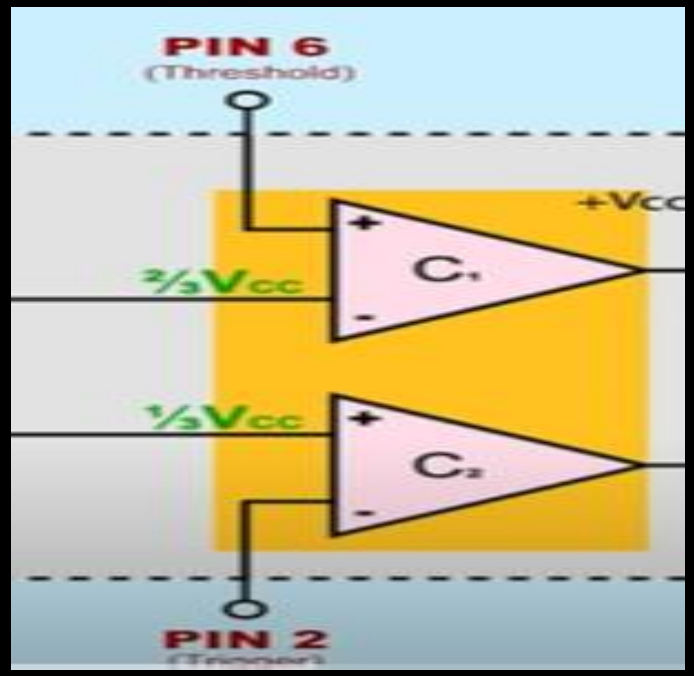
Get 2/3 VCC and at 2nd point

We get 1/3 VCC.

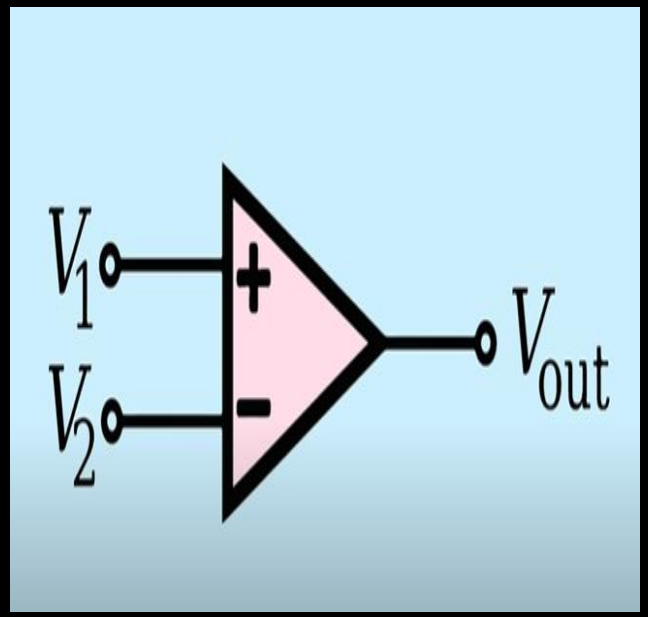


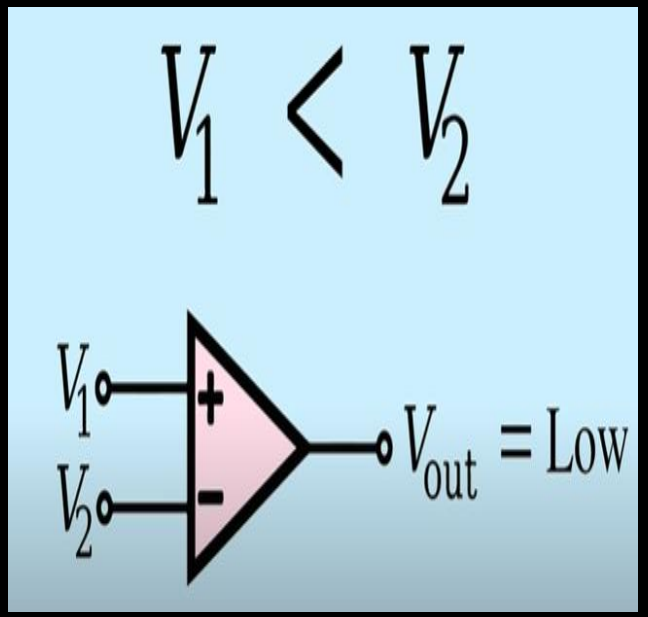
BLOCK 2

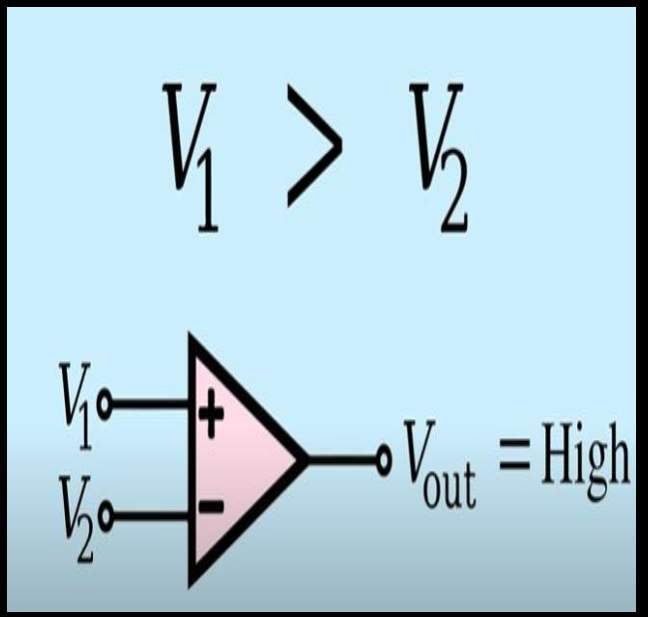
- In this block 2 comparators are used
- It has two terminals in each comparator (+.-)
- Which of these has high value the output will be as that terminal for example if the value at positive terminal is high then the output is high(1) if the negative terminal has the high value then the output is low (0).



BLOCK 2







BLOCK 3

- It contains RS flip flop circuit
- It is considered as one of the basic

Sequential circuit

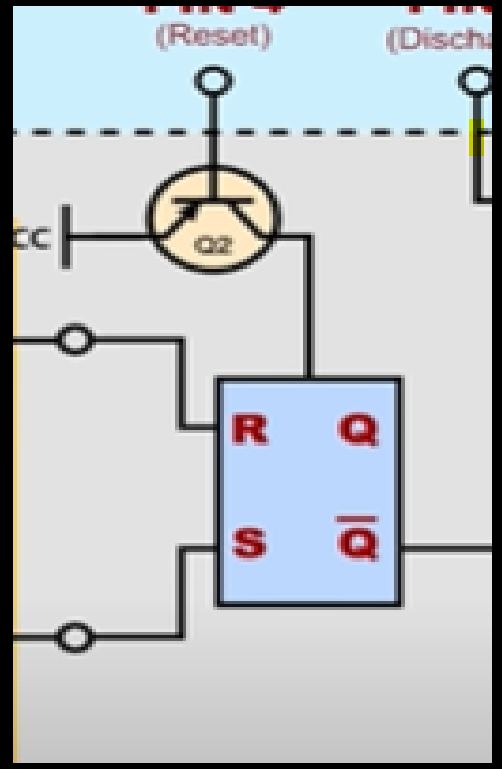
- it has two inputs one is called set and

other is called reset

- In this block there is also an external option for

Reset but it depends on the circuit we are

Dealing with(bistable,monostable and astable)

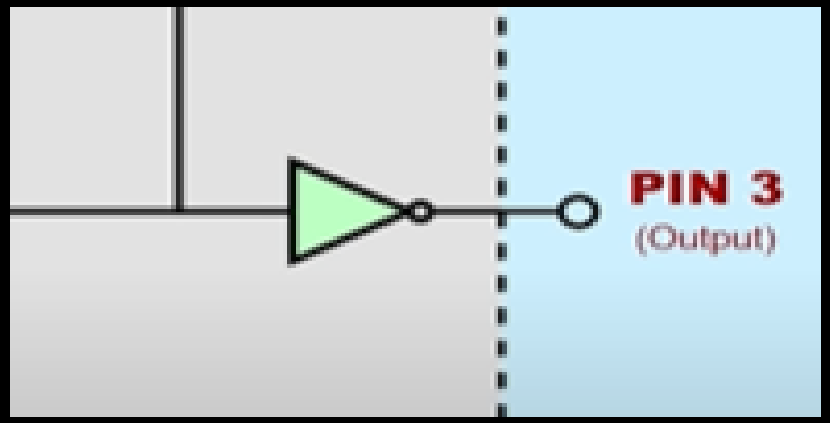


TRUTH TABLE FOR RS FLIP_FLOP

R	S	Q	Q'
0	1	1	0
0	0	1(no change)	0(no change)
1	0	0	1
1	1	invalid	invalid

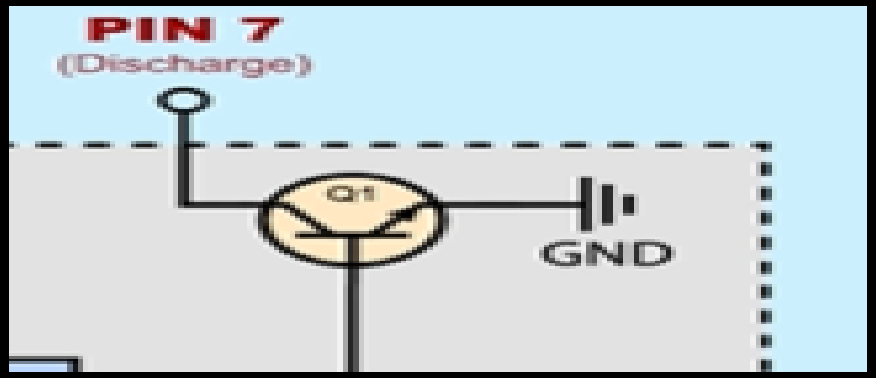
BLOCK 4

- This block contains an output signal with the help of invert gate



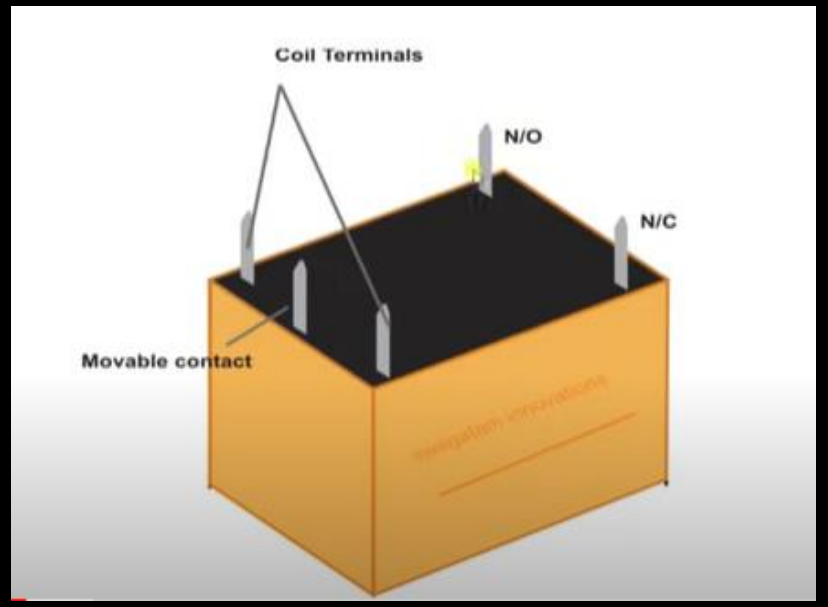
BLOCK 5

- It contains a transistor that works as a discharge option.
- Discharge pin is used with external capacitors setting duration of the timer
- It also depends upon the type of circuit we are required to design(bistable,monostable and astable)



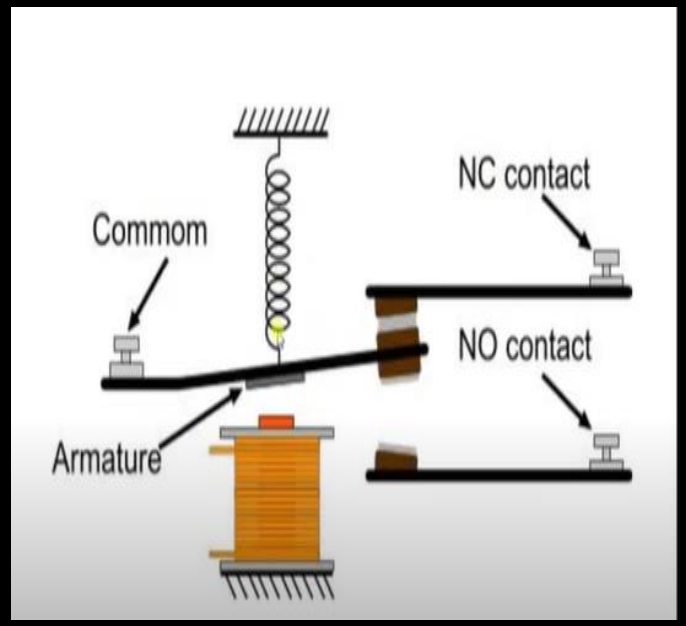
12 V RELAY

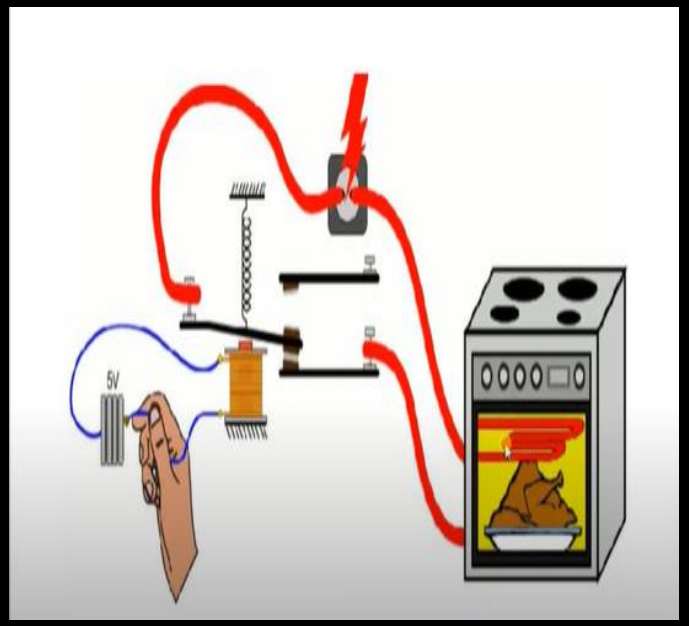
- A relay is the device that opens or closes the contacts to cause the operation of the other electric control. Relays control one electrical circuit by opening and closing contacts in another circuit.
- it contains 5 pins
- There is coil between pin 1 and 2
- Pin 3 in common pin also known as movable contact
- Pin 4 is normally open
- Pin 5 is normally close

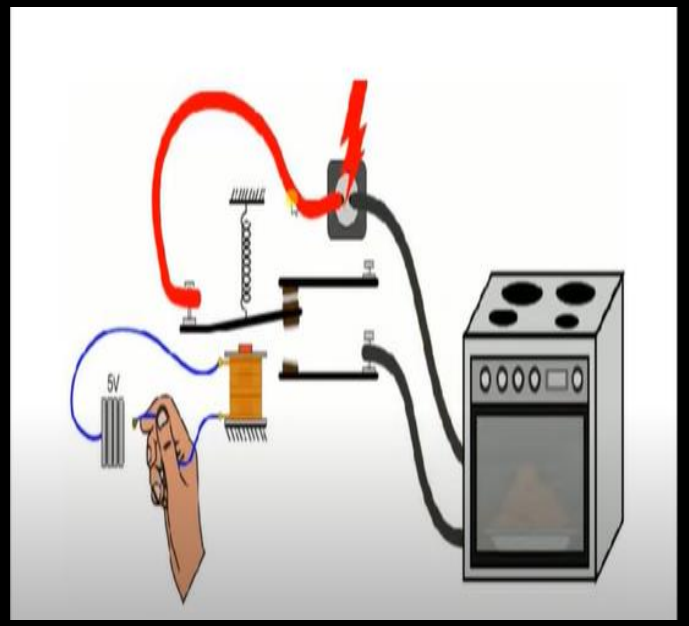


12 V RELAY

- It works on a principle of electromagnetic attraction coil acts as a magnet then it attracts the movable connection (common) for switching purpose.



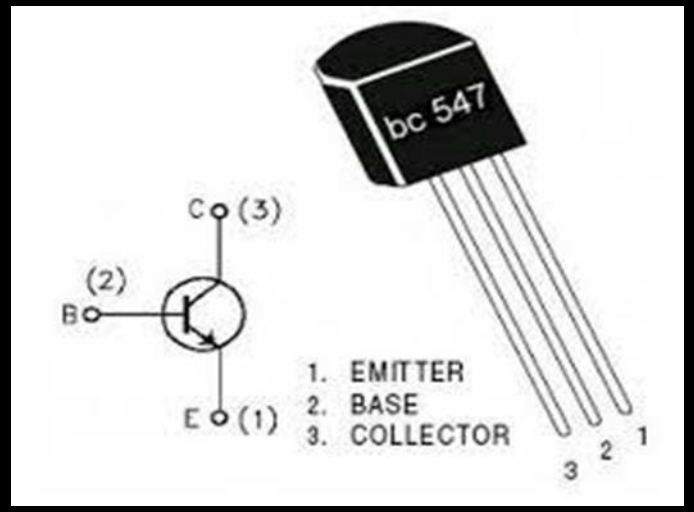


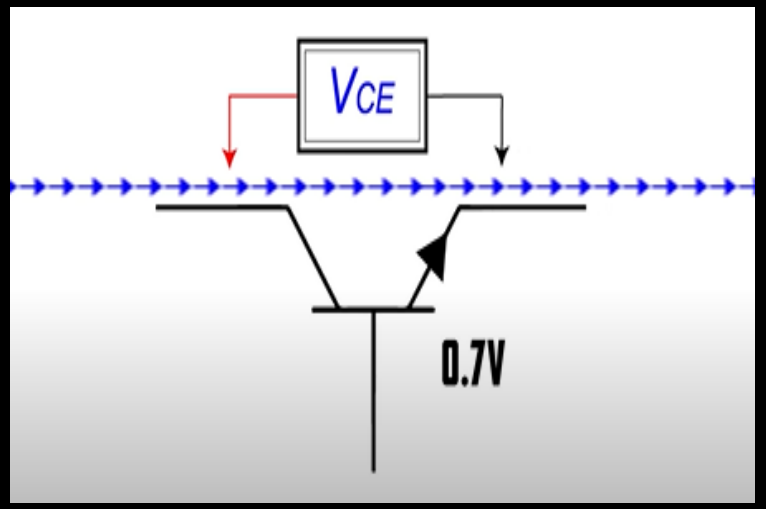


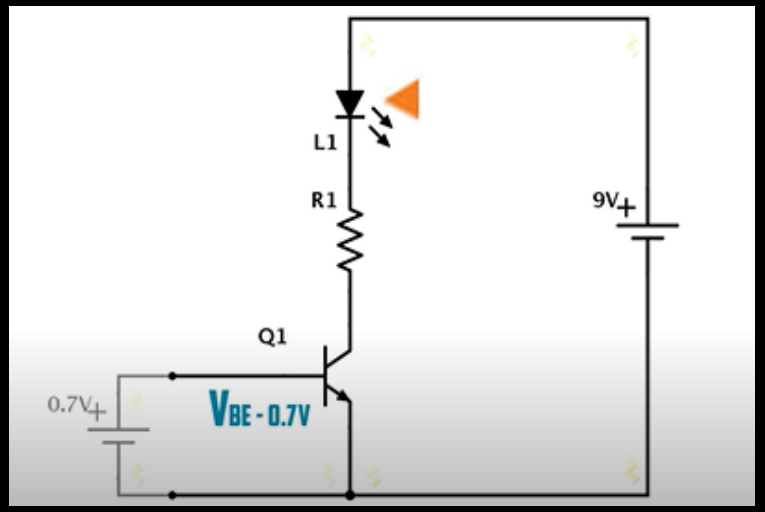
BC547 TRANSISTOR

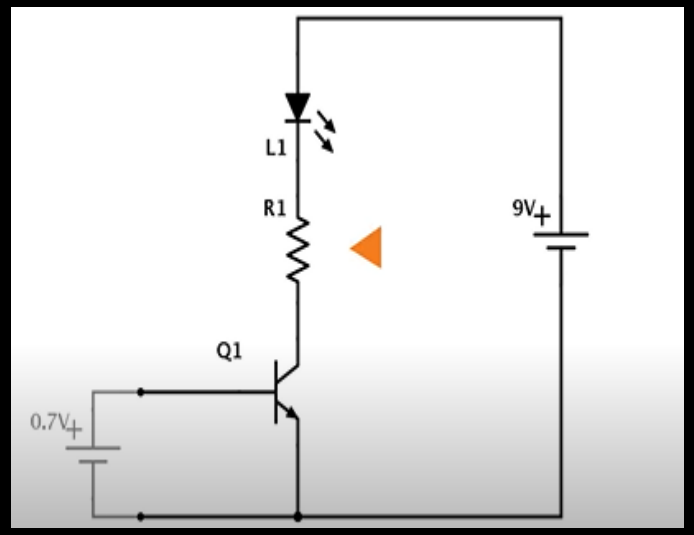
- Bc547 transistor is used as driver
- The BC547 transistor is an NPN transistor(2 diodes). Rather then using a mechanical switch a transistor can work as an electronic switch,also it can be used to amplify currents but in this circuit it is used as an electronic switch.
- Main current flow through collector and emitter
- Signal current flows from base to collector,this current also control the switch
- Current from base to emitter can open the current flow from collector to emitter.
- As we know from diode that at least 0.7v is required to start functioning so in this case when 0.7v is applied at base the transistor start functioning.
- In our circuit if there is high voltage at base then it allows current to flow from collector to emitter.
- Connectivity of collector is such that it is connected to positive terminal and emitter is grounded (Vce).base can be connected to positive terminal aswell wit h respect to emitter at negative (Vbe).

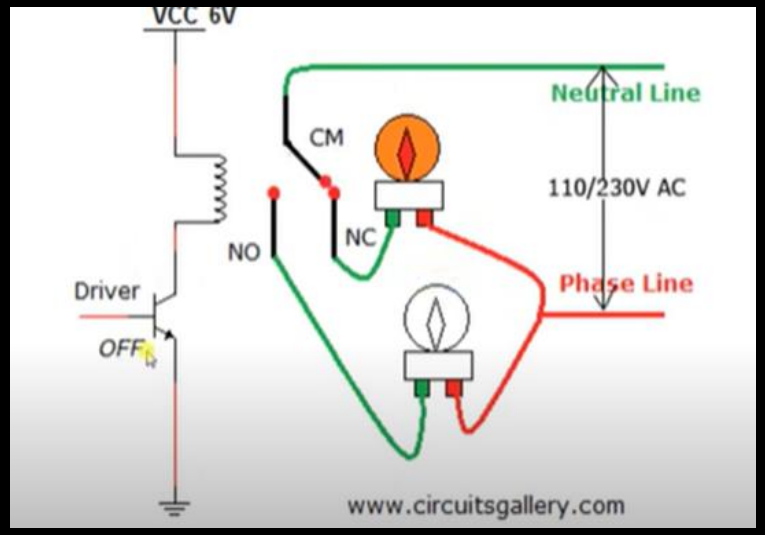
BC547 TRANSISTOR

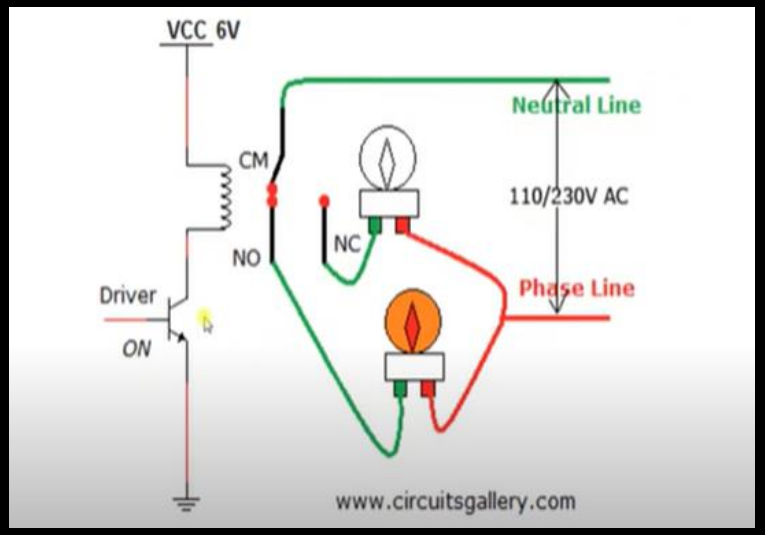








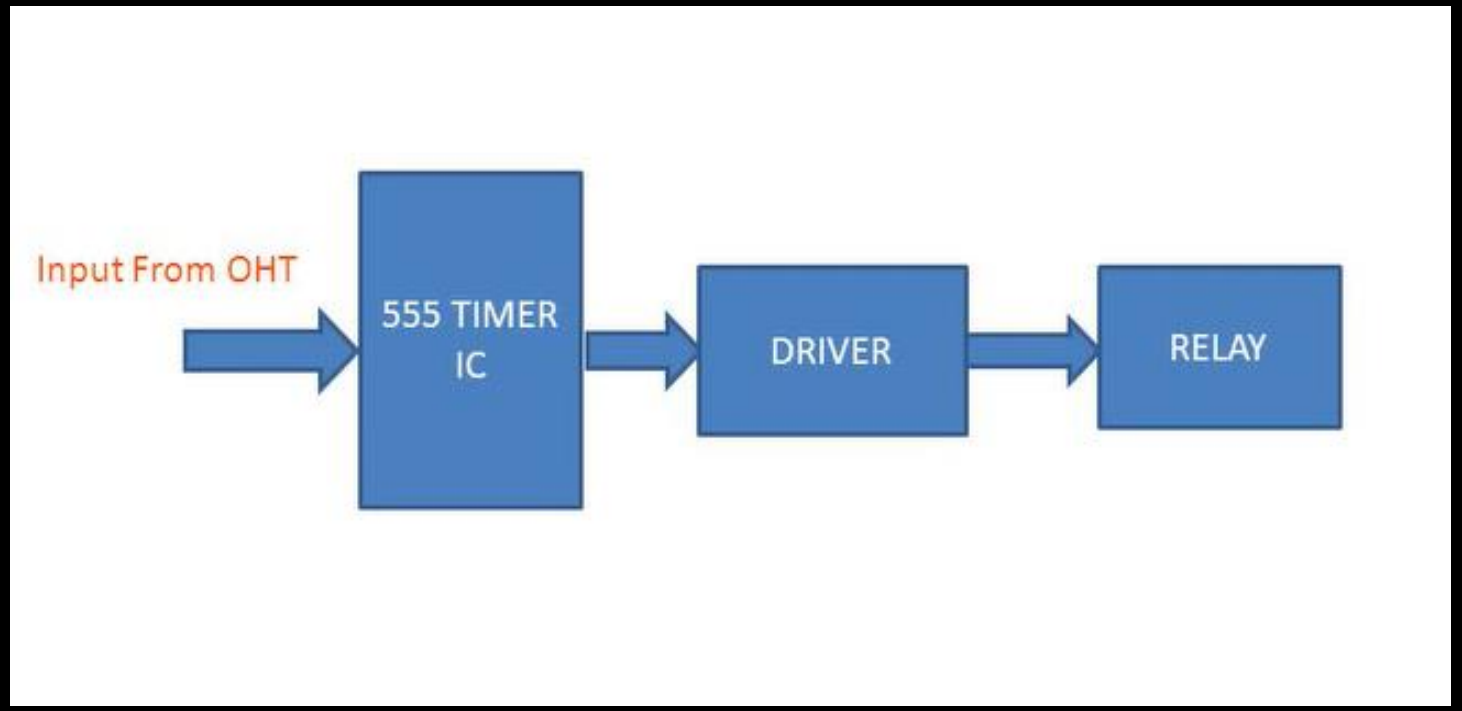




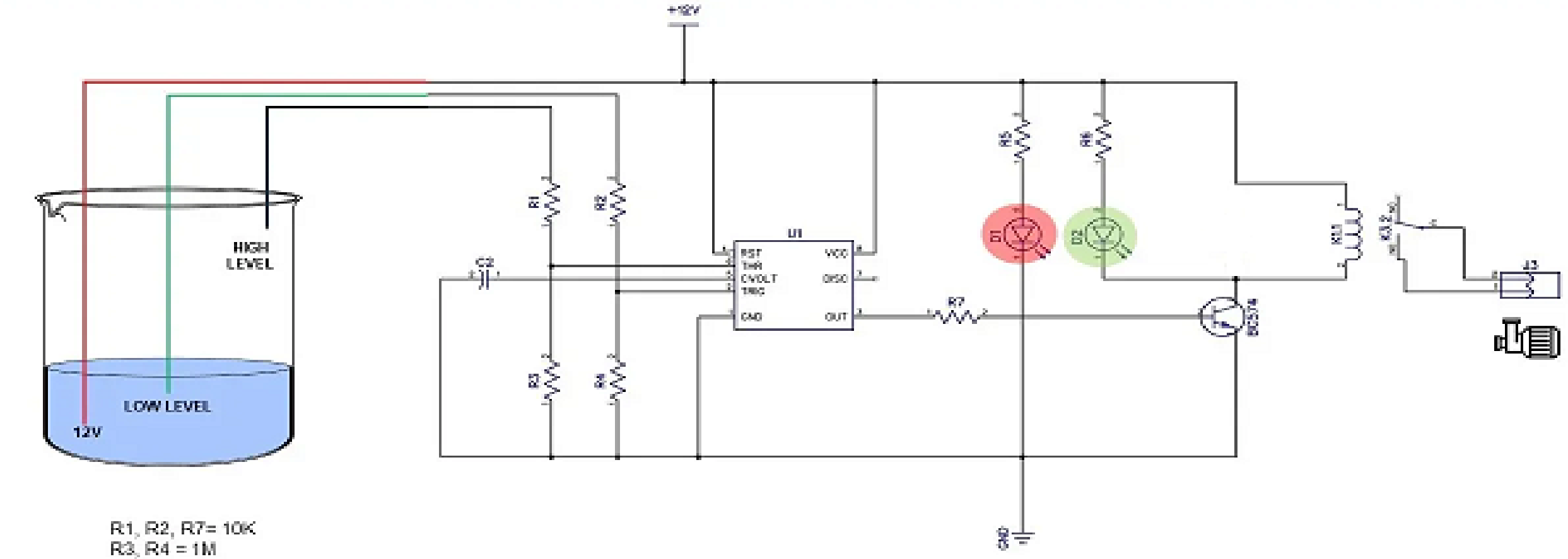
CAPACITOR

- 0.1 micro farad capacitor is used due to the following reason
- When used in a direct current or DC circuit, DC has zero frequency, a capacitor charges up to its supply voltage but blocks the flow of current through it because the dielectric of a capacitor is non-conductive and basically an insulator.
- Normally control terminal (pin 5) of timer is connected to ground through a 0.01µF bypass capacitor so as to prevent noise coupled onto this pin from causing false triggering.

BLOCK DIAGRAM OF WATER PUMP CONTROLLER



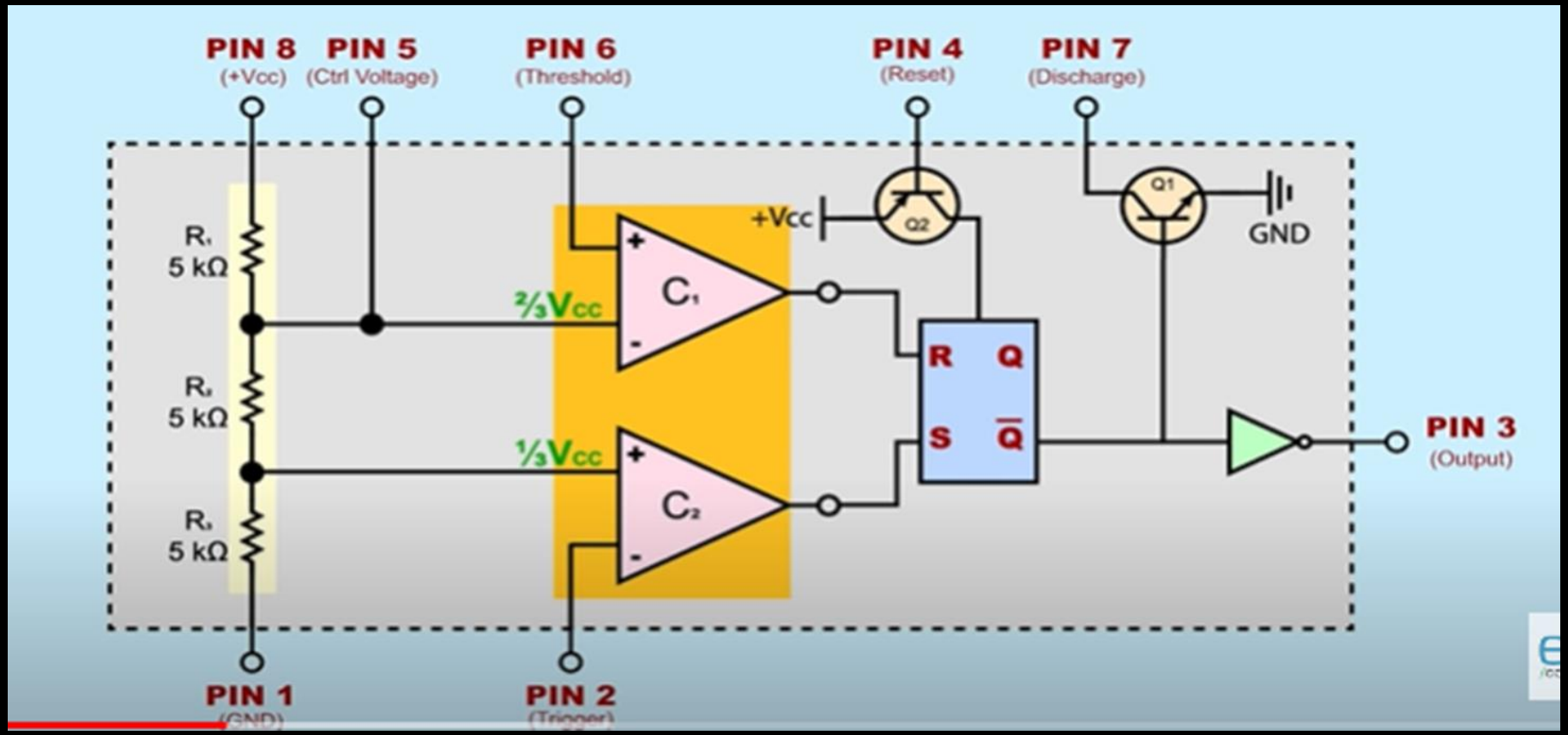
CIRCUIT DIAGRAM OF WATER PUMP CONTROLLER



R1, R2, R7= 10K
R3, R4 = 1M
R5, R6 = 2.2K
D1,D2= LED

C2=0.1uF

DRY RUN


PIN 8
(+Vcc)
PIN 5
(Ctrl Voltage)
PIN 6
(Threshold)
PIN 4
(Reset)
PIN 7
(Discharge)
R
5 kΩ
R
5 kΩ
R
5 kΩ
+Vcc
Q2
Q1
GND
⅔Vcc
C1
⅓Vcc
C2
R
Q
S
Q̄
PIN 3
(Output)
PIN 1
(GND)
PIN 2
(Trigger)

Working of Circuit

- Working can be understand by the following truth table

Pin 6 (Highlevel)	Pin 2 (low level)	R	S	Q’	(Q’)’	pump
low	low	low	high	low	high	on
low	high	low	low	low	high	on
high	high	high	low	high	low	off
high	low	high	high	invalid	invalid	invalid

Applications of Water Pump Controller

- Automatically turn ON/OFF pumps
- Can be used in factories, commercial complexes, apartments, home,
- Fuel tank level gauging
- Oil tank level control
- High & low-level alarms
- Pool water level control
- water level control
- Pump controller
- Stream level monitoring
- Tsunami warning and sea level monitoring

PROBLEM FACED

- These were some of the major problems faced while making this project
- Faulty components initially we designed a proper circuit but due to faulty Components it was not working
- Understanding connectivity
- Working of ne555 ic and relays

LEARNING EXPERIENCE

- Overall it was very interesting experience
- We got to learn so many thing in this project
- Working of relays
- Use of ne555 timer ic
- Checking for the components are they functional or not?
- Developing some enginnering mindset
- Trubleshooting the problems
- Developing logics and much more

CONCLUSION

- To conclude this whole project it was really fun and interesting project to work on we know that it is not something unique but still at our level we learned a lot of new concepts .
- We think that such activities should be promoted and supported as it helps student to have practicle understanding of their engineering knowledge and also it helps boosting students confedence.
- At the end we would like to thank sir abbas Ali shah for giving us this opputunity.

THANKS!!!

For listening to us if there are any queries you may ask.

Wassalam!!!