VISVESVARAYA TECHNOLOGICAL UNIVERSITY

MINI PROJECT REPORT ON

"RAIN SENSING WIPER SYSTEM"

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CERTIFICATE

Certified that the mini project work entitled "**Rain Sensing Wiper System**" carried out by **K..Harshitha (1NH18EC049), K.C.Ankith(1NH18EC042), K.Praneetha (1NH18EC127), K.Harshavardhan(1NH18EC043),** bonafide students of Electronics and Communication Department , New Horizon College of Engineering, Bangalore.

The mini project report has been approved as it satisfies the academic requirements in respect of mini project work prescribed for the said degree.

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Name of Examiner — Signature with Date

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ACKNOWLEDGEMENT

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Finally, a note of thanks to the teaching and non-teaching staff of electronics and communication department for their co-operation extended to us, who helped us directly or indirectly in this successful completion of mini project.

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TABLE OF CONTENTS

List of Figures:

List of Tables:

ABSTRACT

Over the past few decades, the automobile industry has come a tremendous way to upgrade the way of living of mankind and has utilized every aspect of modern computing and electronic advances for the development of safety, reliability and other various technologies of automobiles.

With every driver being exposed to ever increasing number of distractions eventually leading to higher chances of accidents, these automatic wipers have become more appealing to the industry. they require minimum attention and work as compared to the conventional wipers being used. The conventional/ traditional wipers require constant attention from the driver while adjusting the wiper speed. Thus the manual adjustment of the wipers would not only require extra attention but also the driver's hands off the wheel. This would distract the driver which maybe a direct cause of the accident.

Thus in automatic wiper system, water will be detected by the rain sensor, which will trigger the entire circuitry to start working. Thus manual intervention will be reduced to a great extent causing a less chance of accidents and greater efficiency.

CHAPTER 1

INTRODUCTION

A windscreen wiper or a windshield wiper is a device used to remove primarily rain and debris from the screen. This system is equipped in almost all automobiles presently. This system usually consists of an arm pivoted at one end (fixed). The arm/blade swings back and forth with a certain speed on the screen removing any debris or water present. this type of force can be generated by using a worm gear on the output of an electric motor. Thus the driver will be required to turn on the gear and operate the wipers manually.

There are a lot more facilities in today's automobiles such as GPS and music system which will drive away enough attention of the driver. Driving becomes harder than ever to keep focus on many things at the same time. As the amount of manual works increases, chances of accidents will get higher.

Here is where automatic rain sensing wipers come into the picture. This system includes a circuit which consists of four main parts, one being the rain being detected by the rain sensor and triggering the whole circuit which then starts working and wiping the screen. Thus an effort has been made to reduce the effort put by the driver into constantly adjusting the wiper and its speed eventually putting more concentration and focus into his driving.

To make it easier for the drivers, vehicles are now available with driver programmable intelligent windscreen wipers that can detect the presence and amount of rain using a rain sensor. The sensor automatically adjusts the speed of the blades according to the amount of rain detected on the surface. So here we propose an automatic wiper system that automatically switches ON while detecting raining and switches OFF when the rain stops. The system must detect droplets of rain on the windshield and turn ON automatically and adjust the wiper system in accordance to the level of precipitation.

For this purpose we use a rain sensor along with 555 timer and transistor to drive the wiper motor. The rain sensor here is mainly to detect the presence of the rain and send a signal which is then processed by the 555 timer IC to take the desired action. The rain sensor here uses water to complete its circuit, so when rain falls on it, the circuit gets completed and sends out a signal to 555 timer IC. Thus the motor is operated based on the signal sent and the wipers start working

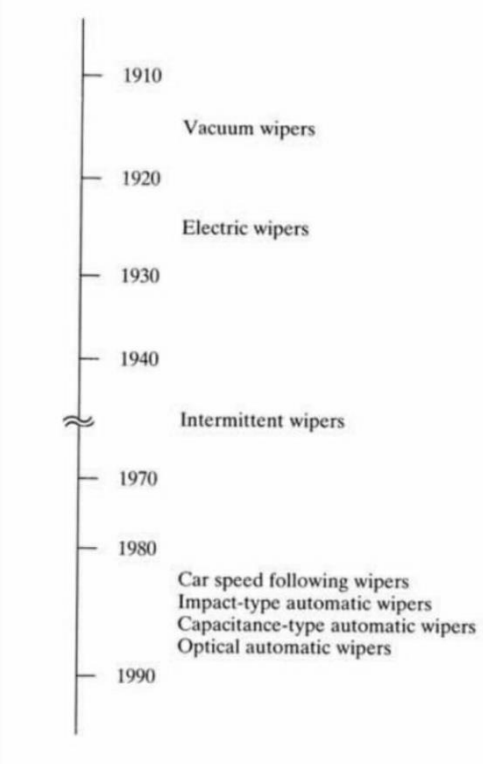
CHAPTER 2

LITERATURE REVIEW

The first windshield wipers were actually brushes. Inventor J.H. Apjohn came up with a method of moving two brushes up and down on a vertical plate glass windshield in 1903. In the same year, Mary Anderson devised a swinging arm that swept the rain off the windshield when the driver moved a lever or gear located inside the car. This became standard equipment by 1913.

Here fig shows the history of wipers. The last remarkable invention/development was of electric wipers. Intermittent are convenient to use when it is drizzling/light rain or just after it stopped raining.

Rubber strips replaced the brushes in 1905 but unfortunately, the hazardous need for the drivers to wipe the windshields while driving was not eliminated until 1917. Wipers were one of the first electrical devices to be used in automobiles after the electric starters were developed in 1912.



Most wipers before 1930 were hung down from the top of the windshield and they were moved to the base of the windshields as the electrical systems got more complicated. In 1962, Bob Kearns invented the intermittent wiper with intervals and speeds that the driver could change. Research and the development for raindrop detection started a long time ago but became popular around the 1970's

Fig 2.1: history of wipers

Wipers were added to the headlights too in the 1980's, requiring connections between the lighting and wiper systems. In the 1990's micro sensors were also built into the windshields to detect the rain on the windshield, activate the wipers and adjust the speed and intermittent use for the amount of rain.

Rain sensing windscreens wipers appeared in various models in the late 20th century, one of the first being Nissan's 200SX/Silvia. As of the early 2006, rain sensing wipers are optional or standard on all Cadillac and most Volkswagen and are available in many other mainstream manufacturers.

B. PRASHANTH, R. PRUTHVI, SANJAY VADIRAJ RS had discussed on windshield wiper system using robust design.[1]

P. ABHILASH REDDY, G. SAI PRUDHVI, PJ SURYA SANKAR REDDY, SS SUBASHKA RAMESH also presented a paper on automatic rain sensing car wiper.[2]

KOTHARI MOHIT, SHAH AMIT, PATEL VIPUL, KADAKIA NISHANTH also reviewed the project 'automatic rain operated wiper system in automobile.[3]

KUSHAL SARIN, JATIN SETHI, ANSHUMAN GUPTA, USHA TIWARI, ISHAN MATHUR made an analysis of 'automatic control of vehicles.[4]

N.M.Z. HASHIM also published a paper on 'smart wiper control system.[5]

CHAPTER 3

PROPOSED METHODOLOGY

PRINCIPLE:

Automatic rain sensing wipers is a project that operates on 5V-12V power supply. The automatic rain sensing wiper system is a circuit that works on the concept of two main components, i.e., 555 timer IC and a rain sensor.

The circuit can be divided into 4 parts mainly, i.e.,

1. 555 IC in astable mode
2. Comparator LM358
3. Motor driver circuitry using L293D
4. Rain detector

Here the 555 timer IC is used in astable mode to operate as an oscillator as to generate output pulses at a certain desired frequency. The time duration of generating the output depends on the external resistors R1, R2 and capacitor C1. Here there is no external triggering required in astable mode as it automatically interchanges its two states on a particular interval to generate a rectangular waveform, hence this mode is also called as free running or self triggering mode.

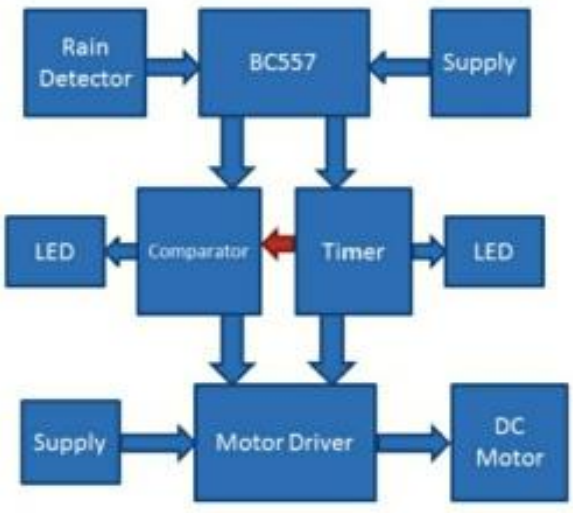


Fig 3.1: Block diagram

The output of the timer is given to comparator LM358 and motor driver L293D. Here comparator is used to compare the output voltage of the timer and the reference output

voltage across the non inverting terminal of the comparator. Thus the output of the timer IC and the comparator is given to the motor driver which will further drive the wiper motor in the direction required.

The main principle of this circuit is to completely cut off any manual intervention in the operation of the wipers when required and program it in such a way that the wipers automatically start functioning upon the detection of precipitation.

WORKING:

We have already noted that there are four main parts of this circuit. Let us now look at a more detailed explanation of this automatic rain-sensing wipers. Fig shows the circuit diagram of the system –

1. 555timer in astable mode
2. LM358 IC
3. L293D
4. Motor driver (DC motor and transistor)

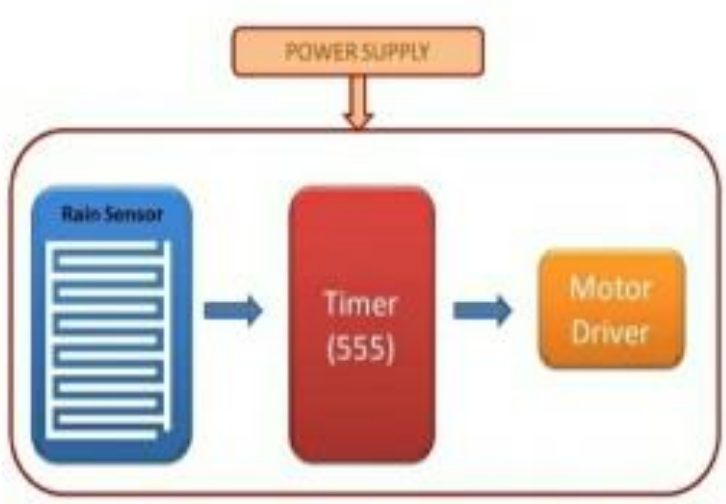


Fig 3.2: flowchart

- Here the rain sensor is used to detect the rain or any precipitation on the windshield. When water drops fall over the rain sensor, it will then trigger the NPN transistor BC547 shown in the circuit. This NPN transistor wills turn ON the power supply of the whole circuit. The circuit will be kept turned ON until there is water being detected at the rain sensor.

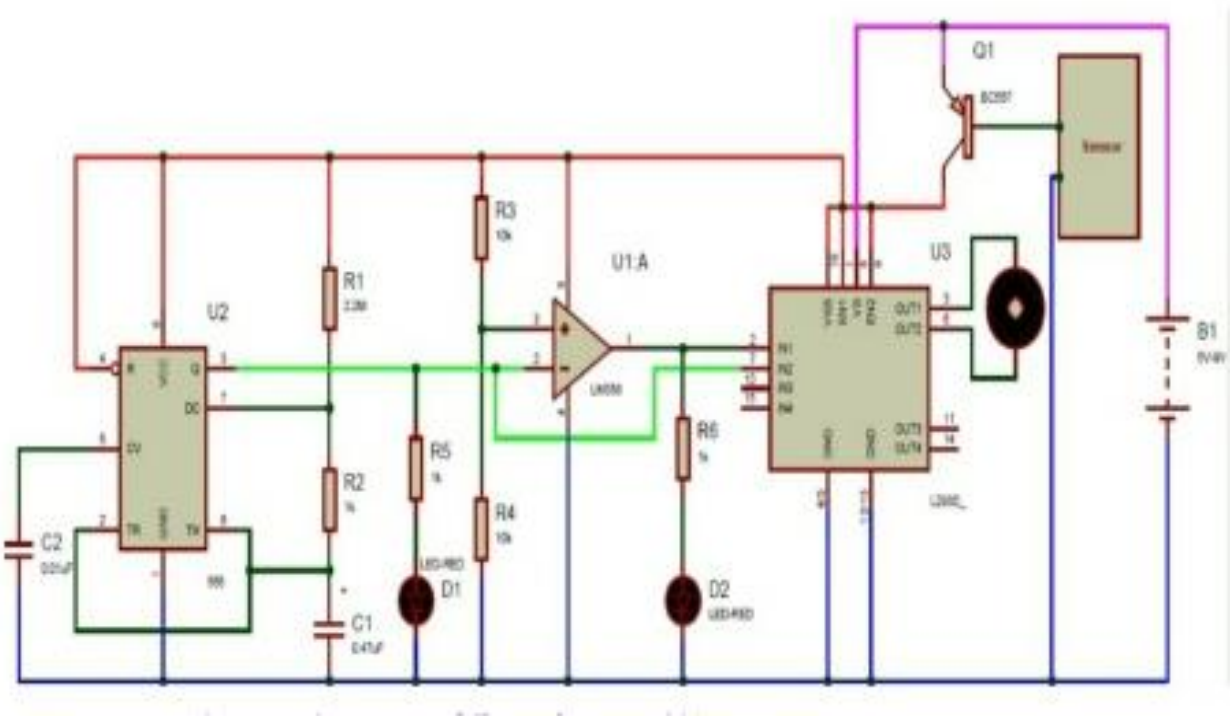


Fig 3.3: circuit diagram

- Once the power supply is ON, the 555 timer IC in astable mode starts working as an oscillator and starts oscillating in the configured frequency. It generates HIGH and LOW outputs in accordance with the time duration setup by the resistors R1, R2 and capacitor C1. The output of the astable multivibrator is directly given to the inverting terminal of the comparator LM358 and to pin 7 of motor driver L293D. Here the reference voltage at the non-inverting terminal of the comparator is set by the voltage divider circuit (set by the resistors R3 and R4).
- Now when the output of the 555 timer IC goes HIGH, the comparator gives a LOW output and when the 555 timer IC goes LOW then the comparator's output goes HIGH. The output of the comparator is directly connected to pin 2 of the motor driver. There are two LED's which have been used, one each at the output of 555 astable circuit and at the output of the comparator LM358 just for our reference, in order to tell the user that the output has been detected at that point.
- Here a voltage follower circuit is placed before LM358, in order to obtain a unity gain.

By using the two different outputs from 555 timer and comparator , the DC motor is operated accordingly: in which these outputs are taken as inputs.

- A single L293D IC is capable of operating 2 DC motors at a time which also includes the ability to control their direction independently. Enable pins 1, 2 are used to enable the input pins provided for motor 1. Thus, the enable pins are connected to the supply (Vcc). Thus, the motor driver in relative accordance to the inputs given at pin 2 and pin 7 and the outputs appear at pin3 and pin 6 as given below-

- Input 1=HIGH, Input 2= LOW gives Output 1=HIGH, Output 2=LOW – the motor rotates in clockwise direction.
- Input 1=LOW, Input 2= HIGH gives Output 1=LOW, Output 2=HIGH – the motor rotates in anti-clockwise direction.
- Input 1=HIGH, Input 2= HIGH gives Output 1=HIGH, Output 2=HIGH – the motor will stand still.

Thus the wipers will operate in the desired way and direction according to the inputs given at the 555 timer IC and the comparator LM358.

The circuit will keep working until the water on the screen gets evaporated or until there is water present on the rain sensor. This is how the wipers will be automatically operated based on the presence of rain/precipitation.

CHAPTER 4

PROJECT DESCRIPTION

COMPONENTS:

1. 555 timer IC

2. L293D

3.IC LM358

4.Transistor BC547

5.Resistors(1k,10k,2.2M)

6.Capacitors(0.01uf,0.47uf)

7.DC Motor

8.Rain sensor

9.power supply

1.555 timer IC

The 555 timer IC Is an integrated circuit Used in a variety of timer, pulse generation on oscillator applications. The 555 can be used to provide time delays, as an oscillator, and as a flip-flop element. Depending upon the manufacturer, the standard 555 package contains 25transistors,2 diodes and 15 resistors on a silicon chip installed with dual in line 8 pin package.

The internal structure of IC consists of 2 comparators, SR flipflop ,3 resistors and one transistor.

Modes of 555 timer:

1.Astable mode

2.Monostable mode

3.Bistable mode

4.Schmitt trigger

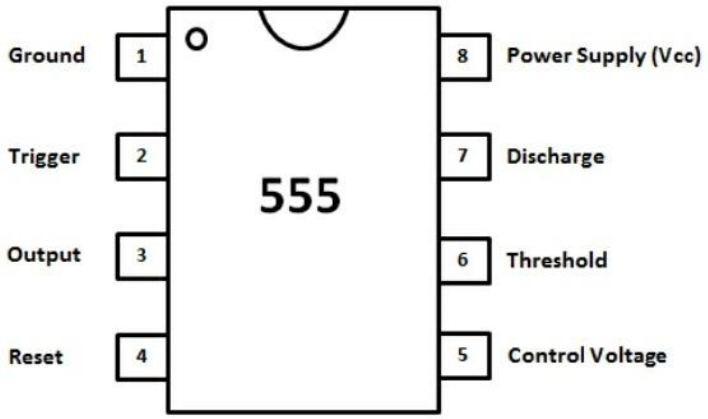


Fig 4.1: Block diagram of 555timer

Pin		I/O	DESCRIPTION
NO.	NAME		
1	GND	O	Ground Reference Voltage
2	Trigger	I	Responsible for transition of SR flip-flop
3	Output	O	Output driven waveform
4	Reset	I	A negative pulse on reset will disable or reset the timer
5	Control Voltage	I	Controls the width of the output pulse by controlling the threshold and trigger levels
6	Threshold	I	Compares the voltage applied at the terminal with a reference voltage of 2/3
7	Discharge	I	Connected to open collector of a transistor which discharges a capacitor between intervals.
8	V_{CC} Supply	I	Supply voltage

Fig 4.2: pin configuration

FUNCTION OF TIMER:

The power connection to a chip is through pins 1 (ground) and pin 8 (Vcc). Positive supply voltage has to be in between 5 and 15V. The image is the closeup of the diagram depicting the

internal functional components of a chip. It consists of few elements like: resistors, compaarators, transistors, a flipflop and a common stage.

- All the 3 resistors are 5k ohms.The major purposeof these resistors is to set up a voltage divider between VCC and ground. AS all the resistors are of same value,we know that the voltage at the junction between the resistors are 2/3Vcc and 1/3Vcc. These voltages are inturn used as as a reference voltages for comparators.
- A comparator is a circuit which compares an input with a reference voltage and outputs a LOW or HIGH signal based on whether the input is a higher or lower wen compared to reference voltage.The comparator connected to pin 2 used compares the “trigger” input to a reference voltage of 1/3Vcc and the comparator connected to pin 6 used to compare the “threshold”input to a reference voltage of 2/3Vcc from the voltage divider.

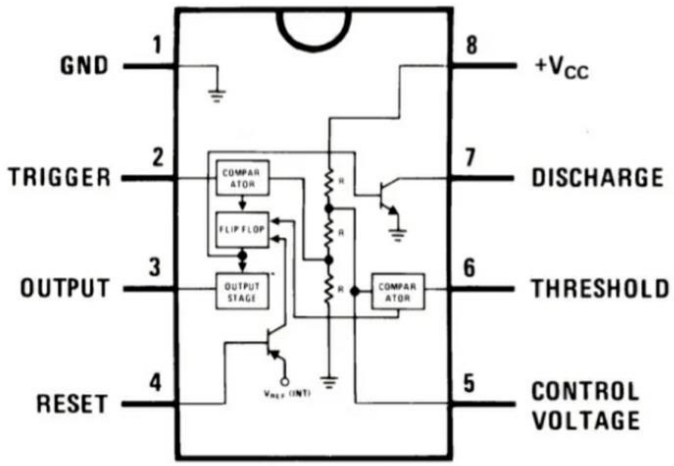


Fig 4.3: internal configuration of 555 timer

- The flipflop used in the circuit which switches in between two stable states based on the states of inputs. 555 flipflop outputs a high or low based on the states of two comparators. When the trigger comparator is outputting a low signal (regardless of threshold comparator) the flipflop switches high. When both are comparators are outputting a high signal ,the flipflop switches low. The timing of a high pulse output from the flipflop can also be manually reset by pulsing the reset pin low.
- The transistor attached to pin 7 is a NPN transistor. As the pin 7 is connected to collector terminal of NPN transistor, this type of configuration is called as “open collector”. This pin is usually connected to capacitor and is used to discharge the capacitor everytime the output pin goes low. The transistor attached to pin 4 is PNP transistor. The purposew of this transistor is to buffer the rest pin,so the 555 timer does not source current from this pin and cause it to sag in voltage.
- The main purpose of output oin is Tom act as buffer when the output pin is connected to any loads. The output stage stage supplies current to the output pin.

Features:

1. 555 timer can used to operate at wide range of power supplies from 5V to 18V
2. Timings can be taken from microseconds to hours
3. Can be operated in different modes
4. Hight output current
5. Has an adjustable duty cycle
6. The output can source or sink a current of 200mA to the load

Applications:

1. Pulse generation
2. Pulse width modulation
3. Missing pulse detector
4. Oscillator
5. Regulated DC to DC converter
6. Voltage to frequency converter

Here in our project we mainly concentrate on Astable mode

Astable mode:

In this mode, the 555 timer acts as a free running mode. Output of this astable multi-vibrator will continuously toggle between low and high values ,there by generating a train of pulse.

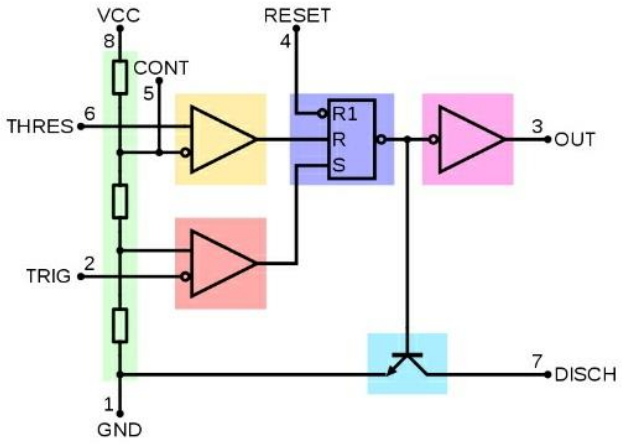


Fig 4.4: internal layout of astable mode

In astable mode ,the 555 timer produces a continuous stream of rectangular pulses with specific frequency .This is implemented by using two resistors R1,R2 and C .In this configuration control pin is not used ,as a result it is connected to ground with 10nF capacitor .This capacitor is known as decoupling capacitor as it is used to shunt the electrical noise .

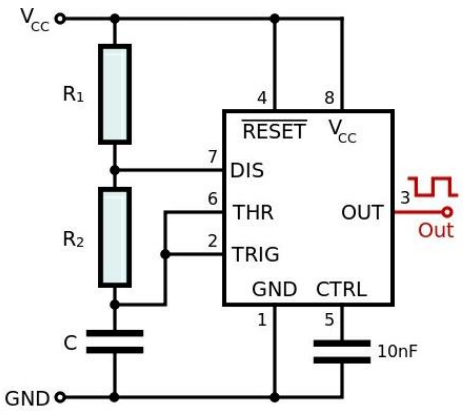


Fig 4.5: Astable mode

Charging and Discharging of Capacitor:

The threshold and trigger pins are connected to capacitor C ,thus they both have the same voltage .Initially the capacitor C is not charged thus trigger pin receives 0 v ,which is less than the 1/3 of voltage supply .Consequently ,the trigger pin makes the output to go high and the internal discharge transistor to go to cut off mode .As the discharge is not short circuited to the ground ,the current flows through the resistors R1 and R2 ,to the capacitor charging it .The capacitor C gets charged until the voltage reaches 2/3 rd of the supply voltage .At this point ,the threshold pin causes the output to go low and internal discharge transistor to go into saturation mode .As a result ,the capacitor starts discharging through R2 till it be less than $1/3^{rd}$ of supply voltage ,in which trigger pin of output goes high and internal discharge transistor to go to again cut off mode .And the cycle repeats .

In the first pulse ,capacitor charges from 0to $1/3^{rd}$ 0f supply voltage ,in later pulses ,it charges only from $1/3^{rd}$ to $2/3^{rd}$ of supply voltage .consequently ,the first pulse have longer time interval than other pulses .Here the capacitor charges from both resistors and discharges only through R2 .Thus the high interval is longer than the low interval .

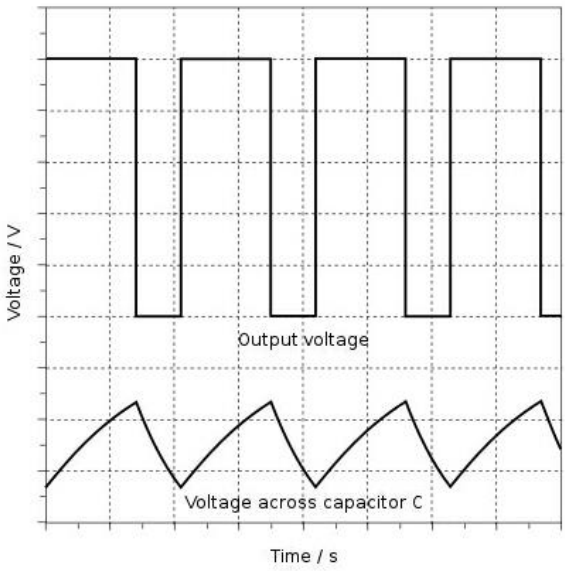


Fig 4.6: wave form in astable mode

- The first cycle takes appreciably longer time, as the capacitor must charge from 0v to 2/3rd of supply voltage but for subsequent cycles it is only from 1/3rd of Vcc to 2/3rd of Vcc.

This is shown through following equation:

The high time interval of each pulse is given as

t_{high} =ln (2) *(R1+R2) *C

The low time interval of each pulse is given as

t_{low} =ln (2) *R2

Hence the frequency *f* of the pulse is given as

$$\frac{1}{t_{high} + t_{low}} = \frac{1}{\ln(2) \cdot (R_1 + 2R_2) \cdot C}$$

And the duty cycle is given as

$$duty = \frac{t_{high}}{t_{high} + t_{low}} \cdot 100$$

Where t is in seconds (time), R in ohms (resistance), C in farads (capacitance), ln (2) is the natural log of 2 constant which is equal to 0.6931.

Resistor R1 requirements:

R1 has to be greater than (Vcc*Vcc)/R1 as per ohms law.

- Low values of R1 ahs to be avoided particularly so that the output stays saturated near 0 v during discharge, otherwise it will not satisfy the given above equation.

Operation of 555 timer in astable mode:

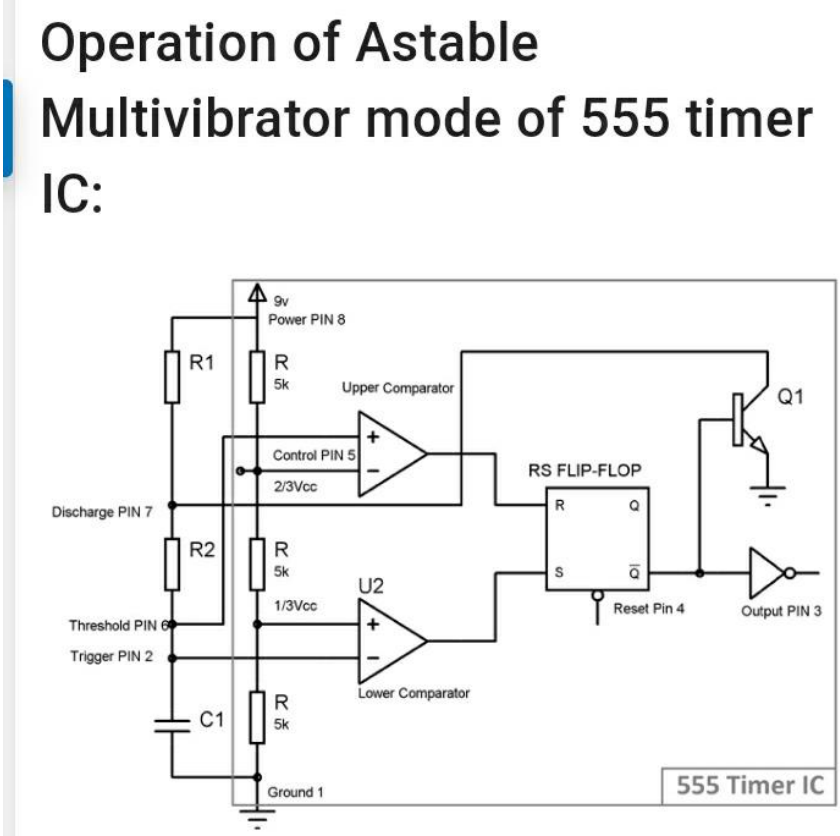


Fig 4.7: Astable mode

- When initially power is turned ON, trigger pin voltage is less than Vcc/3, that results the value of lower comparator output high and sets the flipflop as a result the output is high.

- This makes the transistor Q1 off, as Q'=0 is directly applied to the base of transistor .As transistor is off .C1 gets charged to the voltage greater than Vcc/3 ,then the output of lower comparator becomes low and the output of flipflop remains same the previous output .
- When the capacitor charging becomes greater than 2/3Vcc, then the voltage of non-inverting end becomes higher than inverting end of comparator. This makes the output of upper comparator HIGH and resets the flipflop, output of 555 chip becomes LOW.
- As soon as the output of 555 timer chip goes LOW Q'=1, then transistor Q1 be ON, then the capacitor C1 is shorted .so C1 starts discharging to ground through PIN 7 and resistor R2.
- As capacitor voltage gets down to 2/3Vcc, upper comparator becomes LOW, SR flipflop remains in the previous state, here both the comparators are LOW.
- While discharging, when capacitor voltage goes down to Vcc/3, the lower comparator output becomes HIGH and sets the flipflop again as a result the output becomes HIGH.
- Transistor Q1becomes OFF and again capacitor C1 starts charging.

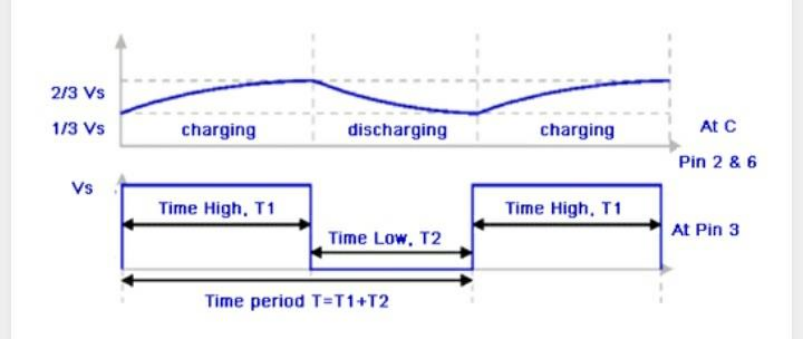


Fig 4.8: final waveform output

This charging and discharging of capacitor continues as a result rectangular oscillating output wave is generated. when the capacitor charges, the output is HIGH else the output is LOW. Here none of the state is stable and it automatically interchanges from HIGH to Low and vice-versa. It is also called as Free Running Multi-vibrator.

NOTE:

- Increase the value of C to increase the period
- Increase the value of R1 to increase the high time(T_1) without affecting the low time(T_0).
- Increase the value of R2 to increase the high time (T_1), with increase in the low time(T_0) and decreases the duty cycle.

2.IC LM358:

LM358 is a great, low power and easy use with dual channel op-amp. It consists of two internally frequency compensated, high gain, independent op-amps. This is specially designed to operate from a single power supply over a wide range of voltages.

Pin configuration is given as:

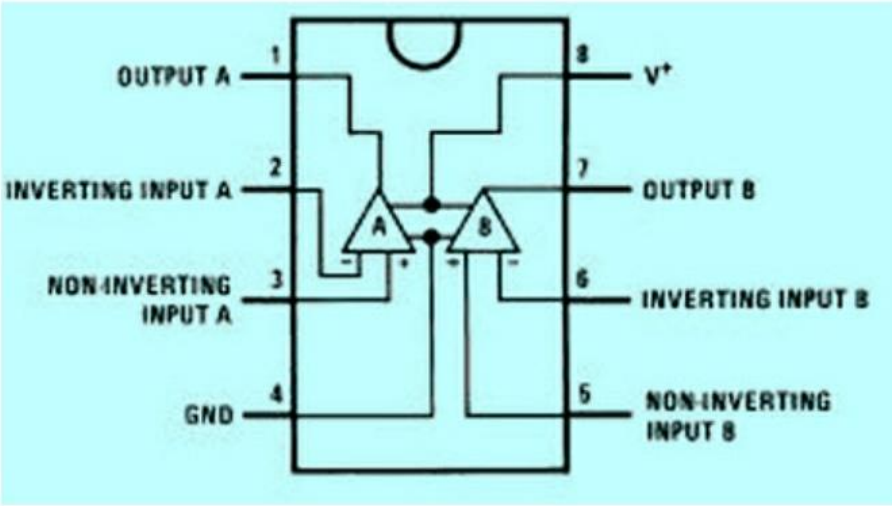
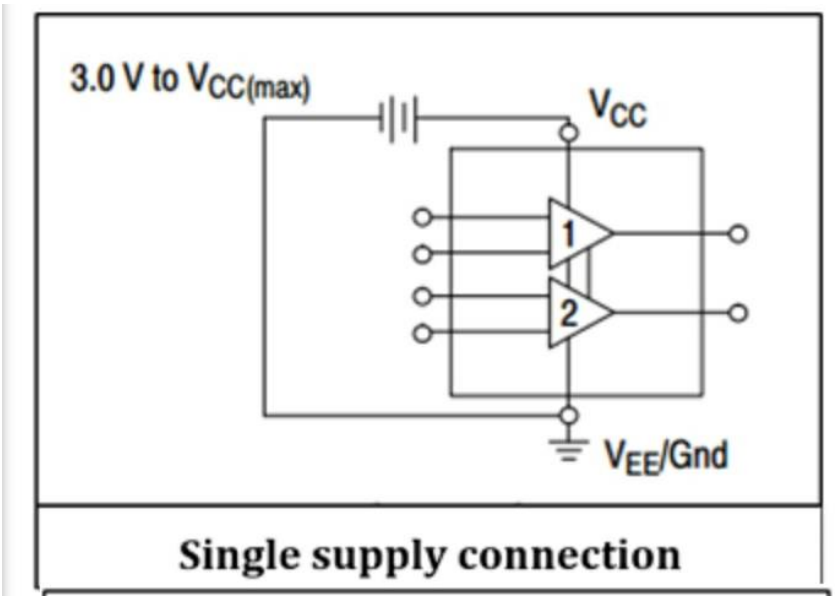


Fig 4.9: pin configuration of LM358



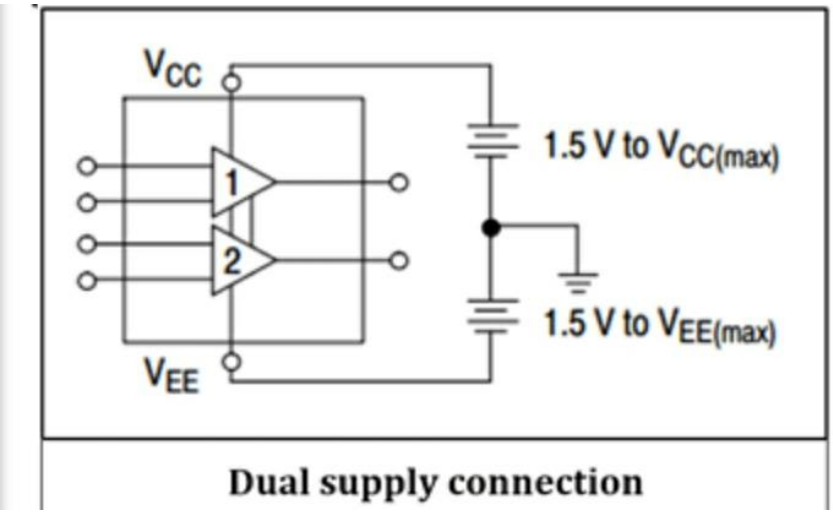


fig 4.10: supply connections

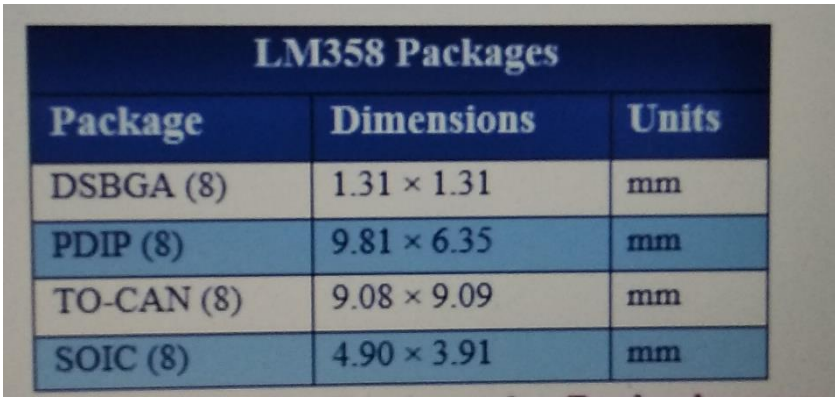
- If the inverting pin is HIGH, the output is NEGATIVE
- If the inverting pin is LOW, the output is POSITIVE
- If the non-inverting pin is HIGH, the output is POSITIVE
- If the non-inverting pin is LOW, the output is NEGATIVE

Features of LM358:

- It consists of two op-amps internally and frequency compensated for unity gain
- Max voltage gain of 100dB
- Max wide of bandwidth is 1MHz
- It includes both single and dual power supplies
- Single power supply ranges from 3V to 32V
- Dual power supply ranges from -1.5V to -16V
- Drain current is very low i.e, is 500uA
- Low input offset voltage of 2mV
- Common mode input voltage comprises to ground
- Output swing is large

PACKAGES OF LM358:

LM358 has 4 different 8 pin packages.Namely, DSBGA, PDIP, TO-CAN, SOIC and its dimensions are stated below.



LM358 Packages		
Package	Dimensions	Units
DSBGA (8)	1.31 × 1.31	mm
PDIP (8)	9.81 × 6.35	mm
TO-CAN (8)	9.08 × 9.09	mm
SOIC (8)	4.90 × 3.91	mm

Fig 4.11: packages of LM358

Applications:

1.Transducer amplifiers

2.Conventional op-amp circuits

3.Integrator, differentiator, summer, adder, voltage follower

4.Dc gain blocks, digital multi-meters, oscilloscopes

5.Comparators

3.L293D:

L293 is typical motor driver which allows DC motor to either direction. L293 is a 16 pin IC which can control asset of two DC motors at a time in any direction. Which means that you can control the two motors at a time in a single IC. The L293D can drive small and quiet large motors as well.

Concept:

This IC works on the concept of H-bridge. It is a circuit that allows the voltage to be flown in either direction. As you know the voltage need to change its direction for being able to rotate the motor either in a clockwise or anti-clockwise direction. Hence H-bridge IC is ideal for driving a DC motor.

In a single chip there are two H-bridge circuit inside the IC which helps to rotate the motors independently. Due to its size it is very much used in robotic applications.

Pin configuration of IC

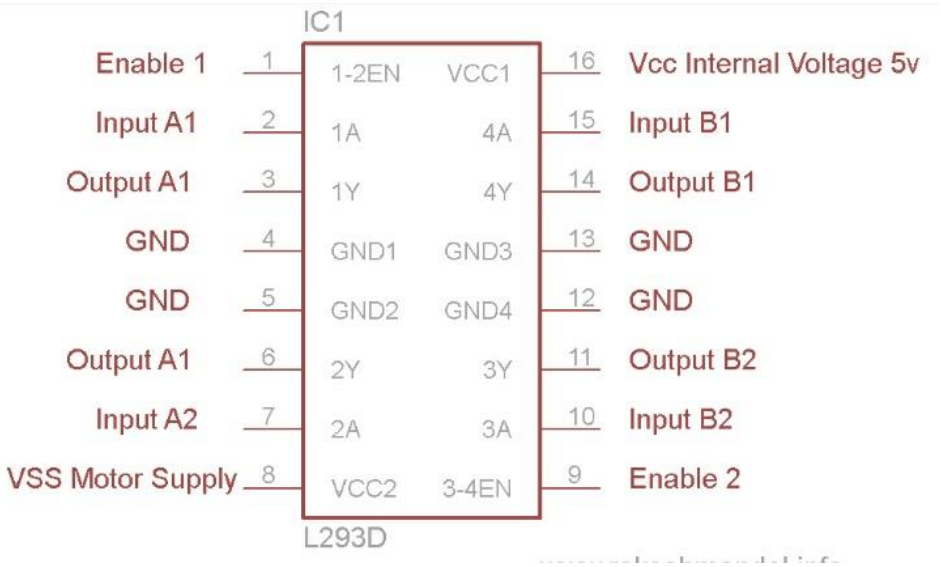


Fig 4.12: pin configuration of L293D

There are two enable pins in the IC. Pin 1 and pin 9, for being able to the motor, the pin 1 and pin 9 need to be high. For driving the motor to left H-bridge you need to enable pin 1 high to be enable the R – bridge you need to enable pin9 to be high. If any of the pins either pin 1 or pin 9 goes low then motor will suspend working. It acts like a switch.

Working of L293D

There are four Input pins for L293D, pin 2, pin 7 on the left and pin 15, pin 10 on the right. Left input pins are used to rotate the motor in the left direction whereas the rightside pins are used to rotate the motor in right direction. Motors are rotated based on the inputs provided at the input side either LOGIC 0 or LOGIC 1. In simple, if the motor to be rotated, inputs are to be given either with LOGIC 1 or LOGIC 0.

L293D logic table:

Let's consider a motor connected on the left side output pins (pin 3,6). For rotating the motor in a clockwise direction, the input should contain either LOGIC 1 or 0.

- Pin2=logic 1 and pin7=logic 0 results in clockwise direction
- Pin 2=logic 0 and pin 7=logic 1 results in anticlockwise direction
- Pin 2=logic 0 and pin 7= logic 0 results in no rotation
- Pin 2=logic 1 and pin 7= logic 1 results in no rotation

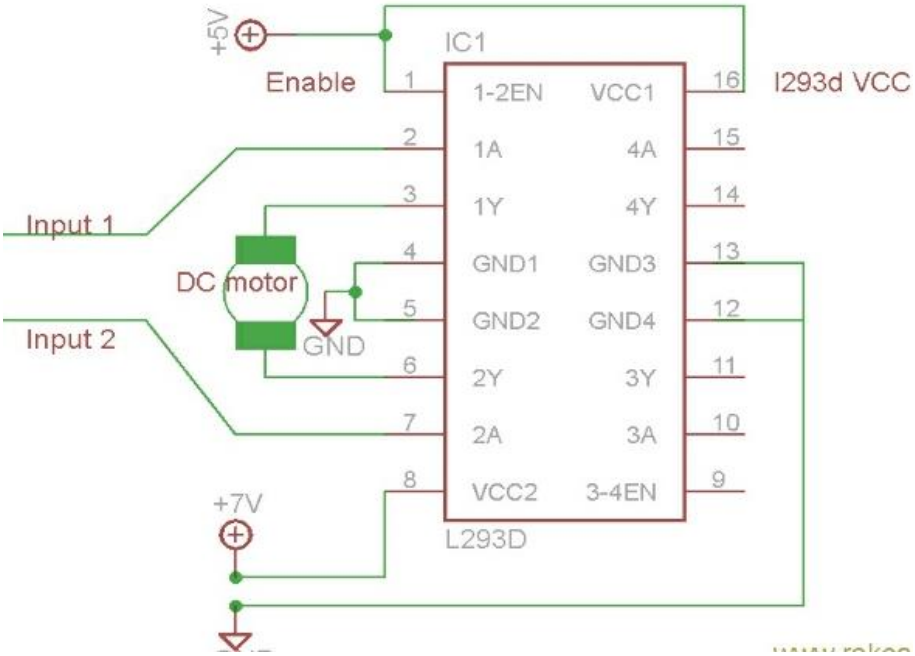


Fig 4.13: connection of DC motor

Input 1 = LOW(0v)	Output 1 = LOW	Motor 1 rotates in Anti-Clock wise Direction
Input 2 = HIGH(5v)	Output 2 = HIGH	
Input 3 = LOW(0v)	Output 1 = LOW	Motor 2 rotates in Anti -Clock wise Direction
Input 4 = HIGH(5v)	Output 2 = HIGH	

Fig 4.14:conditions of DC motor output

Voltage specification:

Vcc is the voltage that needs for its own internal operation 5V whereas this IC doesn't use this voltage for driving the motor .For driving the motor, it has a separate motor supply(Vss).L293 uses this voltage to drive the motor. The maximum voltage for Vss motor supply is 36V.

Features:

- Can be used to run two motors simultaneously
- Speed and direction control are possible
- Range of motor voltage is 4.5V to 36 V
- Max peak motor current is1.2A
- Max continuous motor current is 600mA
- Supply voltage to Vcc is 4.5 to 7V
- Transition time is 300ns
- Automatic thermal shut down is available availability as 16 pins

4.Transistor BC 547:

BC 547 is an NPN transistor. A transistor is nothing but transfer of resistance that is used for amplifying the current. A small current of the base terminal of this transistor helps in controlling the large current of emitter and base terminals. The main function of this transistor is to amplify as well as switching purposes. Max gain current of this transistor is 800A.

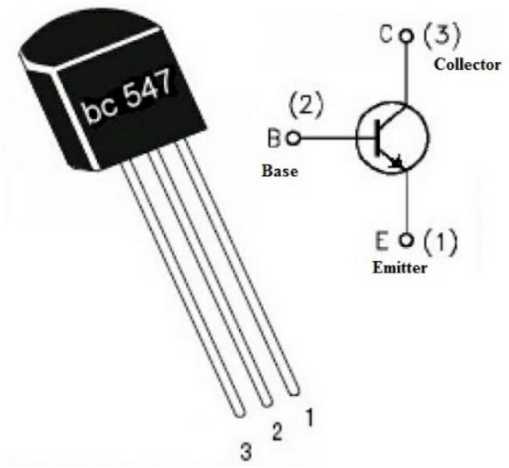


Fig 4.15:schematic view of transistor

Features of transistor:

1. Dc current gain is 800A
2. Continuous collector current is 100mA
3. V_{BE} is 6v
4. Base current is5mA
5. Transition frequency is 300MHz
6. Power dissipation is 625mW

Transistor as a switch:

Transistor can be used as both switch and amplifier. Transistor works as a switch when it is in between saturation and cut-off regions. In cut-off state both emitter base junction and collector junction are reverse biased. But, in saturation region both are forward biased.

Transistor as a switch ON:

Transistor becomes ON when there is a sufficient voltage is given at the input. During this condition, the collector emitter voltage V_{ce} will be approximately equal to 0 i.e, the transistor is short circuited. For a silicon transistor it is 0.3V. Thus collector current $I_c=V_{cc}/R_c$ will flow.

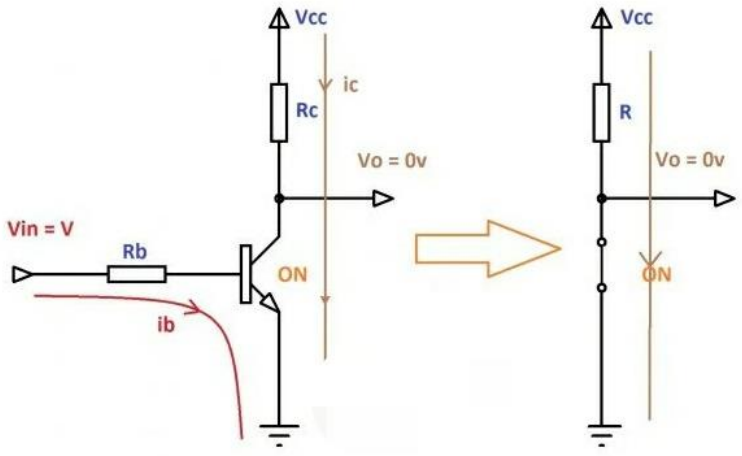


Fig 4.16: when transistor is ON

Transistor as a switch OFF:

Transistor goes OFF when the input Vin =0. During this state transistor acts as an open circuit and as a result entire voltage is available at collector.

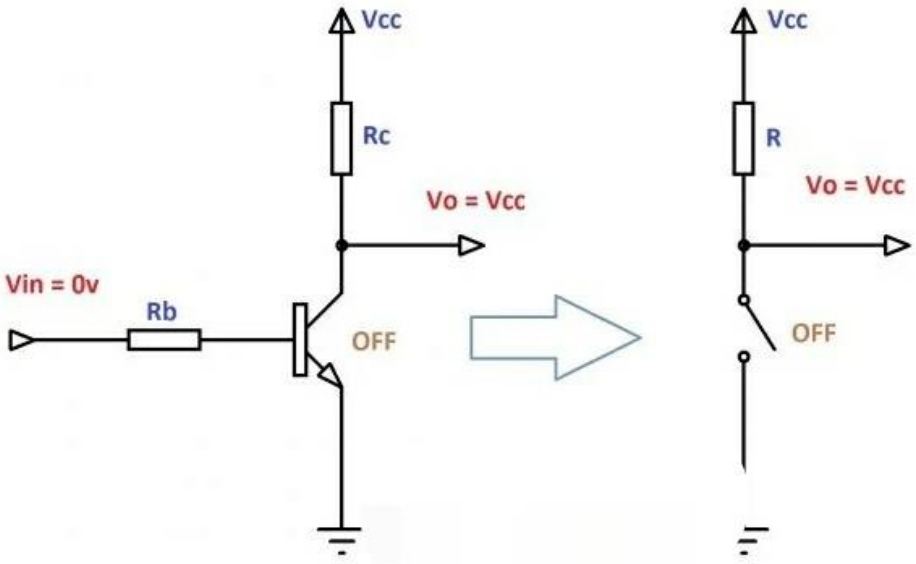


Fig 4.17: When transistor is OFF

Applications:

1. Widely used as a switch and amplifier
2. Amplification of current
3. Darlington pair
4. Pulse width modulation
5. Audio amplifiers

5.DC Motor:

DC motor is a rotary-electrical motors that converts direct current electrical energy to mechanical energy. Here in our project DC motor simulates the action of car wiper. The DC motor works on the principle of Lorentz force. Nearly all types of DC motors have some internal mechanism either electromechanical or electronic, to periodically change the direction of current flow in part of the motor. Most types produce rotary motion, whereas a linear motor produces force and motion in a straigh line path. DC motors were the first type

that is are widely used, since they could be powered from existing direct-current lightening power distribution systems.

Fig 4.18: DC motor

The speed of a DC motor can also be controlled over a wide range, by using either a variable supply voltage or by changing the strength of current in its field windings. Small Dc motors are used in tools, toys and applications. The universal motor can operate on direct current but is a lightweight motor used for the portable tools and applications. Large DC motors are mainly used in propulsion of the electric vehicles, elevators or in rolling mills.

Here in our project we prefer gear DC motor. Because it is an all in one combination of a motor and a gear box. The addition of gear to a motor head reduces the speed while increasing the torque output.as a result the shaft speed of a motor reduces.

6.Rain sensor:

A rain sensor is a switching device activated by the rainfall or presence of water. It works like a switch and the working principle of this sensor is, whenever there is a rain, the switch will be normally closed.

The rain sensor which we use in our project consists of a zigzag pattern of conductive path printed on the PCB. They are electrically isolated and conducted on waterfall or rainfall. The rain sensor module is an easy tool tom detect the rainfall.

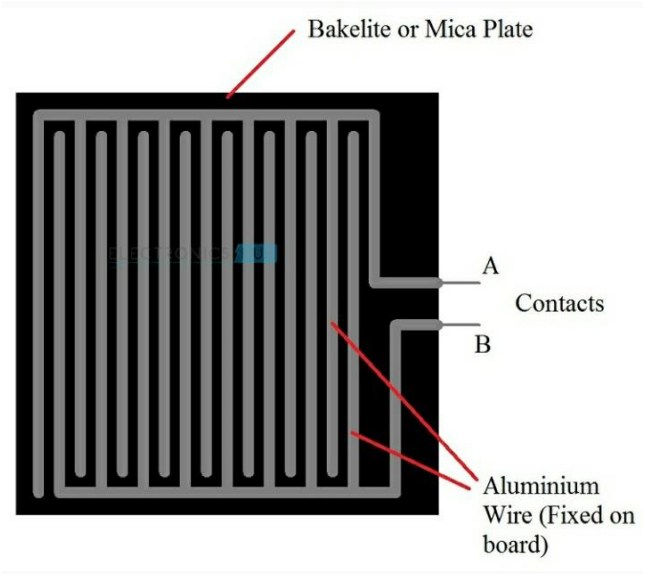


Fig 4.19: Rain sensor

Applications:

1. Used as a water preservation device connected to irrigation system
2. Used to guard the internal parts of an automobile against the rainfall.
3. Supports the windscreen wiper's mode

7.Resistors and Capacitors:

- A resistor is a passive element. Resistors is an electrical component that reduces the electrical current flowing through a circuit line. The resistor's ability to reduce the current is known as resistance and is measured in ohms.
- A capacitor is a device that stores electrical energy in a electric field. It is a passive electronic component with two terminals. The effect of capacitor is known as capacitance. In other words, the capacitor charges and discharges The electric charge stored in it. The function of capacitor is that it blocks the flow of DC and allows the AC to flow in.

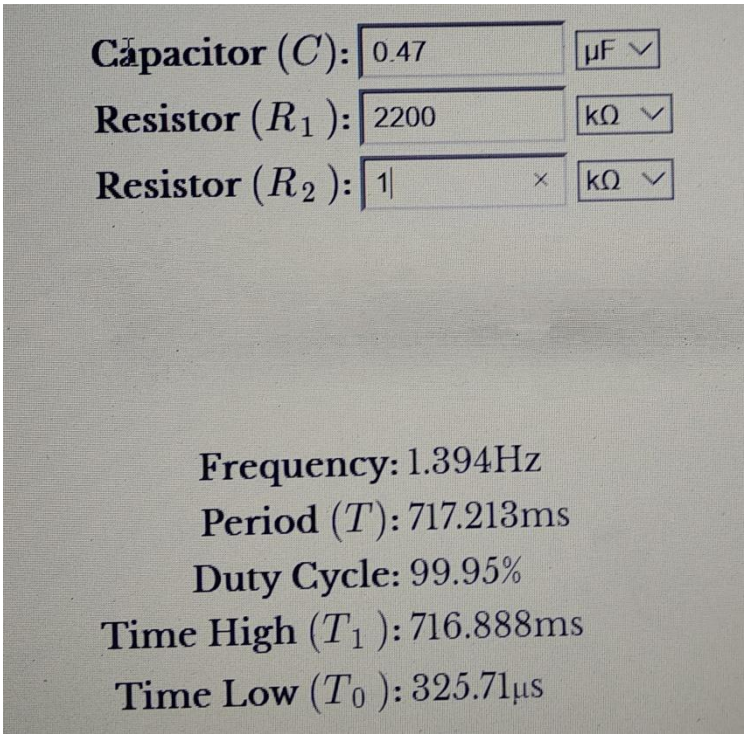
8.Power supply:

A power supply is a device that supplies electric power to electric load. The term is the most commonly referred electric power that converts one form of electrical energy to other, though it may also refer to that convert another form of energy (mechanical, chemical, solar) to electrical energy. The regulated power supply is that controls the output voltage or current to a specific value;

CHAPTER 5

RESULTS AND DISCUSSION

The components used are made to be activated in a required way. The wipers used here remains activated till the rain sensor detects water. Here, the wipers are designed in such a way to operate at a time period of 15µsec to 700msec.



Theoretical result

CHAPTER 6

CONCLUSION AND FUTURESCOPE

CONCLUSION:

We would like to say that there are still many more enhancements one can implement to make this project much more effective and convenient. The project we have made is quite efficient and cost effective as per the necessity of a common man. The speed controlling mechanism can be added in this project which will work basing upon the intensity and speed of the water coming on it.

FUTURESCOPE:

Using more appropriate rain sensor we can make more precise wiper system. By adding microcontroller to the system we can add some security features to it. Moreover by using microcontroller we can make the wiper to operate at a particular angle. We can use a capacitor sensor which will enable it to work along the line of sight. Moreover speed controlling mechanism can also be added in order to control the speed of wiper basing on the speed of the intensity of water flow.

ADVANTAGES:

1. It can be easily and quickly installed in the automobiles.
2. Simple and portable
3. Easy to implement in vehicles
4. Cost effective
5. Less power consumption of 120W
6. Helps the driver a better and convenient driving

APPLICATIONS:

1. Useful for vehicles
2. It can also be implemented at house window for cleaning
3. Prevents the glass shield or bars from being corroded
4. A slight modification in the system makes it a better cleaning system

LIMITATIONS:

1. As the circuit being simple,
2. order to implement in larger applications the circuit is to be modified
3. Sensitive to external light
4. The entire circuit functioning depends upon the 555 timer
5. Rain sensor is to be carefully designed for apt output

REFERENCES:

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3. https://www.eeweb.com/project/automatic/wiper