

# DC Motor Control by Using Single Switch

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**Abstract-** The aim of developing this project is to control the direction of DC motor using a single switch. The main advantage is maintaining proper constant voltage throughout the operation. This is achieving by forming H-BRIDGE CIRCUIT. The timer IC is used to avoid false triggering of the motor while pressing switch. For generating of pulses a DECADE COUNTER (4017) is used. This produces the signal to the motor to run in forward (or) reverse direction. This project is practical and highly feasible in economic point of view, and has an advantage of reduce wire of all the operation. The direction of DC MOTOR is finding by LED. This project gives a reliable, durable, accurate and efficient way of control of a DC motor.

Power switch is a device used to control the electronic circuits. It's function is make, change, break. We use a single push button to control all the operation. Power LED's indicates that the motor is in stop, forward rotation and reverse rotation respectively. IC 555 Multi-vibrator can be used to generate stable timer delay. The duration of pulse is determined by the RC network connected externally to the 555 timer. Decade Counter which is reset at the 10th clock pulse otherwise called divide by 10 (or) mod 10 counter (or) BCD counter. Direction Control is used to operate the motor in forward and reverse direction. The 9v power supply is used and 6v regulated power supply for 6v DC motor.

## I. INTRODUCTION

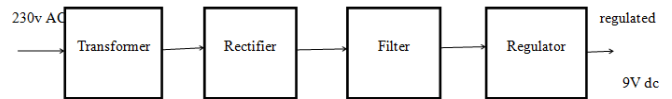
The motor can be made to run in both directions (i.e) clockwise and anti-clockwise. An interesting fact that adds to the curiosity of the circuit is that this is done by pressing a single switch. The commonly used H-Bridge circuit uses two control signals to control both the direction of the motor. Before we begin explaining the circuitry, let's have some information about the H-Bridge circuit.

### H-Bridge Circuit:

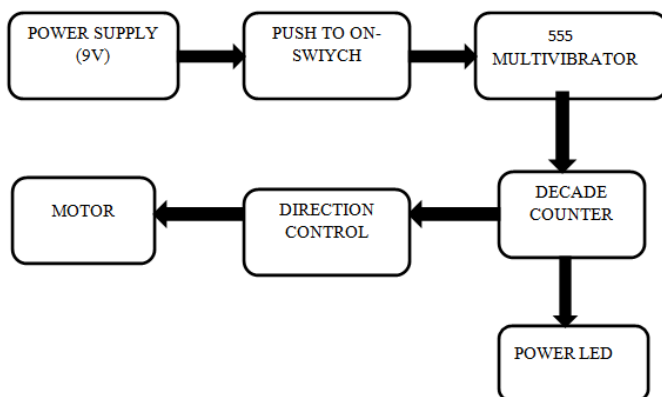
Mainly used to control DC motors and stepper motors, H-Bridge divides the voltage on the either side of the load. In this circuit, two IC555 timers form the H-Bridge circuit around the motor. These 555timers work in Mono stable mode.

## III. CONSTRUCTION:

**POWER SUPPLY:** In our circuits we use 9volts power supply. Normally in domestic power we get 230volts Alternating current power converted into Direct power by regulated power supply system.



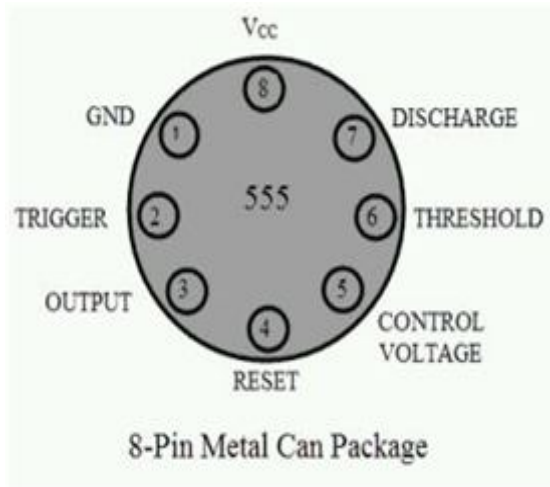
## II. BLOCK DIAGRAM



**IC 555 TIMER:** It is one of the most widely used IC in electronics and is used in various electronic circuits for its robust and stable properties. It works as a wave form generator with duty cycle varying from 50% to 100%, oscillators and can also provide time delay in circuits. A timer comes as 8 pin DIP.



Pin outs of 555 timer

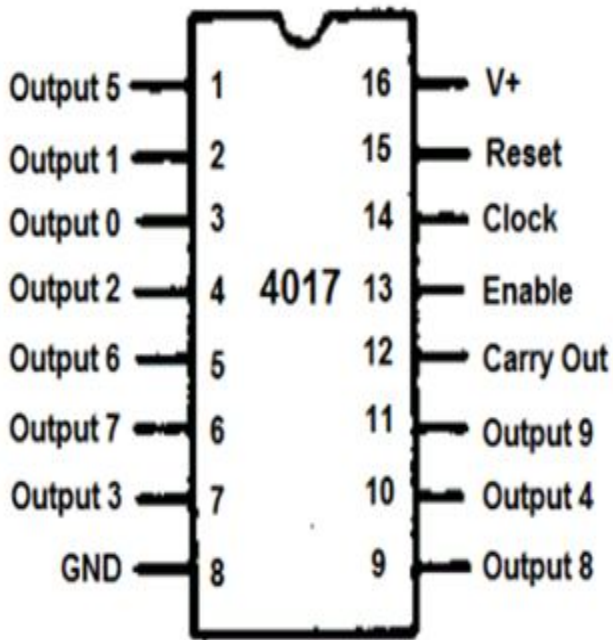


Top view of timer IC

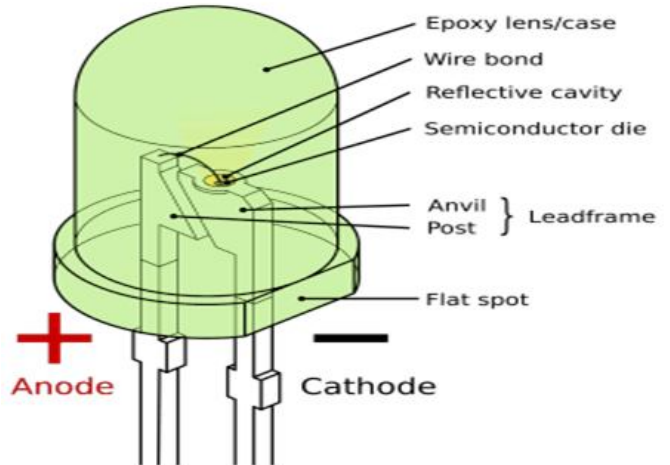
**Uses:**

1. The IC 555 timer is used in many circuit , for example one-shot pulse generator in Monostable mode as an oscillator in Astable mode or in bistable mode to produce a flip/flop type action.
2. It is also used in many types of other circuit for achievement of various purposes for instance Pulse Amplitude Modulation (PAM), Pulse Width Modulation(PWM)etc...

**DECADE COUNTER IC 4017:**

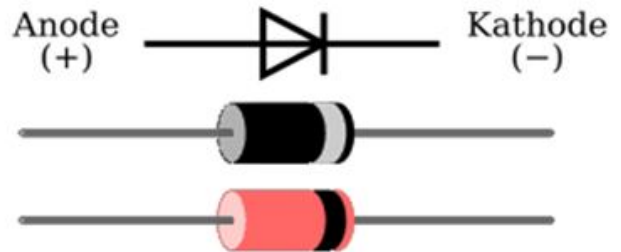


**LED:**



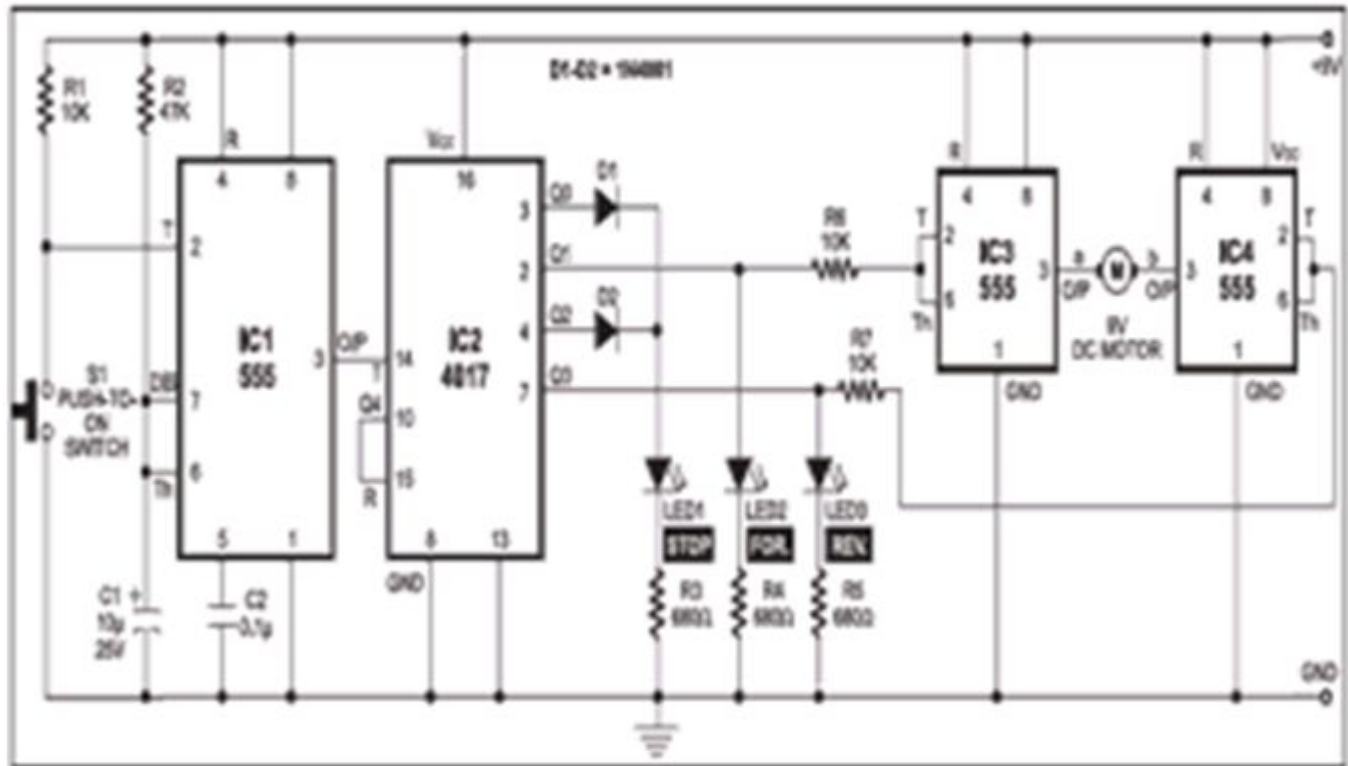
It means Light emitting diodes and it's a semiconductor light sources. LED is a specially made forward biased PN junction diode, which emits light when current flows through it. They operate on low voltage and power.

**DIODE:**



Diode is a rectifying device which conducts onlu from anode to cathode. Diode behaves open circuited for the current flow from cathode to anode. Here IN4001 is a 1 A diode with low forward voltage drop and high surge current capability. Its DC blocking voltage is 50V.

#### IV. CIRCUIT



#### V. CIRCUIT OPERATION

This simple circuit runs a DC motor in clockwise (or) anticlockwise direction and stops it using a single switch. The glowing of LED1 through LED3 indicates that the motor is in stop, forward rotation and reverse conditions respectively. Here, timer IC1 is wired as a monostable multi vibrator to avoid false triggering of the motor while pressing switch S1. Its time period is approximately 500 milliseconds (ms). Suppose, initially, the circuit is in reset condition with OUT0 output of IC2 being high. Since OUT1 and OUT3 outputs of IC2 are low, the outputs of IC3 and IC4 are high and the motor doesn't rotate. LED1 glows to indicate that the motor is in stop condition. When you momentarily press switch S1, timer 555 provides a pulse to decade counter CD4017, which advances its output by one and its high state shifts from OUT0 to OUT1. When OUT1 goes high, the output of IC3 at pin3 goes low, so the motor starts running in clockwise direction. LED2 glows to indicate that the motor is running in forward direction. Now if you press S1 again, the high output of IC2, shifts from OUT1 to OUT2. The low OUT1 output of IC3 makes pin 3 of IC3 high and the motor doesn't rotate. LED1 glows to indicate that the motor is in stop condition. Pressing switch S1. Once again shifts the high output of IC2 from OUT2 to OUT3. The high OUT3 output of IC2 makes pin3 of IC4 low and the motor starts running in anti-clockwise direction. LED3 glows to indicate that the motor is running in reverse direction. If you

press S1 again, the high output of IC2 shifts from OUT3 to OUT4. Since OUT4 is connected to rest pin 15, it resets decade counter CD4017 and its OUT0 output goes high, so the motor does not rotate. LED1 glows to indicate that the motor is in stop condition. Thereafter, the cycle repeats.

#### VI. CONCLUSION

The present project is a practical one and feasible according to economic point of view, reliability & accuracy. The aim of this project is to control the direction of DC motor using a single switch. This is achieved by forming an H-BRIDGE CIRCUIT.

#### REFERENCES

- [1] Nandkishor P. Joshi, Ajay P. Thakare, International Journal of Engineering Research & Technology Vol.1 - Issue 9 (November - 2012) e-ISSN: 2278-0181
- [2] Speed Control of D.C. MOTOR Using Chopper Ivarun Rohit Vadapalli, 2hemanth Kumar Kella, 3t.Ravi Sekhar, 4y.David Samson, 5n.Avinash, International Journal of Electrical and Electronics Research ISSN 2348-6988 (online) Vol. 3, Issue 1, pp: (289-295), Month: January - March 2015.