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# Simulation of Low Cost 50Hz Pulse Generator

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**Abstract -** *This paper is based on Simulation of low cost 50Hz pulse generator. The proposed pulse generator is designed by multivibrator circuit. This pulse generator circuit is designed using 555 timer ic, resistance and capacitor. In the electrical engineering there are many applications where the pulse generator is used. We can use this type of pulse generator in the electrical machine laboratory where we use the the pulse generator or frequency generator to control the speed of 3-phase induction motor. In the industry, there also use pulse generator in many applications. We also can use this pulse generator in many electronics device where different pulse is required because in this pulse generator we can control the frequency.*

***Key Words***: Multivibrator, Duty cycle, Pulse generator

## 1. INTRODUCTION

The 555 timer ic is used as IC timer circuit and it is the most commonly used general purpose linear integrated circuit. It can run in two modes: Monostable (one stable state) and Astable (no stable state). A multivibrator circuit behave as a non-sinusoidal oscillator with a regenerative feedback. In the Astable mode the ic produces rectangular waveforms with a variable Duty cycle. An astable multivibrator[3] can be produced by adding resistors and capacitors. The timing which is the output is either high or low is determined by the externally connected resistors and capacitors. Frequency is the number of cycles completed in one cycle and duty cycle is the ratio of the time period of the high state to the time period of low state.

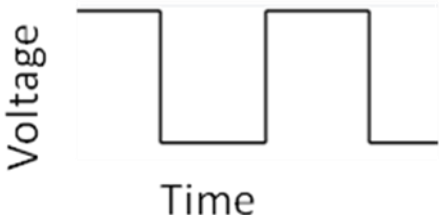


**Fig 1:** Square wave

### Duty cycle:

The mark to space ratio of a square wave or pulse oscillator is called the Duty cycle. Duty cycle is useful when the purpose of an output wave used to run some device. When the duty cycle is changed the average DC voltage or DC current level will be changed. The Duty Cycle is a term which is describes the percentage of each cycle taken by the active period.[2]

Duty cycle={(R1+R2)/(R1+2*R2)}*100

### Pulse generator:

Pulse generator is an electronics device which generates the pulse normally rectangular pulses. The pulse generator is to provide pulses in many electronics application.

In this paper we are going to show the output of the pulse generator will be 50Hz.We also can vary the frequency by using a potentiometer externally. This paper is proposed to make the 50Hz pulse generator[1].

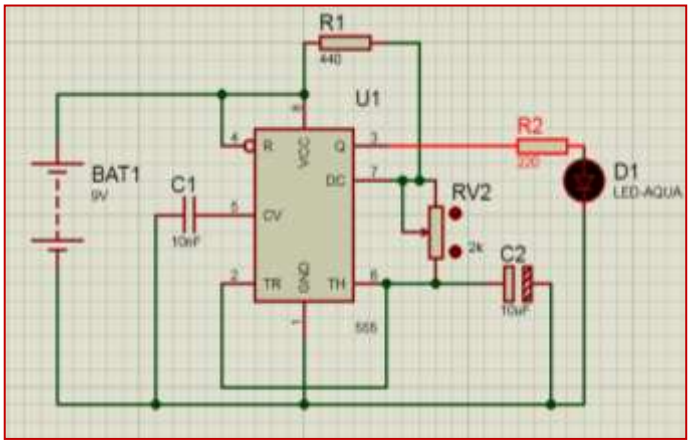


**Fig 2:** Schematic diagram of the system

## 2. WORKING PRINCIPLE OF THE SYSTEM

This paper proposes the simulation of low cost 50Hz pulse generator.Fig:2 shows the circuit diagram of the pulse generator. The main component of this circuit is 555 timer ic. In this circuit diagram we have used the resistance 440Ω(R1) and 220Ω(R2).WE have also used the potentiometer 2KΩ(RV2).In this circuit we have used the capacitor 10uF(C1) and 10nF(C2).We have used 9v battery to give the supply of this circuit. The LED is connected with the pin 3 of the ic to the GND to indicate the frequency in the output.

This circuit is set up in the Astable mode of the 555 timer ic. Astable mode causes the 555 timer to trig itself. It has produced the pulses as long as its hooked up by the power supply. Pin 2 and pin 6 are connected so that the circuit acts as an oscillator. Capacitor C1 is charged through the two resistors R1 and the potententiometer(RV2).C1 is also discharged through the potentiometer(RV2).We want to detect the frequency at 50Hz.So we connect a counter timer in the frequency mode to measure the frequency. In this mode the LED is blinked. We can change the frequency using control the potentiometer. But our target to maintain the frequency at 50Hz.

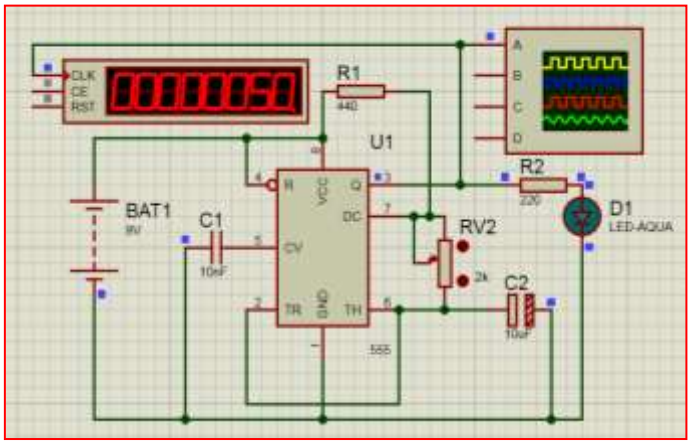


**Fig:3** Simulation of 50Hz pulse generator

In this paper there are used a potentiometer of 2kΩ which can vary the resistance. Pin 7 of the 555 timer ic is discharged the current. In the theoretically calculation of this circuit there also the frequency is 50Hz.

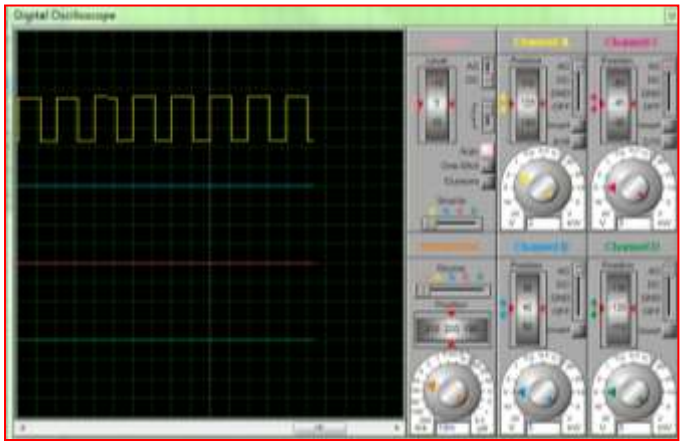

**Fig:4** 50Hz pulse characteristics

This is the continuous process of pulse generating in same frequency. So when we vary the potentiometer the frequency will be changed with the variation of resistance.

| THE CHART OF VARIATION OF FREQUENCY | | | | |
|---|---|---|---|---|
| RESISTANCE | | POT(VR) | CAPACITOR | FREQ. |
| R1(Ω) | R2(Ω) | | | |
| | | 2KΩ | | 50Hz |
| | | 1.8KΩ | | 53.73Hz |
| | | 1.5KΩ | | 60.50Hz |
| | | 1.4KΩ | | 63.15Hz |
| | | 1KΩ | 10uF | 76.50Hz |
| | | 900Ω | | 80Hz |
| | | 800Ω | | 85Hz |
| | | 500Ω | | 104Hz |
| 440 | 220 | 200Ω | | 133Hz |

**Fig:5** Chart of variation of frequency

Here we can see that there are also deferent types of pulse also generate in the pulse generator. But we fix our pulse in 50Hz.

## 3. RESULT AND DISCUSSION

This paper proposes the simulation of low cost 50Hz pulse generator. We have used "Proteus 8 professional" to design the circuit diagram for the simulation. In the software when we vary the potentiometer RV2 the frequency will be changed. But our motive to control the frequency in 50Hz and stabilized it. Here the theoretical calculation is given below to maintain the frequency in 50Hz.

We take R1=440Ω, VR=2KΩ, R2=220Ω, C1=10uF/16V

We know, f=1.44/[{(R1+VR)+2R2}*C1]

So, put the value of R1,R2,VR,C1.

f=1.44/[{(440+2000)+(2*200)}*(1*10^-5)]

=1.44/0.0288

=50

## 4. CONCLUSIONS

Pulse generator is an electronic equipment which is used to generate rectangular pulse. Pulse generator is used for working in digital circuit and control signal equipments. Pulse is injected in a circuit to test as a clock signal which is progress through the device. In this paper we have come to know about the pulse generator which can produce the pulse of 50Hz.This pulse can use in electrical laboratory to control the speed of 3 phase induction motor experiment. We can also use it in industrial equipments.

## REFERENCES

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**BIOGRAPHIES**

Shuvajit Pradhan pursuing B.Tech in Electrical Engineering at MODERN INSTITUTE OF ENGINEERING AND TECHNOLOGY,Bandel,India.His research interests include Electrical machines, Power system, power electronics,Digital electronics and Internet of things(IOT).

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