

# AMERICAN INTERNATIONAL UNIVERSITY BANGLADESH

## Faculty of SCIENCE and TECHNOLOGY

### Lab Cover Sheet



*Students must complete all details except the faculty use part.*

Please submit all assignments to your subject lecturers or the office of the concerned lecturer.

Lab Title: Design and implementation of an electronic circuit PCB layout.

Lab Number: \_\_\_\_\_ Due Date: 20-04-2021 Semester: spring, 2021-2022

Subject Code: EEE 2209 Subject Name: ENGINEERING SHOP Section: E

Course Instructor: Raja Rashidul Hasan Degree Program: EEE

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Faculty comments \_\_\_\_\_

**TITLE:** Design and implementation of an electronic circuit PCB layout.

## **Timer circuits**

### **PURPOSE :**

In timing circuits you are controlling the rate of response of the capacitor or controlling the rate of the voltage across the capacitor. The simplest timing circuit is a series combination of a resistor and capacitor.

This circuit produces a sound similar to the police siren. The 555 timer IC is an integrated circuit used in a variety of timer, pulse generation and oscillator applications. The 555 can be used to provide time delays, as an oscillator, and as a flip-flop element. I have used two 555 Timer ICs in this project and both these 555 ICs act as Astable Multivibrators.

Police siren circuit, which is explained here, is based on the NE555 timer IC. The circuit is built with the help of two NE555 IC. Both the timer ICs in this circuit are configured as astable multivibrator. Although, both the ICs in the circuit work at two different frequencies.

The IC1 is an astable multivibrator of slow frequency and is working on a frequency of 20HZ with 50% of duty cycle while the IC2 is a fast astable multivibrator with a frequency of 600Hz. The output of the IC1 is then supplied to IC2 at its control pin (pin5). Using this arrangement, the output frequency of IC2 will be modulated with respect to the output frequency of IC1. The circuit works on the DC supply between a range of 6V to 15V.

In order to vary the frequency range of the siren, you can vary with the values of R2 and R4 resistors by replacing them with appropriate potentiometers. The pitch of the sound can be enlarged with the attachment of the power amplifier at the output. The accurate effect of police siren can be produced by connecting flashing LEDs at the correct place. The circuit can be made on a Perfboard. NE556 can be used in the place of two NE555.

### **EQUIPMENT:**

- 555 TIMER
- BATTERY
- Resistor -1K,10K ,470R
- GREEN LED
- CAPACITOR
- OSCILLOSCOPE

### **PROCEDURE:**

In this experiment, we will show how to build a simple LED flasher circuit using a 555 timer chip.

An LED flasher circuit is a circuit which flashes the LED- meaning turns it ON-OFF, ON-OFF, ON-OFF.

The 555 timer chip is a very versatile IC, because when connected correctly, it can create pulses of current at specific time intervals decided by the resistor-capacitor (RC) network. When a 555 timer creates pulses in this way, the LED doesn't stay constantly on. It only turns on at a pulse and then shuts off after the pulse has passed. And it does this in a never-ending cycle, which creates the flashes of light.

To make the 555 timer chip create pulses, it must be placed in astable mode. Astable mode simply means that the 555 timer has no stable state. It switches constantly between high and low, or on and off. This is why this mode is also called oscillator mode, because it uses the 555 timer as an oscillator, which creates square wave signals.

## DISCUSSION:

### Discussion:

In this experiment, we designed a timer circuit using flashing LED, 555 timer IC.

In this experiment we know about IC 555 timer uses. It is used to produce time delay intervals for triggering load.

After doing this experiment, we implement and analyze digital circuit and clear the concept of about digital components.

555 timer the frequency output of the 555 timer would be probably be less useful than the straight voltage output of a traditional resistor divider. High-precision ADC chips are much easier to come by the high-precision frequency-counters.

## QUESTION ANSWER:

1. The number of layers is referred to as the number of separate conductor patterns. It is usually even and includes the two outer layers. Most main boards have between 4 and 8 layers, but PCBs with almost 100 layers can be made.

Multilayer PCB boards manufacturing is more expensive as compared to double layer and single layer PCBs. Multilayer PCB board design is difficult so we need more time to work out any possible problems. They have a complex manufacturing process so there are high labor costs

2. PCB fabrication is the process or procedure that transforms a circuit board design into a physical structure based upon the specifications provided in the design package. This physical manifestation is achieved through the following actions or techniques: Imaging desired layout on copper clad laminates
3. Others used to connect board layers, are called vias. 2 lasers. The hole walls for boards with two or more layers can be made conductive and then electroplated with copper to form plated-through holes. These holes electrically connect the conducting layers of the PCB. To produce a multi-layer PCB, alternating layers of epoxy-infused fiberglass sheet called prepreg and conductive core materials are laminated together under high temperature and pressure using a hydraulic press. The pressure and heat causes the prepreg to melt and join the layers together.
4. The minimum track and gap width for a FR4 PCB depends on the thickness of copper. For 35μm a typical value would be a standard of 0.1mm and for advanced manufacturing 0.05mm. Most PCB fabricators that do fast and inexpensive boards have a minimum trace width of 5 or 6 mils, but if you can go a little larger, the better. (For military and other high-tech boards, they can now go as small as 2.5 mils or even smaller.