BSc (Hons) in Computer Engineering
Laboratory Practical

Experiment 4: Hand on Experience on Electronic Circuits

Name:

……………………………………………………………………………………

Index No

……………………………………………………………………………………

Intake

……………………………………………………………………………………

Date

……………………………………………………………………………………

Instructor Name and Signature:

……………………………………………………………………………………

Comments   …………………………………………………………………..

……………………………………………………………………..

……………………………………………………………………..

……………………………………………………………………..

……………………………………………………………………..

Grade

Objectives:
Explore the behavior of integrated circuits (ICs).
Read the datasheet for a particular integrated circuit.

Outcomes:
After completing this experiment, students would be able to:

a) Understand essential electronic components and their usage.
b) Explain steps for circuit designing.
c) Read the circuit diagram and design it.
d) Read the datasheet and modify the circuit as required.

Equipment Required:

NE555, CD4017, Resistors, Capacitors, LEDs, Power supply.

NE 555 Timer IC

The 555 timer IC is a very cheap, popular and useful precision timing device that acts as either a simple timer to generate single pulses or long-time delays or as a relaxation oscillator producing a string of stabilized waveforms of varying duty cycles from 50 to 100%.

The 555-timer chip is a stable 8-pin device that can be operated either as a very accurate Monostable, Bistable or Astable Multivibrator to produce a variety of applications such as one-shot or delay timers, pulse generation, LED and lamp flashers, alarms and tone generation, logic clocks, frequency division, power supplies and converters, etc.
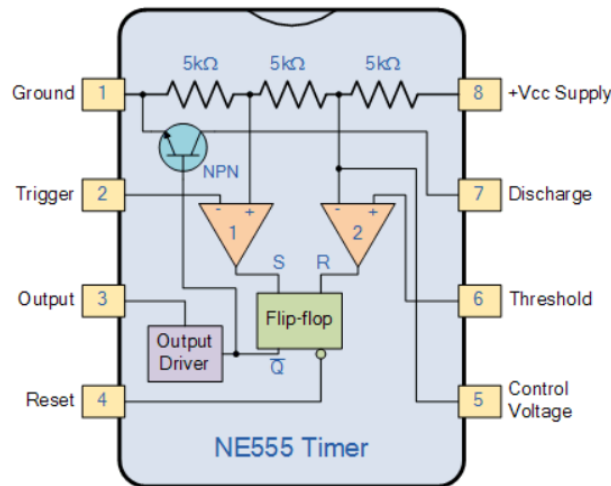

Figure No. 01: NE555 Timer IC Block Diagram.

Pin Number	Pin Name	Description
1	Ground	Ground Reference Voltage 0V
2	Trigger	Responsible for the transition of the flip-flop from set to reset. The output of the timer depends 2 I on the amplitude of the external trigger pulse applied to this pin
3	Output	This pin is normally connected to load as it is the only pin with an output-driven waveform
4	Reset	A negative pulse applied to this pin to disable or reset the timer. When not used for resetting 4 I purposes, it should be connected to VCC to avoid false triggering
5	Control	Controls the threshold and trigger levels. It determines the pulse width of the output 5 Voltage I waveform. An external voltage applied to this pin can also be used to modulate the output waveform
6	Threshold	Compares the voltage applied to the terminal with a reference voltage of 2/3 Vcc. The 6 I amplitude of the voltage applied to this terminal is responsible for the set state of the flip-flop
7	Discharge	Open collector output which discharges a capacitor between intervals (in phase with output). 7 I It toggles the output from high to low when the voltage reaches 2/3 of the supply voltage
8	Vcc	Supply Voltage (Typical = 5V, Maximum = 18V)

Ex 01: Read the datasheet clearly and implement a timer using NE 555
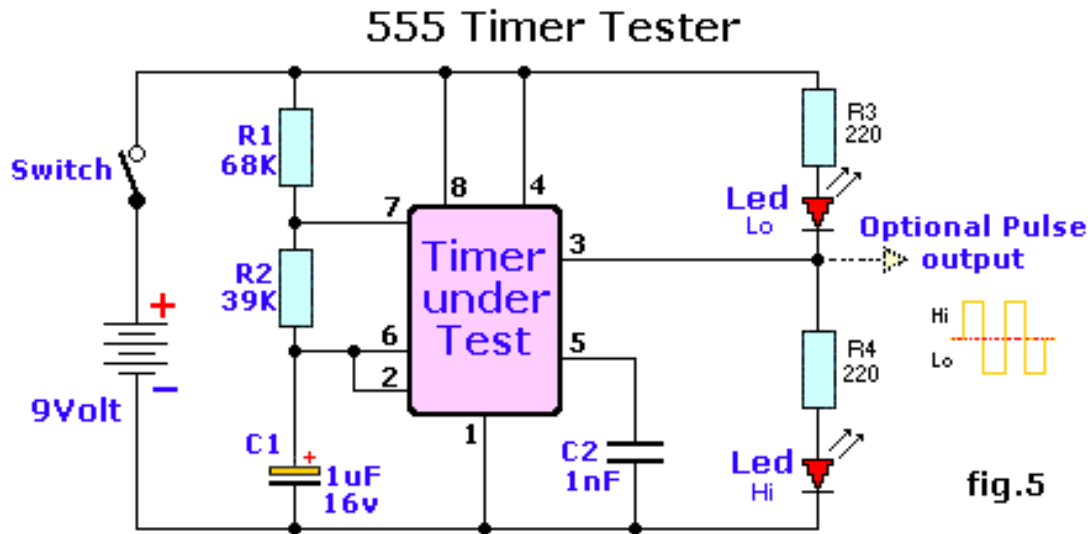

Figure No. 02: Timer

CD4017 CMOS Decade Counter IC

The CD4017 is a CMOS Decade counter IC that is used for low range counting applications. It can count from 0 to 10 (the decade count). The circuit designed by using this IC will save board space and also the time required to design the circuit. CD4017 is as 'Johnson 10 stage decade counter'.
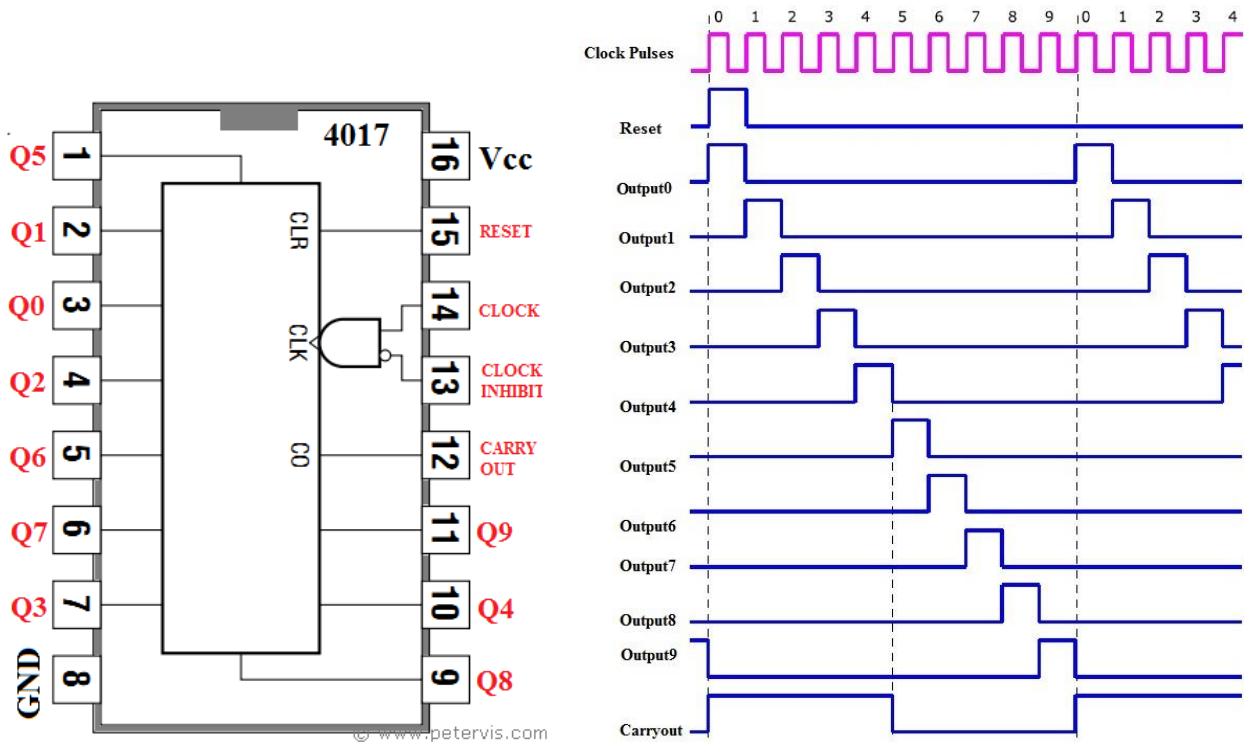

Figure No. 03: Counter IC

Pin Number	Pin Name	Description
1-7 and 9-11	Output	These pins change to 'high' level one by one (one after another) in a sequence. For each clock signal, each pin goes high in a sequence.
8	Ground	The ground pin is connected to the negative supply voltage.
12	Carryout	It completes one full cycle for every 10 clock cycles. This is used to 'ripple' the IC, which means to delay in counting operations.
13	Enable	IC is enabled when the pin is active low. To disable or switch off the IC, this pin should be connected to active high input. When this pin is active high, it ignores the clock signals.
14	Clock	Clock Pin provides signals to the IC for sequential output. When the first clock pulse is applied on the Clock pin then pin 5 goes high (its output 0). The clock input pin only responds to the positive voltage signal or positive clock
15	Reset	The reset pin resets the output of the sequence so output goes on pin 3 as it's reset. It should be connected to the ground to reset the circuit.
16	Vcc	Supply Voltage (Typical = 3V, Maximum = 16V)

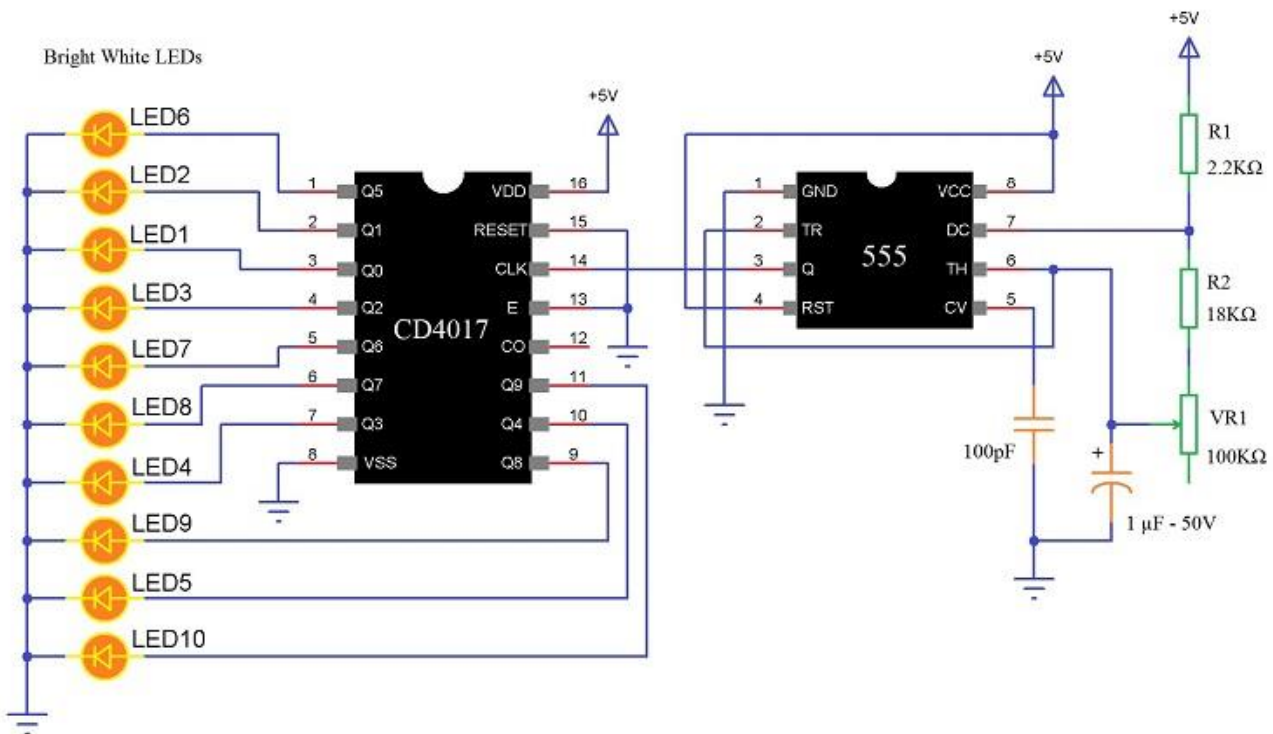## Ex 02: Implement the following Night Rider Circuit using 555 and 4017

Figure No. 04: Knight Rider Circuit Diagram

END