ROULETTE CIRCUIT USING IC 555 TIMER AND CD 4017

PROJECT REPORT

Submitted for the course: Digital Circuit & Design

By

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Slot: B2

CERTIFICATE

This is to certify that the project work titled "**ROULETTE CIRCUIT USING IC 555 TIMER AND CD 4017"** that is being submitted by "*Arun Kumar Verma ,Tanoj Langore, G. Amreshwar Rao Naidu*" for DIGITAL CIRCUIT AND DESIGN (ECE2026) is a record of bonafide work done under my supervision. The contents of this Project work, in full or in parts, have neither been taken from any other source nor have been submitted for any other CAL course.

Place: Vellore

Date: 8 Nov. 17

Signature of Students: Arun Kumar Verma
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Signature of Faculty: Professor Sivanantham S.

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b) We would also like to thank our esteemed school Dean, Dr. Elizabeth Rufus, for providing us with proper facilities for the experimentation phase of the project.
c) We would like to thank our teacher Professor Sivanantham S. for giving us the opportunity to take up this project.

ABSTRACT

Using a simple voltage controlled oscillator a 555 timer IC and 4017 counter/divider IC can be designed a very wonderful electronic roulette wheel game.

This 555 timer circuit electronic roulette wheel is a simple version of an electronic roulette game and is based on the 4017 IC which is a 10 stage decade counter/divider. It is driven by another versatile IC 555 configured as a voltage controlled oscillator (VCO).

1. Introduction

Roulette games can be commonly seen in casinos and clubs. It is a playing device having a large conical shaped wheel with numbers or scores printed on its pockets in a special random manner. It is normally used for betting and wining cash amounts.

The wheel is rotated manually and few balls are thrown into its pockets which shuffles its position as the wheel rotates and eventually settles down into one of the randomly selected pockets with either a winning or a losing number.

The electronic version of such a roulette game is presented here and is perhaps one of the simplest electronic casino home games. Though not as complex as its original mechanical counterpart but nevertheless can be pretty amusing to actually build it and witness the results.

1.1 Objective and goal of the project

To apply various logic and techniques we learnt regarding flip-flops, counters, clock in a circuit which can also be used in a recreational purpose.

2. Methodology

Begin by assembling the circuit board first with the help of the given circuit schematic. As usual it may be simply done by inserting all the procured electronic components on a general PCB and interconnecting their leads through soldering.

For the enclosure you will have to procure a suitable circular plastic box with a locking type of lid. You can get plenty of them in wholesale plastic marts.

Next, drill holes on the lid of the box as per the size of the LED in a circular fashion; neatly do the necessary drawings and markings of numbers as per your own liking. Fix all the LEDs into the drilled holes to form a large circle of a chain of LEDs. Also make provision for fitting the" start" button on the center of the lid.

Interconnect all the LED leads from the rear side as per the circuit diagram.

Join the output wires from the circuit to the appropriate points of the LED assembly and the “start" switch.

Finally strap the battery connector to a 9 volt PP3 type battery.

Fix the lid over the box enclosing the circuit and the battery inside it.

Initially you will find that out of the 10 odd LEDs only one is lit up.

On pressing the “start" button, the LEDs get illuminated one after the other in a sequential manner producing a rotating effect.

Initially the speed of its “rotation" is quite fast. It gradually slows down and ultimately after few seconds only one of its LEDs remains lit over a particular unpredictable position.

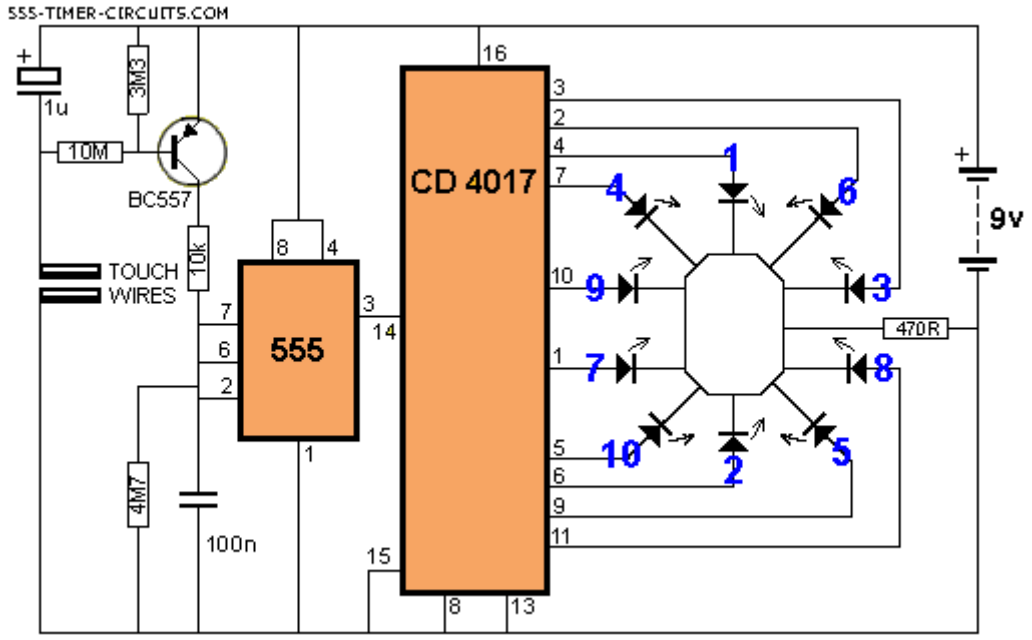
This position of this lit LED will always vary; no matter how many times the switch is initiated, perfectly imitating a casino roulette wheel.

3. Analysis

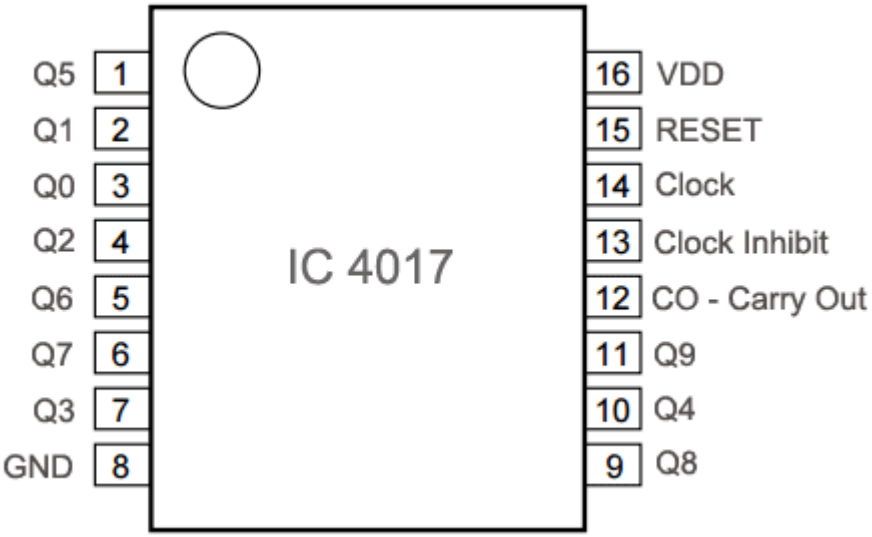
In this circuit the pulse is generated by the IC 555. This IC is wired as an astable multivibrator, but looking into the figure you can find that the supply line to its timing components has been interrupted through a switch. This clever modification is done to effectively convert it into a voltage controlled oscillator (VCO).

On pressing the Switch S1, the reservoir capacitor C1 almost instantly gets charged, also at this point of time a constant stable clock is fed to the IC 4017 and the LEDs at its outputs light up in a cyclic manner producing a revolving effect. The speed may be predetermined by adjusting VR1.

Now as soon as the switch is released, the main supply is cut-OFF, C1 discharges and transfers its charge to C2 through the pot VR1 and the other resistors on its path. This forces the freely running astable to gradually stretch and slow down the time period of its output pulses so that eventually the oscillations stop within a stipulated time. In response to these dying pulses the “rotation" of the LEDs connected to the output of IC 4017 also slow down gradually and stops to select a random score marked on the board. This score will always be selected in random way depending on how long the switch S1 remains depressed and thus can never be predicted accurately.



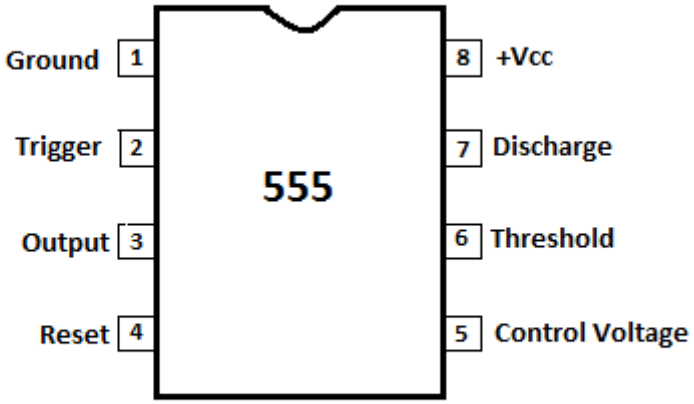
Pin Diagram



Pin Configuration

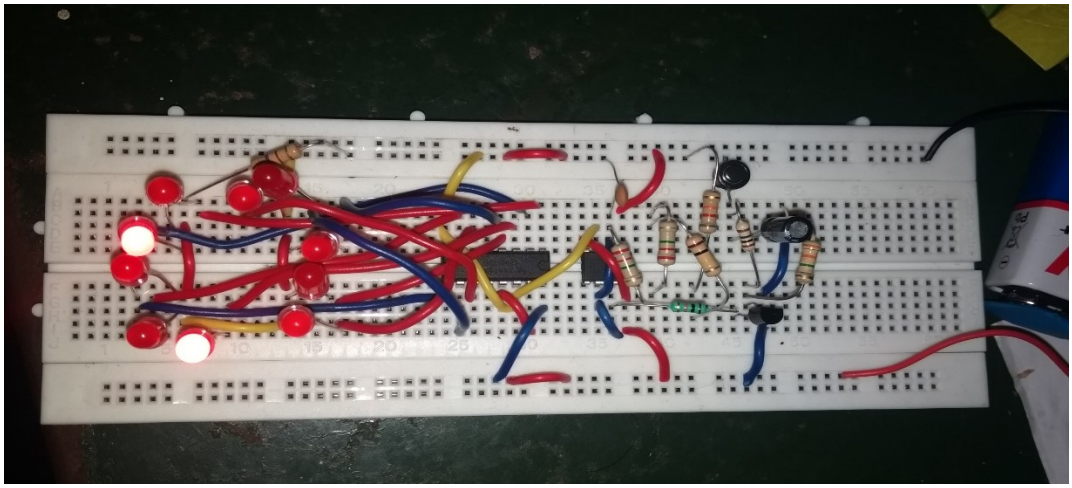
PIN NO.	PIN Name	PIN Description
1	Q5	Output 5: It goes high when the counter reads 5th clock pulse
2	Q1	Output 1: It goes high when the counter reads 1st clock pulse
3	Q0	Output 0: It goes high when the counter reads 0th clock pulse
4	Q2	Output 2: It goes high when the counter reads 2nd clock pulse

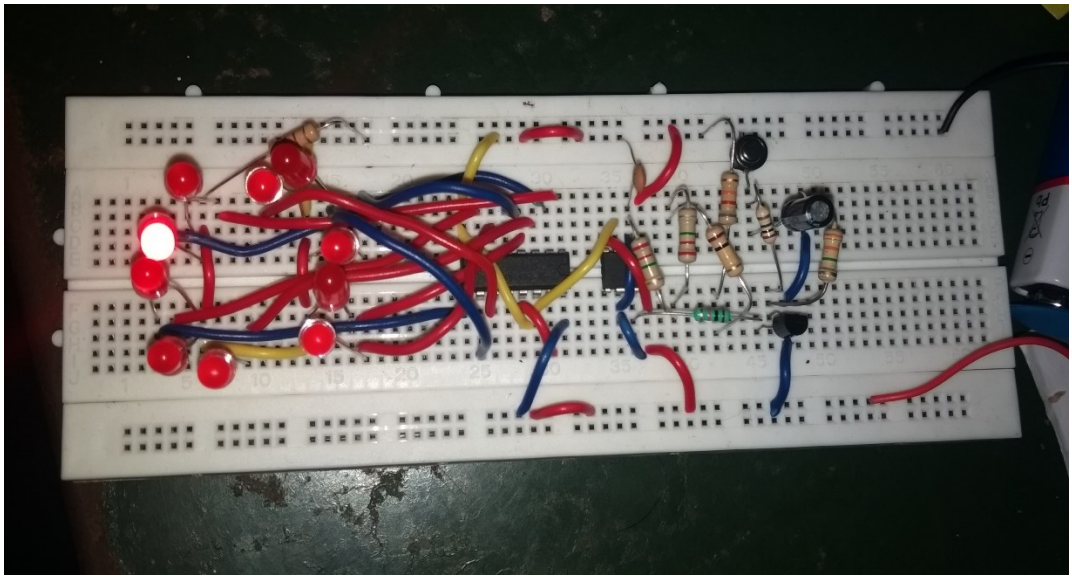
5	Q6	Output 6: It goes high when the counter reads 6th clock pulse
6	Q7	Output 7: It goes high when the counter reads 7th clock pulse
7	Q3	Output 3: It goes high when the counter reads 3rd clock pulse
8	GND	Ground PIN
9	Q8	Output 8: It goes high when the counter reads 8th clock pulse
10	Q4	Output 4: It goes high when the counter reads 4th clock pulse
11	Q9	Output 9: It goes high when the counter reads 9th clock pulse
12	CO –Carry out	Used to cascade another 4017 IC to makes it count upto 20, it is divide by 10 output PIN, we can count how much we want just by cascading the ICs through this pin and every IC will generate 10 outputs.
13	CLOCK inhibit	In operating condition this pin will remain at Low, beacause if this pin is High, will stop the pulse generation means it will be in freeze mode.
14	CLOCK	Clock input, for sequentially HIGH the output pins from PIN 3 TO PIN 11
15	RESET	Active high pin, should be LOW for normal operation, setting HIGH will reset the IC (only Pin 3 remain HIGH)
16	VDD	Power supply PIN (5-12v)

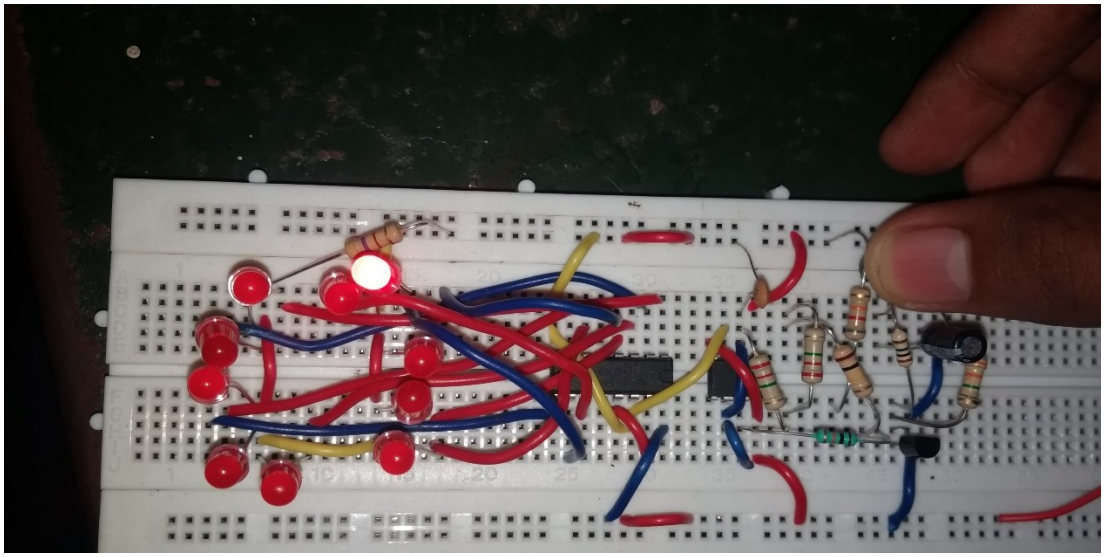


Pin	Name	Purpose
1	GND	Ground reference voltage, low level (0 V)
2	TRIG	The OUT pin goes high and a timing interval starts when this input falls below 1/2 of CTRL voltage (which is typically 1/3 *V*cc, CTRL being 2/3 *V*cc by default if CTRL is left open). In other words, OUT is high as long as the trigger low. Output of the timer totally depends upon the amplitude of the external trigger voltage applied to this pin.
3	OUT	This output is driven to approximately 1.7 V below +*V*cc, or to GND.
4	RESET	A timing interval may be reset by driving this input to GND, but the timing does not begin again until RESET rises above approximately 0.7 volts. Overrides TRIG which overrides threshold.
5	CTRL	Provides "control" access to the internal voltage divider (by default, 2/3 *V*cc).
6	THR	The timing (OUT high) interval ends when the voltage at threshold is greater than that at CTRL (2/3 *V*cc if CTRL is open).
7	DIS	Open collector output which may discharge a capacitor between intervals. In phase with output.
8	*V*cc	Positive supply voltage, which is usually between 3 and 15 V depending on the variation.

4. Simulation Result







5. Conclusion

The randomness of the selection depends upon the time for which the push remains switched ON by the finger. Even a difference of 0.1 second is able to change the position of the final LED position, making the roulette application highly foolproof.10 LED Simple Roulette Wheel **Circuit Diagram**

6. References

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