IC CD4033 Report

Devansh Srivastava

1.1- *Abstract-*

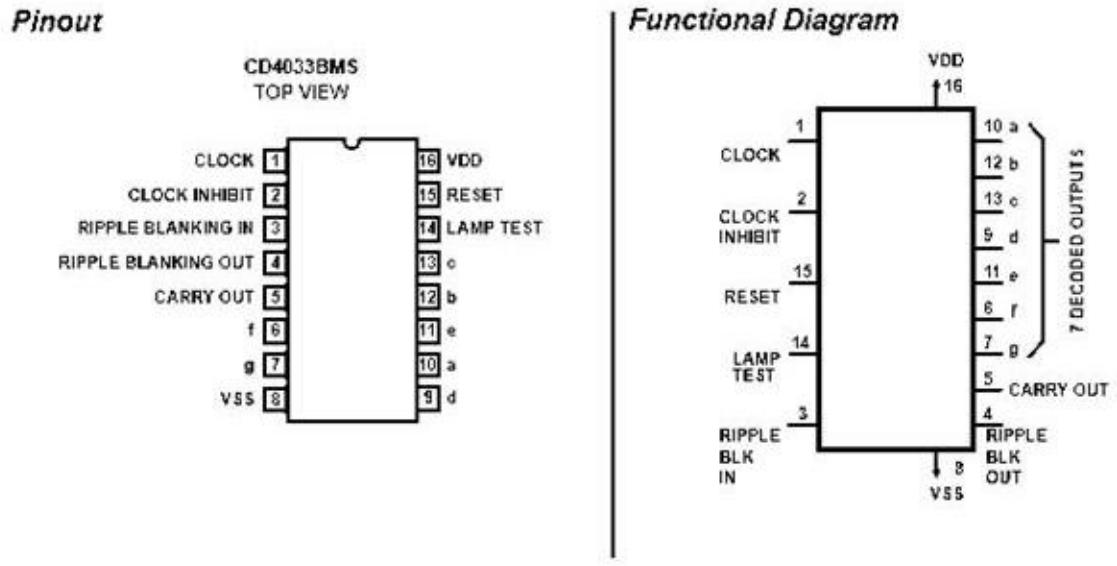
In this report, we will see the characteristics and the working of the IC, CD4033. Also, we will discuss the additional concepts that is used by this integrated circuit. This report has a brief description of working of Johnson Counter and a little introduction to flip flops and its types.

This report highlights the Pin Configuration of the IC, it's practical implementation on the software Proteus.

1.2- *Introduction-*

IC CD4033 is a specialized integrated decade Johnson Counter, designed specifically for 7 Segment display. It has a decoder embedded inside the IC that decodes the incoming signal into readable form to the display. This IC along with the display unit is popularly called **7 Segment Counter**.

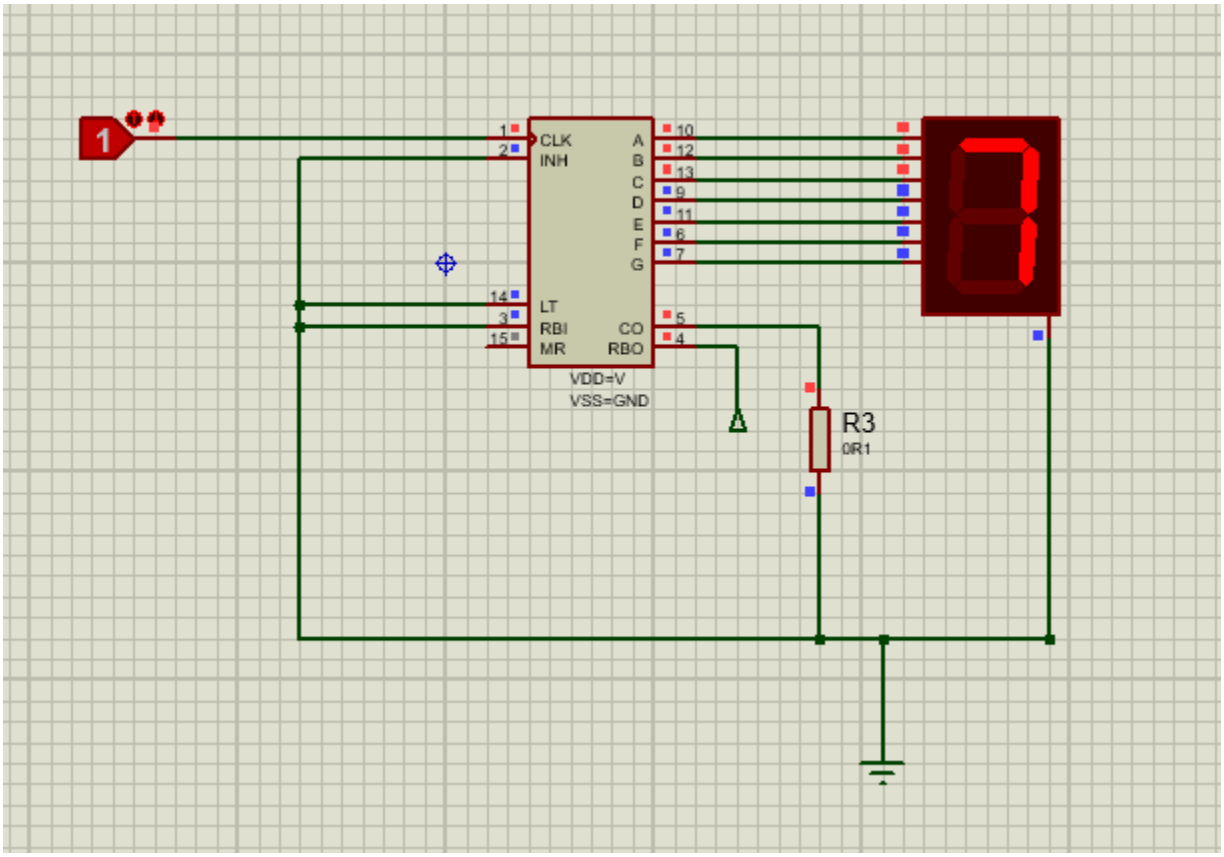
1.3- *Pin Configuration-*



Pin 16 and Pin 8 are the power pins. Pin 16 (VDD) is tugged to 5V supply and Pin 8(VSS) is grounded. Pin 1 is dedicated to the clock that inputs the pulses that is to be counted. Pin 2 is Clock

Inhibit and is grounded. Pin 14 is dedicated to Lamp Test that ensures that all the LEDs are working fine. Generally, we keep it grounded. Pin 3 and Pin 4 (Ripple black In and Ripple Black Out) is used to improve the readability on the display. We must make sure that pin 3 and pin 4 should not be shorted. Pin 5 is carry out pin and is used when we need to count more number of digits. Remaining pins(6,7,9,10,11,12,13) is for display connection.

1.4- *Practical Implementation-*



Software Used- Proteus 8 Professional

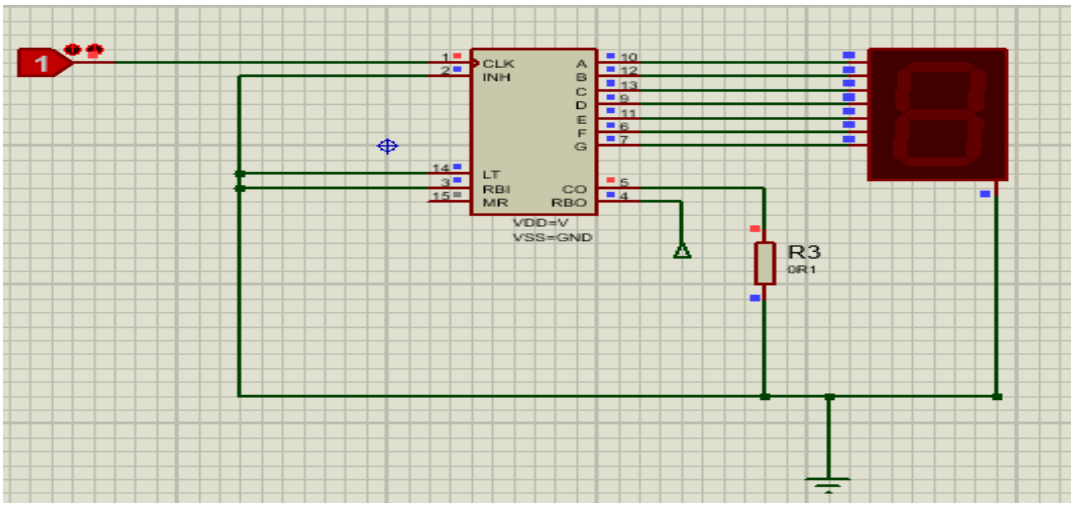
Equipments Used- CD4033

Logic State

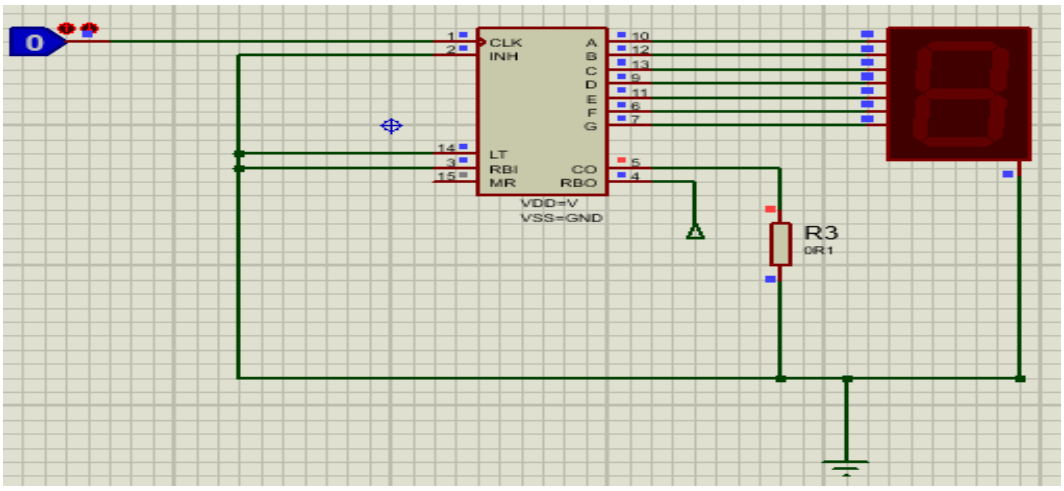
7 Segment Display

Resistor

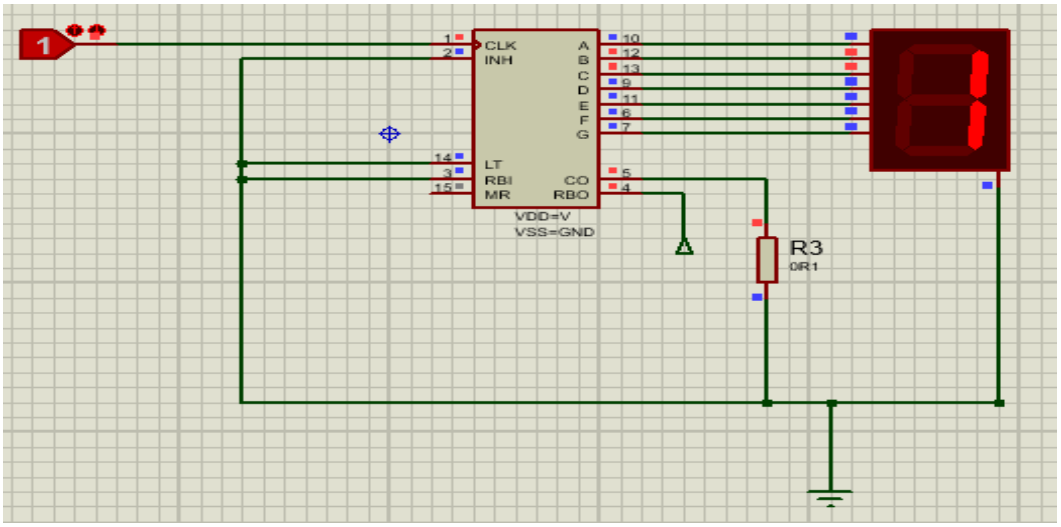
When the logic state is turned to 1 from 0, it completes one pulse cycle. This pulse cycle is counted by this IC, to which it displays on the screen, every time, It completes a cycle, the counter increases by one and as it reaches 10, it resets to zero. Consider these images for better understanding-



This is the initial state in which logic is 1.



Now the logic is turned to 0.

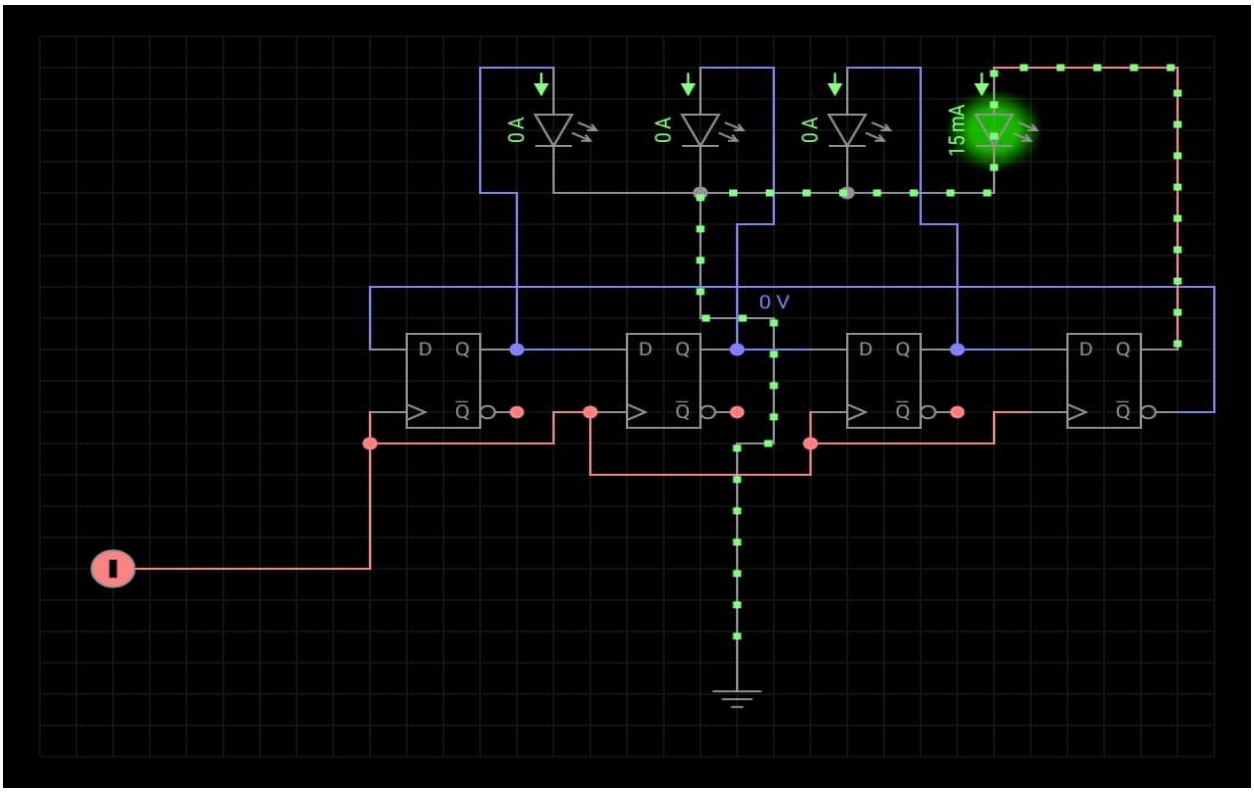


When logic is turned back to 1 again, the cycle completes and counter is incremented by 1.

1.5- *Johnson Counter-*

Before getting to the counters, it is essential to learn Flip flops. Flip flops are collection of NAND or NOR gates to get a desirable result. There are several types of Flip flops- D flip flop, T flip flop, J-K Flip flop, Master Slave Flipflop. For details, you may visit- https://www.tutorialspoint.com/digital_circuits/digital_circuits_flip_flops.htm.

These flip flops, together, when cascaded forms Counter. The basic objective of any counter is to measure the number of pulses covered.



This is the circuit of a 4-bit Johnson Counter. In the above image, there are four D Flipflops, to which every flip flop has one input and two outputs- Q and Qbar. Qbar is the complement of the result Q. Johnson Counter is a ring counter, in which the Qbar's bar of the last flipflop is the input to the first flip flop. This is a synchronous counter, which means that the clock for all the flip flops are same.

Truth Table-

CLK	Q1	Q2	Q3	Q4
0	0	0	0	0
1	1	0	0	0
2	1	1	0	0
3	1	1	1	0
4	1	1	1	1

5	0	1	1	1
6	0	0	1	1
7	0	0	0	1
8	0	0	0	0
9	1	0	0	0
10	1	1	0	0
11	1	1	1	0
12	1	1	1	1
13	0	1	1	1
14	0	0	1	1
15	0	0	0	1

Resources-

1- http://www.circuitstoday.com/7-segment-counter-circuit
2- https://www.labcenter.com/