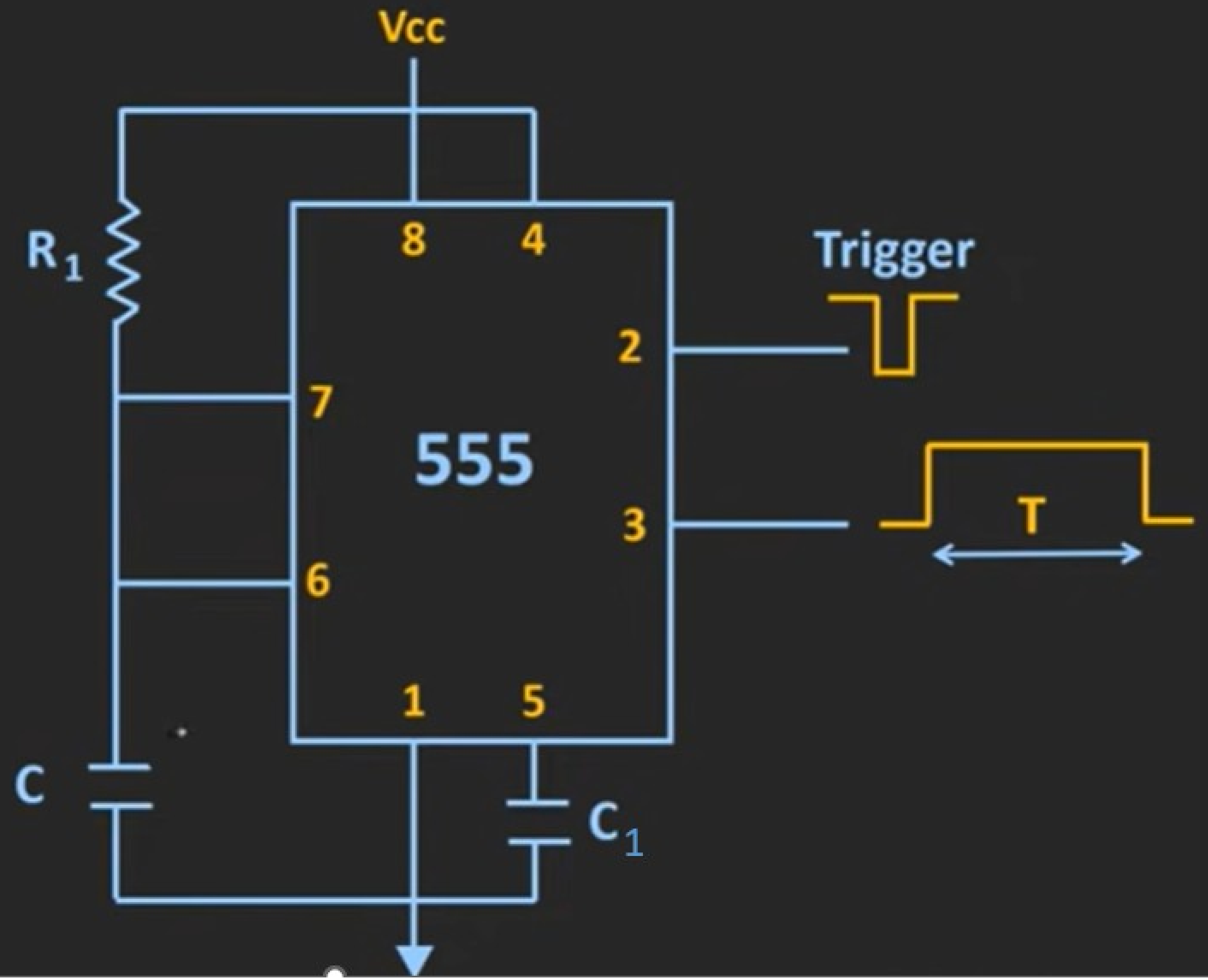
MONOSTABLE MULTIVIBRATOR USING 555 TIMER

555 Timer as Monostable Multivibrator

1 - Ground
2 - Trigger
3 - Output
4 - Reset
5 - Control
6 - Threshold
7 - Discharge
8 - Vcc



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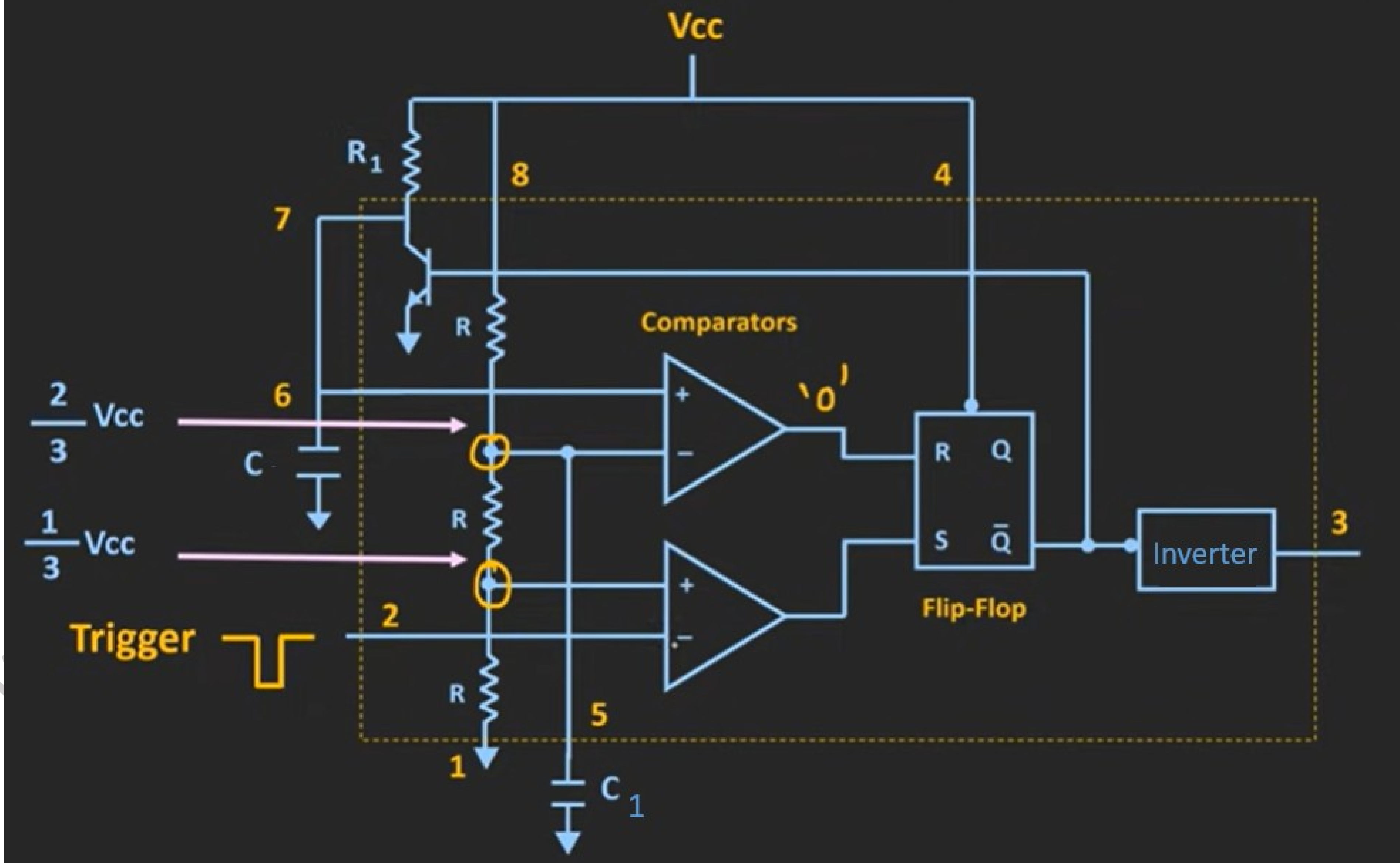


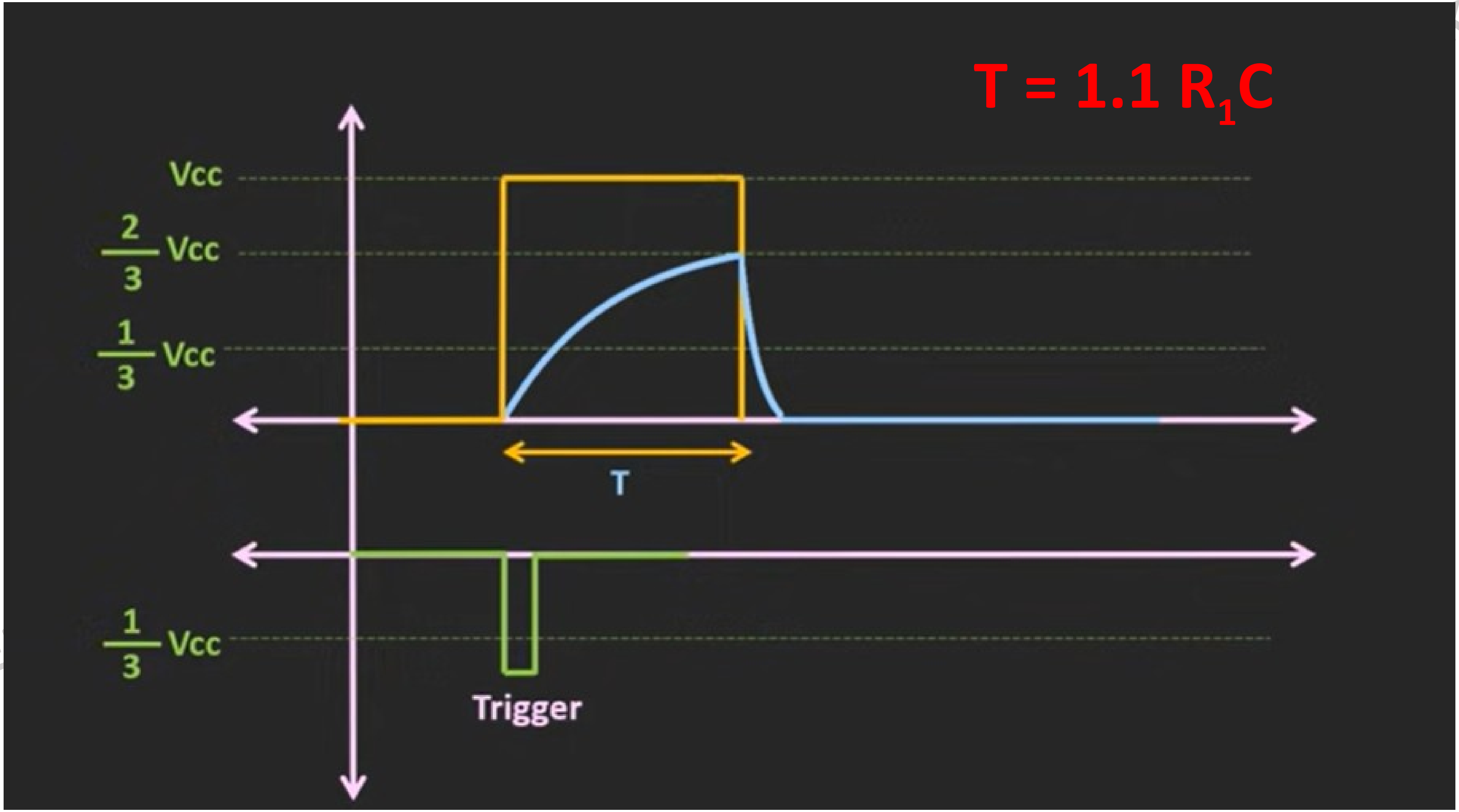
- Initially lets assume timer o/p = 0 (stable state)
- So
- Q1 will become ON
- So V_c = 0. V at pin 6 =0.
- So o/p of UC = 0
- When no trigger is given, trigger pin is connected to Vcc .
- So o/p of LC = 0
- S=R=0 ----- O/p of FF = previous state = 0(stable state)
- Timer o/p =0

When trigger is applied

- Trigger s/g is applied such that o/p of pin 2 goes below 1/3 Vcc.
- Hence o/p of LC =1
- o/p of UC is still at 0
- S=1, R=0 ---- Q=1. Timer o/p goes HIGH(unstable state)
- Q1 is OFF.
- C will charge thru R1 towards Vcc.
- So once triggering happens, C starts charging towards

- After triggering action, V at pin 2 is again Vcc.
- So now again o/p of LC becomes 0
- During charging, whenever V at pin 6 > 2/3 Vcc , o/p of UC = 1
- S=0, R=1 ------- Q=0. Timer o/p =0 (stable)

- Q1 will become ON
- So C will start discharging thru Q1.
- So again o/p of both UC & LC =0. so timer o/p =previous state = 0(stable state)


$T = 1.1\, R_1 C$
Vcc
$\frac{2}{3}$ Vcc
$\frac{1}{3}$ Vcc
T
$\frac{1}{3}$ Vcc
Trigger

- When trigger is applied, a pulse is obtained for a short duration.
- Duration of pulse depends upon charging of the capacitor.

$$T = 1.1\ R_1C$$

- In this way, by changing R1 and C, we can design a MMV and we can change the timing of the pulse.

Applications of MMV

1. For generating timing delays.

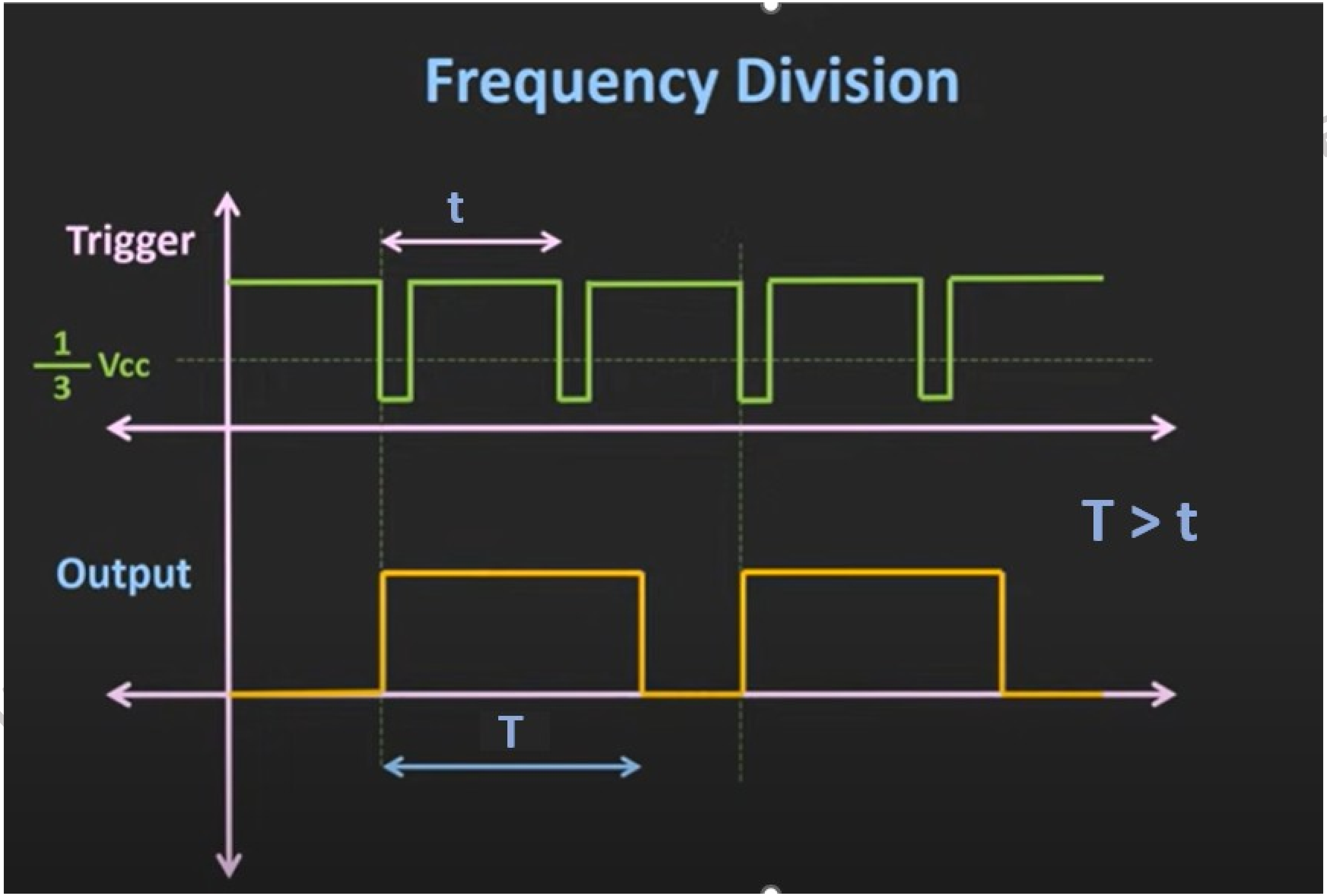
(By changing R1 and C, we can design a MMV and we can change the timing of the pulse.)

2. For frequency division.

(If we are applying a periodic trigger s/g at pin 2)

Time duration of o/p pulse T shud be slightly more than that of triggering s/g t. (T > t).

In that case o/p s/g freq will be half than the trigger s/g freq.


Frequency Division
t
Trigger
1/3 Vcc
T > t
Output
T

3. For pulse width modulation (PWM)

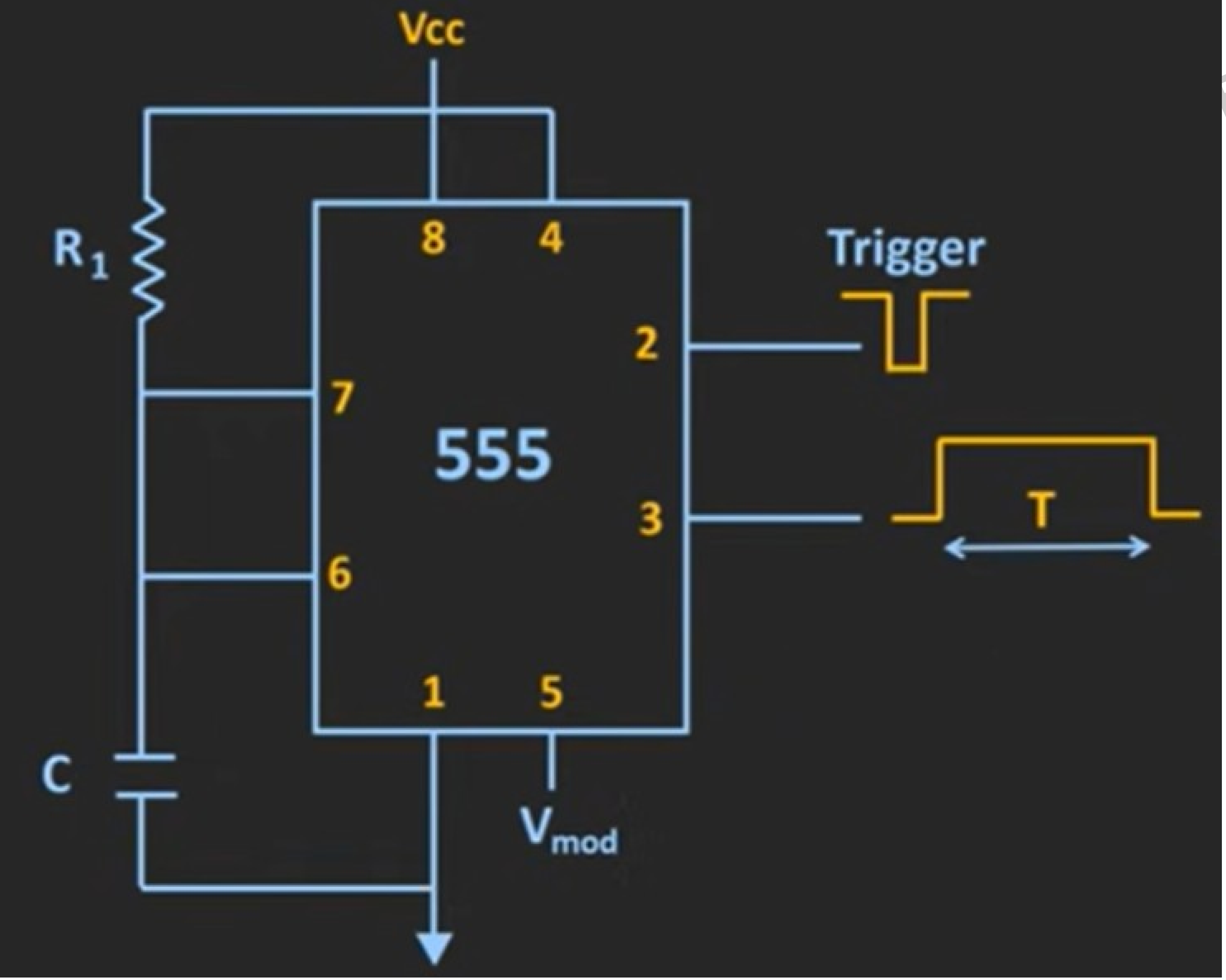
Till now we used only internal reference voltages.

If we apply a modulating s/g at control pin, it is possible to generate PW modulated o/p.

Here ref V will continuously change based on this modulating s/g.

Depending on that o/p PW will continuously change.

Pulse Width Modulation (PWM)



DESIGN

$V_c(t) = V_F + (V_I - V_F)$

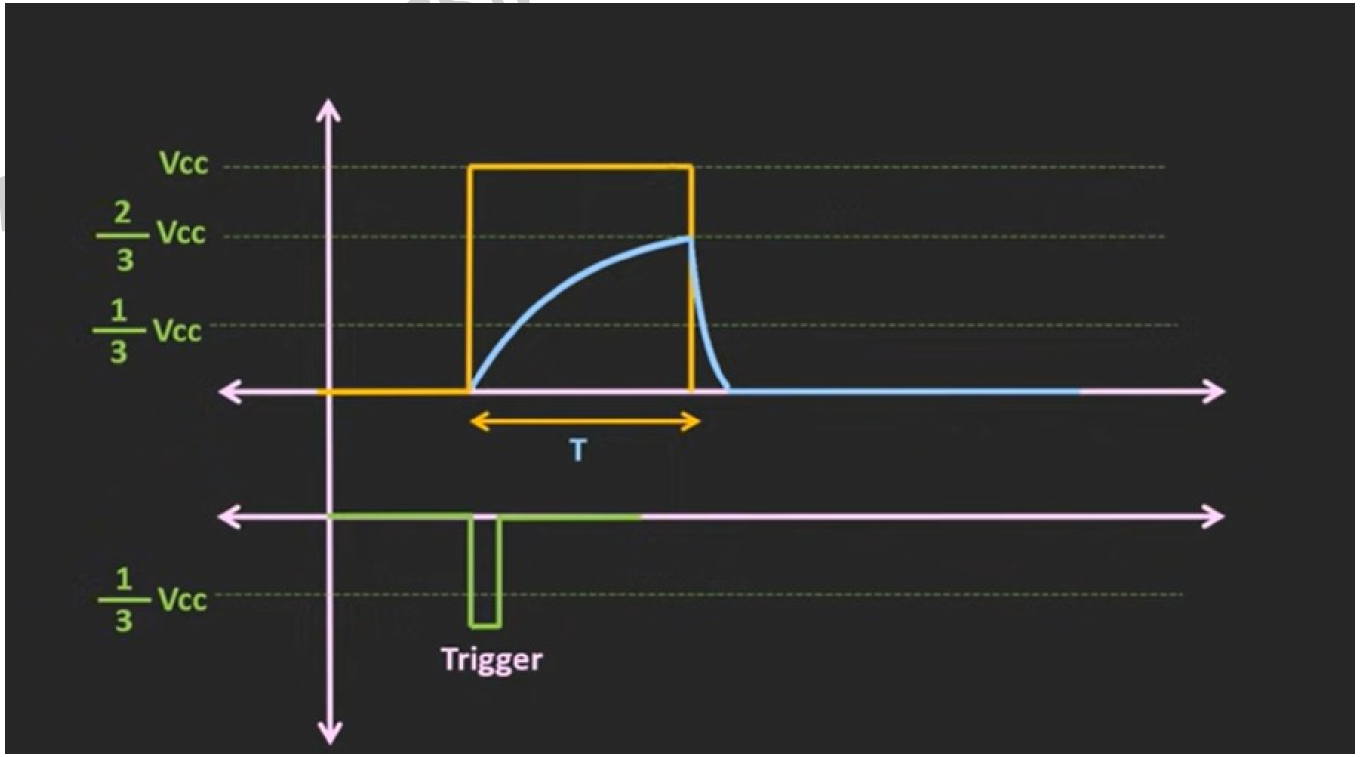
To find T

$V_I = 0$

$V_F = V_{cc}$

$V_c(t) = 2/3\ V_{cc}$

$R' = R_1$



$$T = 1.1\ R_1C$$