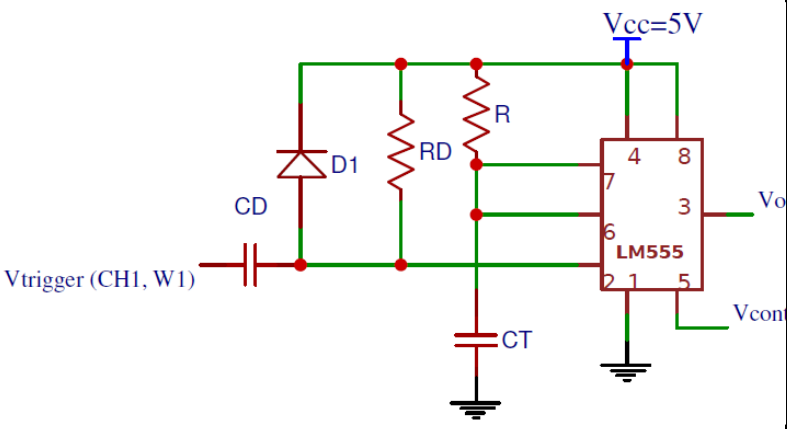
MONO STABLE MULTIVIBRATOR

Objectives of the Experiment:

1. Use of 555 timer as single pulse generator
2. Need of signal conditioning of input signal
3. Applications of 555 Timer as Mono stable MV for simple real time applications

Circuit Diagram



Design equations:

$V_C = V_F - (V_F - V_I)e^{-\frac{t}{RC}}$ ----(1)

With $V_I = 0$, $V_F = V_{CC}$, at t=T, $V_C = \frac{2}{3}V_{CC}$

Equation (1) becomes,

$\frac{2}{3}V_{CC} = V_{CC} - (V_{CC} - 0)e^{-\frac{T}{RC}}$

Pulse width $T = \ln(3)\,RC \approx 1.1RC$

Pulse width with External voltage at $V_{control}$

$$T = RC\ ln\left(\frac{V_{CC}}{(V_{CC} - V_{EXT})}\right)$$

Procedure for conduction:

1. Select the Mono Multi-vibrator through 555 Timer option
2. Select one of the Mono stable MV option
3. Click on conduction button
4. Do the Analog Discovery settings as shown in the table
5. Take relevant screenshots
6. Repeat the above steps with different Vext (DC voltage using W2)

Analog Discovery settings:

<table>
<tr><td colspan="2">Wavegen</td><td colspan="2">Scope:
Time: Position: 0s Base: 1ms/div or appropriate</td></tr>
<tr><td>Wavegen 1</td><td>Wavegen 2</td><td>Channel 1</td><td>Channel 2</td></tr>
<tr><td rowspan="4">Square wave
Amplitude: 3V (2V)
Offset: 2V (0V)
Frequency: 2 KHz
Duty cycle: 50%</td><td rowspan="4">DC: 3.5 V</td><td>Offset: 0V
Range: 1V/div</td><td>Offset: -4V
Range: 1V/div</td></tr>
<tr><td colspan="2">View-Measurements-Add</td></tr>
<tr><td>Vertical
C1-Maximum, Minimum, Peak to peak
Horizontal:
C1: Frequency, Positive width</td><td>Vertical
C2-Maximum
Horizontal:
C2: Positive width</td></tr>
</table>

Readings:

Expt.	R (Ω)	V_{EXT} , (V)	Pulse Width T msec Calculated	Pulse Width T msec Measured
Mono 1	1K			
Mono 2	10K			
Mono 3	10K||1K			

Experiment Outcomes: After conducting the experiment students are able to

1. Distinguish between Mono stable and other Multi -Vibrators
2. Differentiate the stable and Quasi stable state of the circuit
3. Know the importance of Trigger signal and their specifications
4. Know the role of variable parameters on the circuit performance
5. Design the Monostable MV of desired pulse width
6. Provide solutions to real time challenges using Monostable MV