



Introduction to

The 555 Timer

https://wiki.nottinghack.org.uk/wiki/Electronics_Workshops



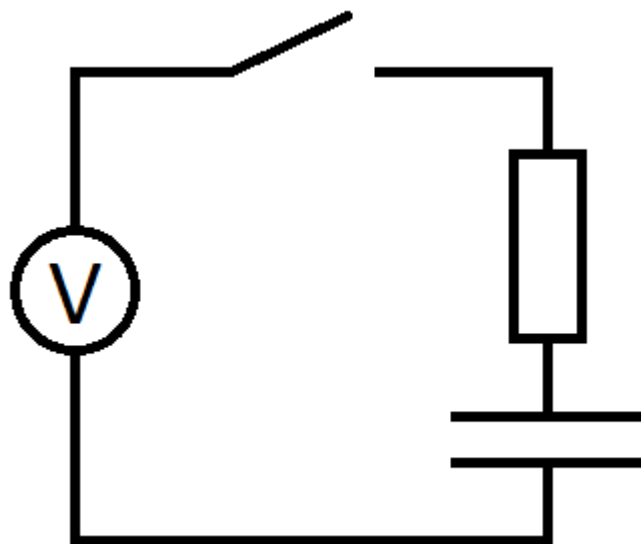
What we'll be doing

- RC circuits
- 555 Monostable circuit
- 555 Astable circuit
- "Advanced" circuits



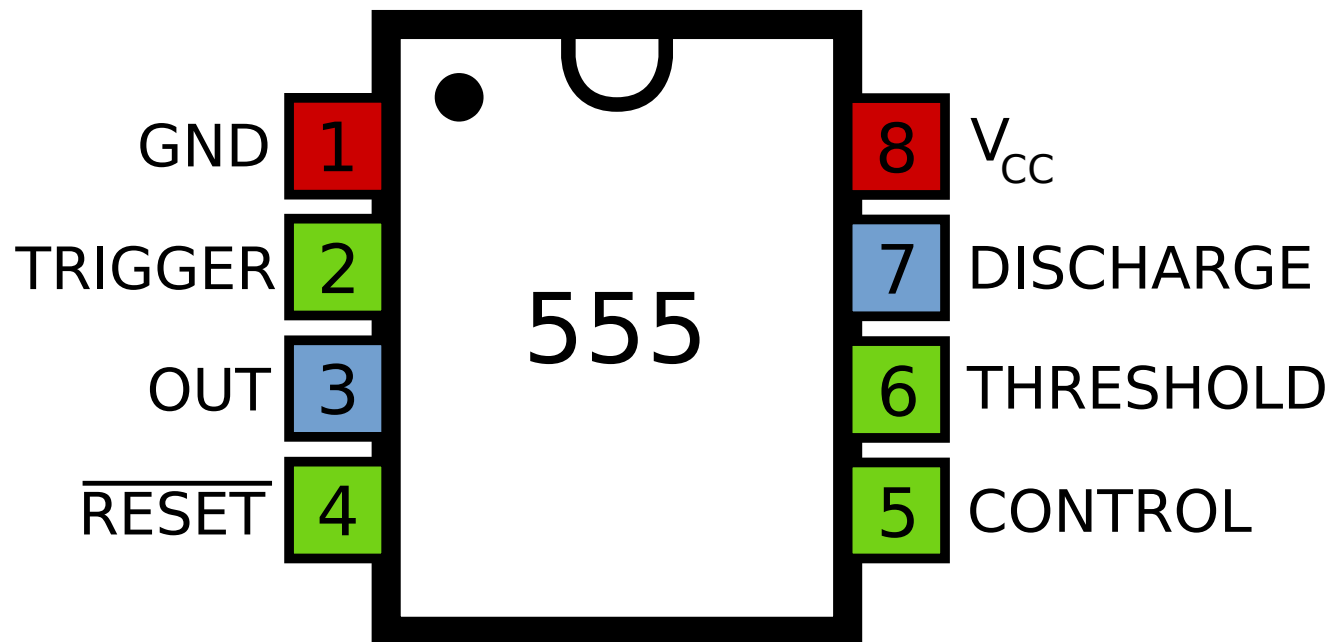
RC Circuits

- Capacitors can *store charge*. Think of them as temporary batteries.





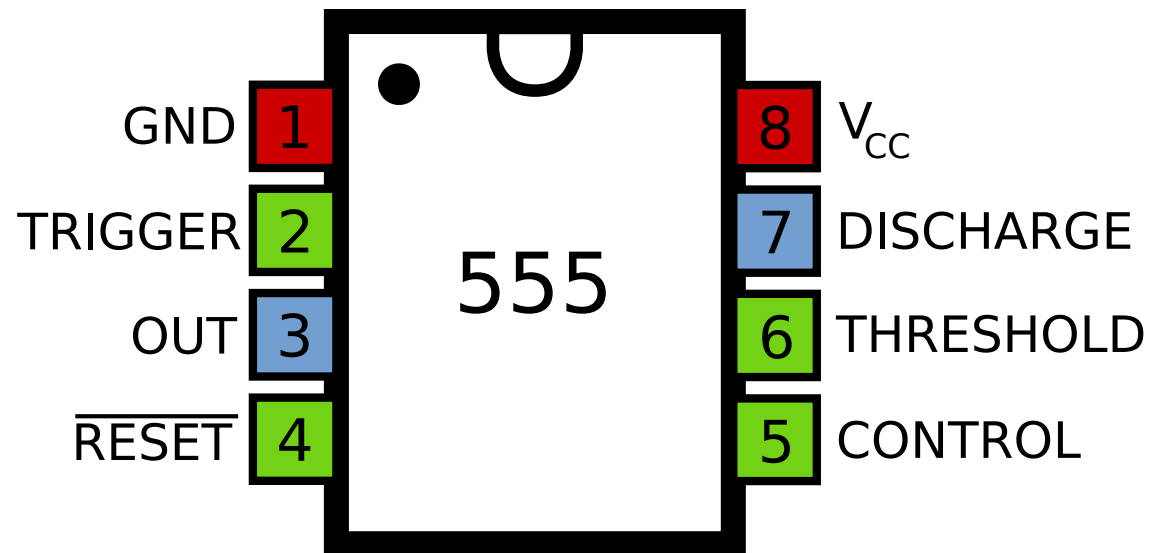
555 Timer Pins





555 Timer "Rules"

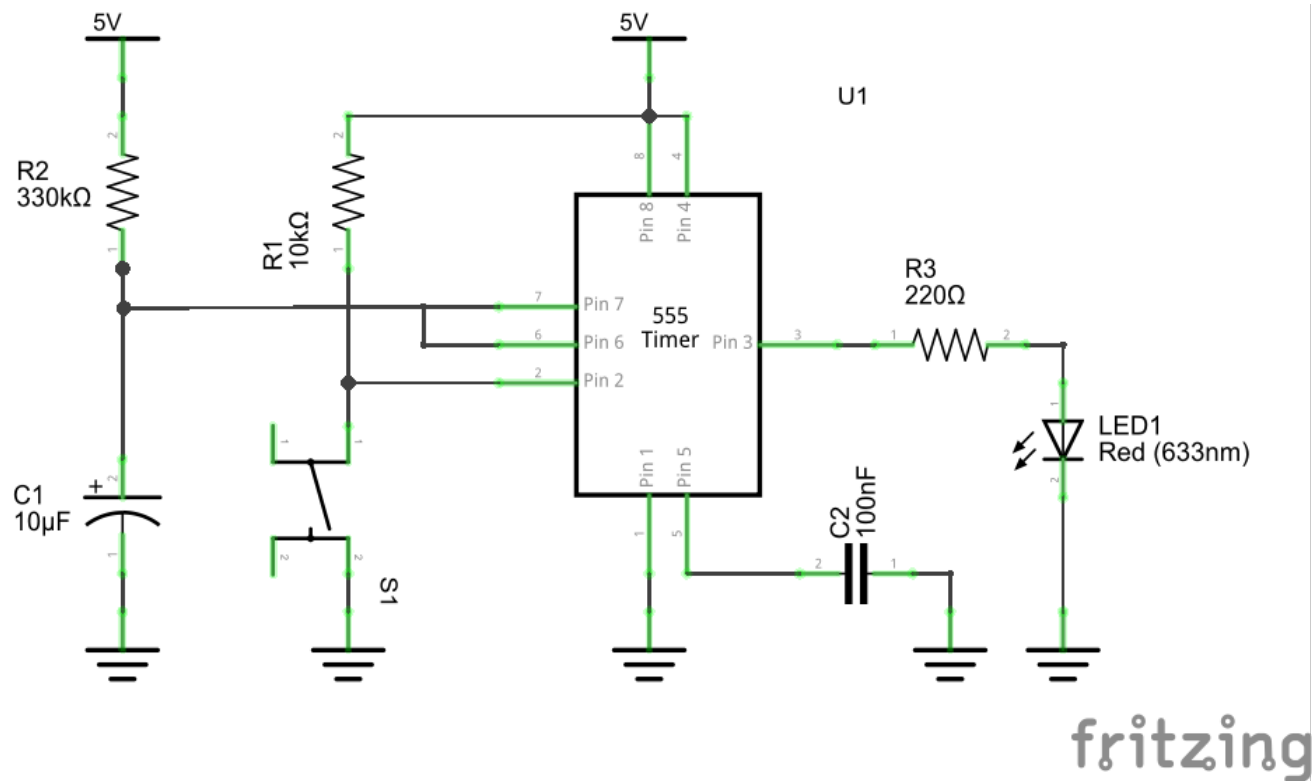
	Output	Discharge
Trigger below $1/3 V_{cc}$	ON (V_{cc})	Floating (unconnected)
Threshold above $2/3 V_{cc}$	Ground	Ground





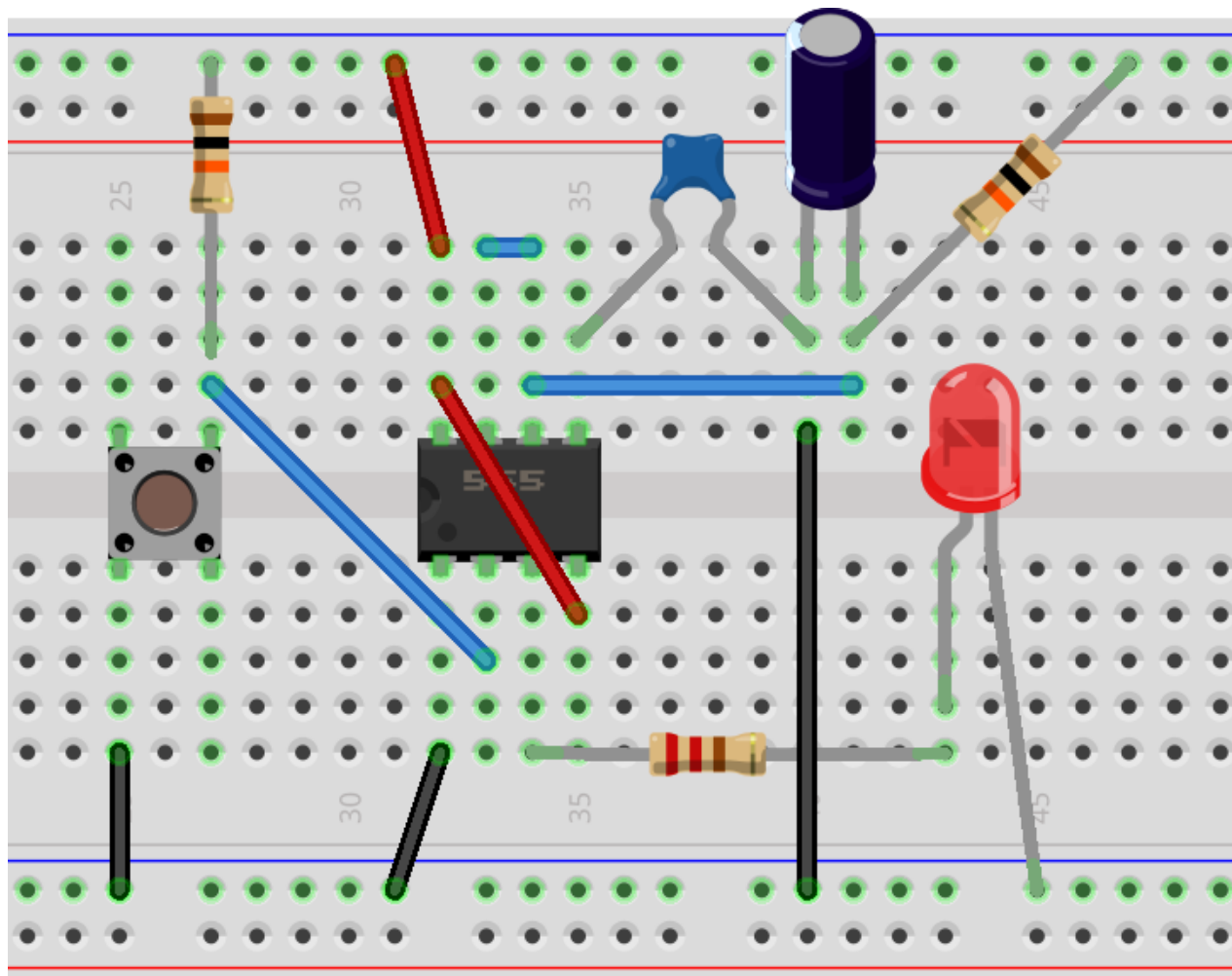
Monostable Circuits

- **Monostable** – one permanent state.





Monostable Circuits



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Monostable Circuits

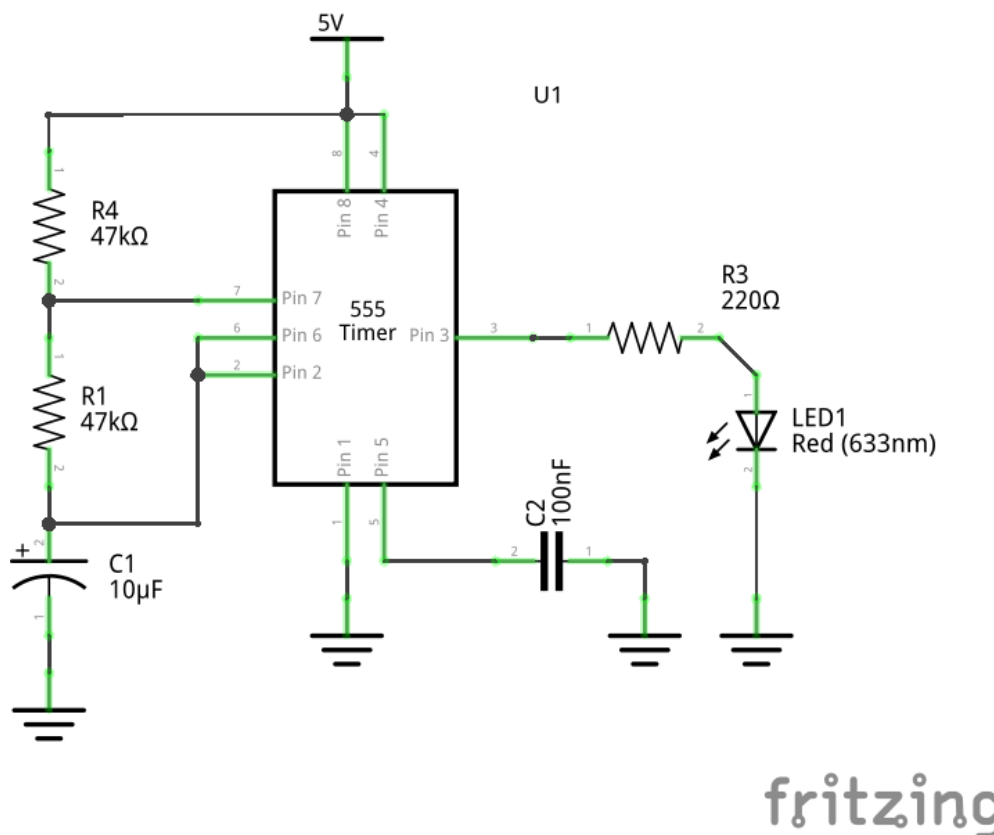
Useful monostable equations:

$$\text{Time on} = 1.1RC$$



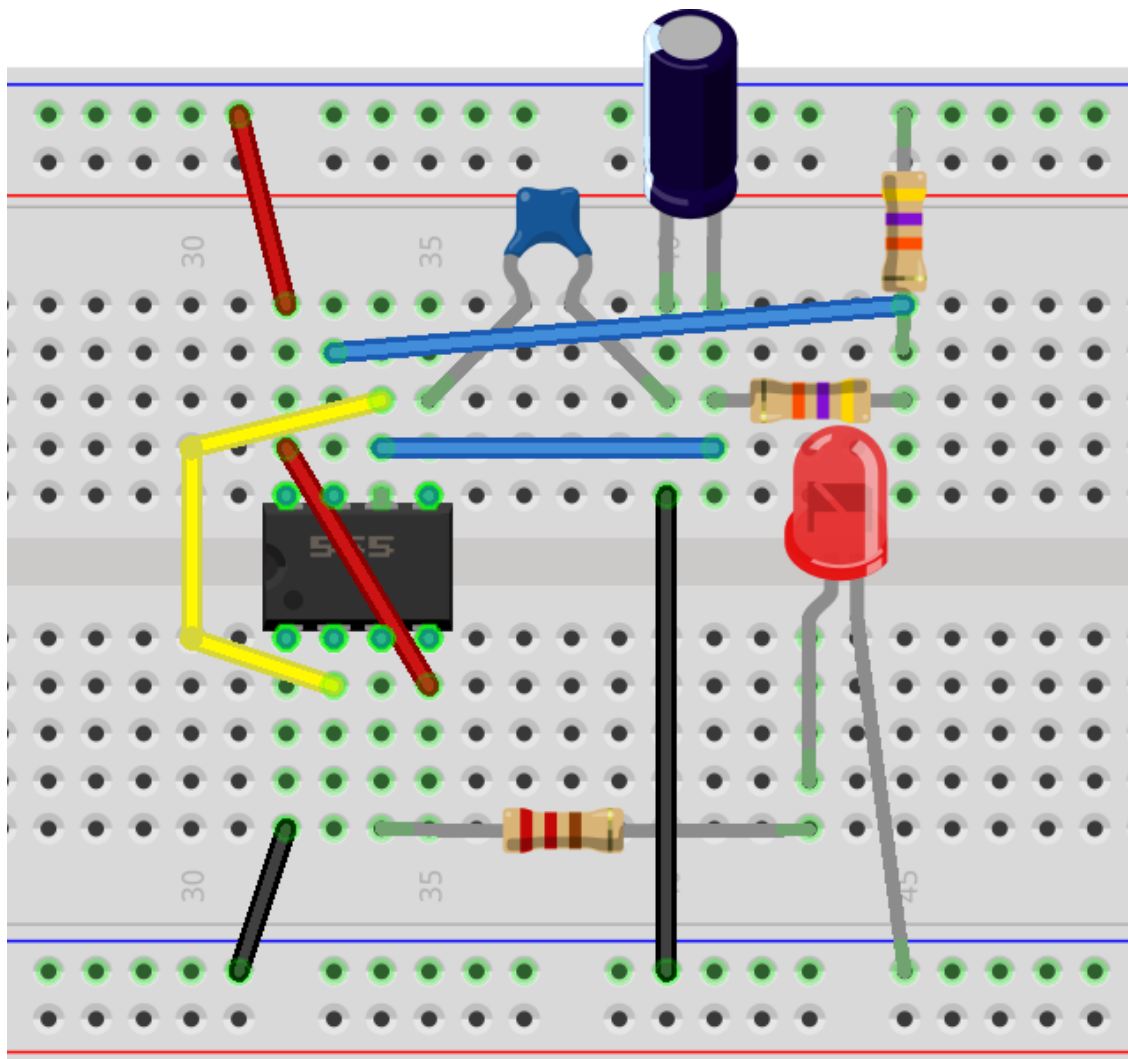
Astable Circuits

- Astable – no permanent states.





Astable Circuits





Astable Circuits

Useful astable equations:

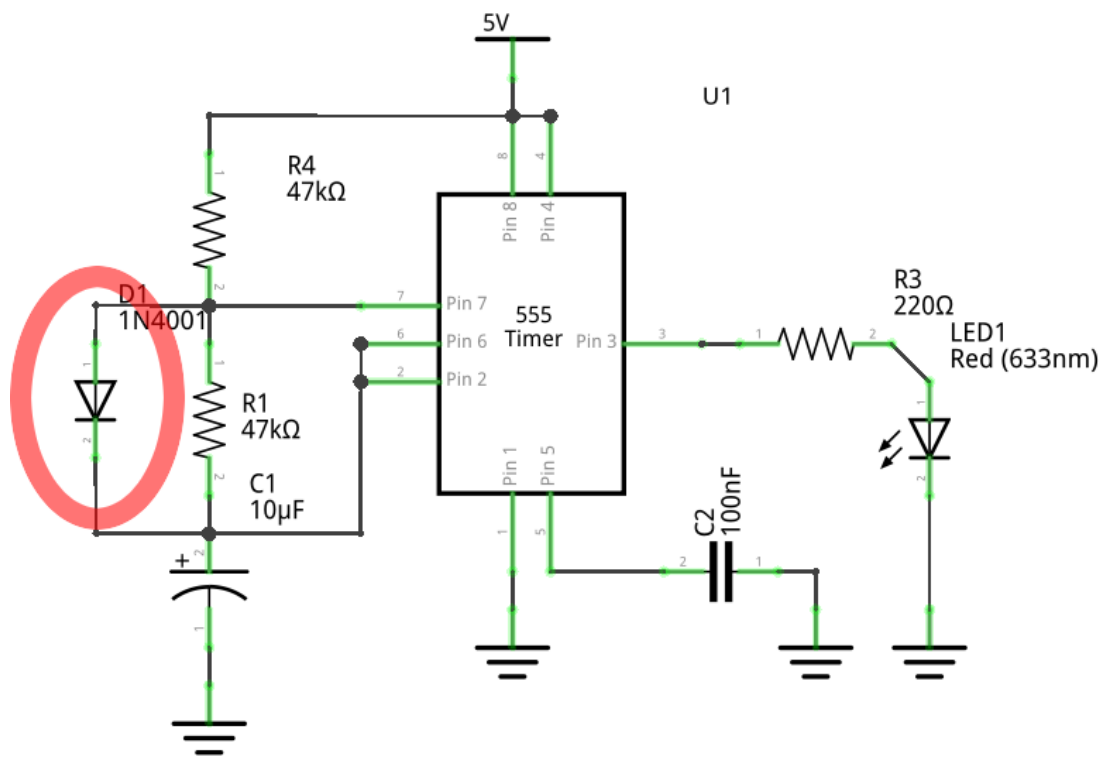
$$\text{Frequency} = \frac{1.44}{(R_1 + 2R_2)C}$$

$$\text{Duty Cycle} = \frac{R_1 + R_2}{R_1 + 2R_2}$$



"Advanced" Circuits

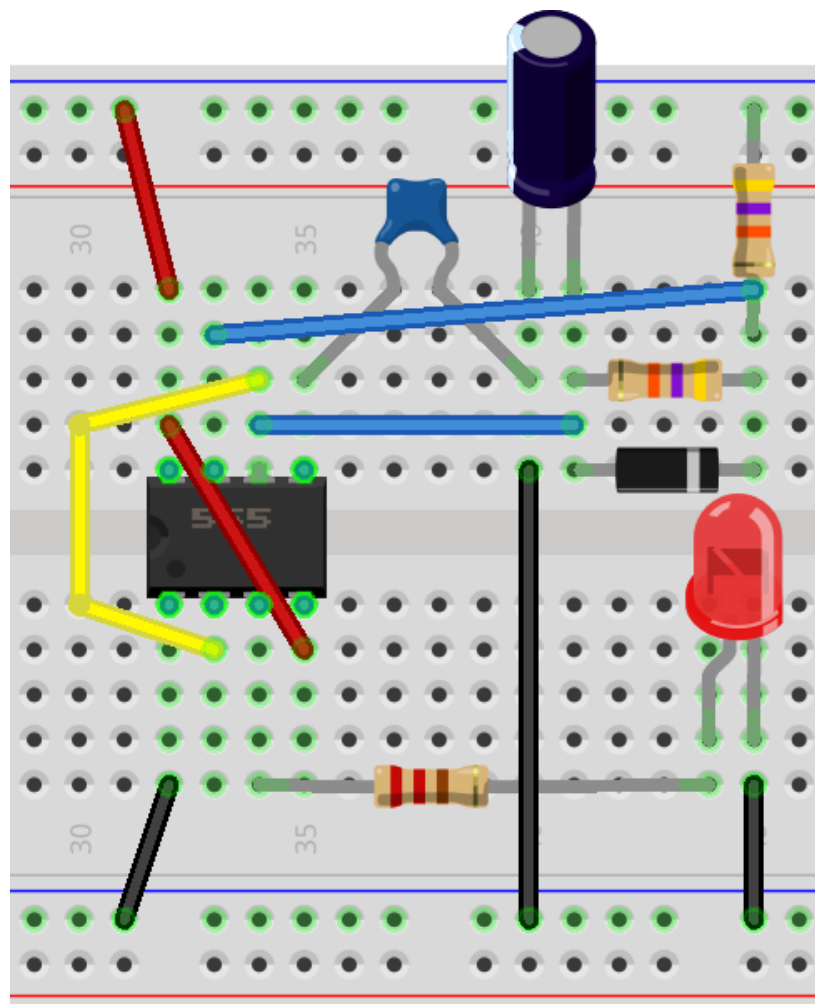
- Astable – low duty cycle



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"Advanced" Circuits



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More “Advanced” Circuits

- Voltage Controlled Oscillator (VCO)
- Pulse Width Modulation (PWM)
- Google it!



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Nottingham Hackspace – 555 Timer Workshop