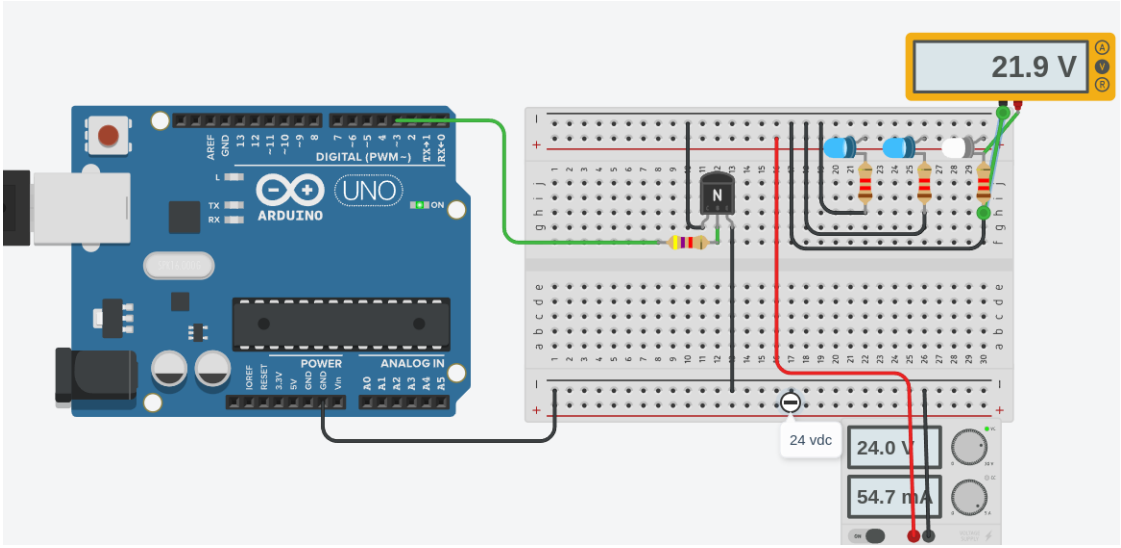
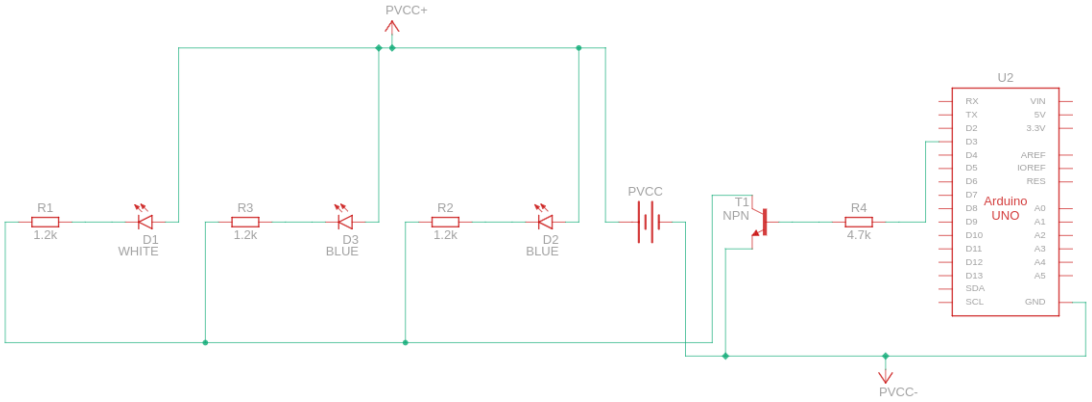
NPN Transistor

Below I'm calculating required resistance between microcontroller and Base of transistor using: 2N222A NPN Transistor and esp8266(NodeMCU1.0(ESP-12E Module)) and arduino IDE.





Calculate resistor at base of transistor (B)

- Calculate total current through transistors Collector pin I_C: 3-led branches @ $18.2_{mA} = 54.7_{mA}$ (This includes a .2 voltage drop, transistor Collector(C) to Emitter(E))
- from data sheet we see β or h_{FE} range of 40-300 I'll use **150**
- Calculate amount of current to transistor Base by: $\frac{I_{Collector}}{h_{FE}} = \frac{54.7_{mA}}{150} = .36_{mA}$
- Calculate resistor to Base(B) of transistor (Note voltage drop of .7 between transistor B and E, V_{BE}

$$R_B = \frac{V_{GPIOPin} - V_{BE}}{I_B} = \frac{3v - 0.7v}{.36_{mA}} = 6389\Omega$$

- reduce resistance, by $\tilde{}\frac{1}{2}$ to make sure transistor switches, in this example 4.7_K resistor