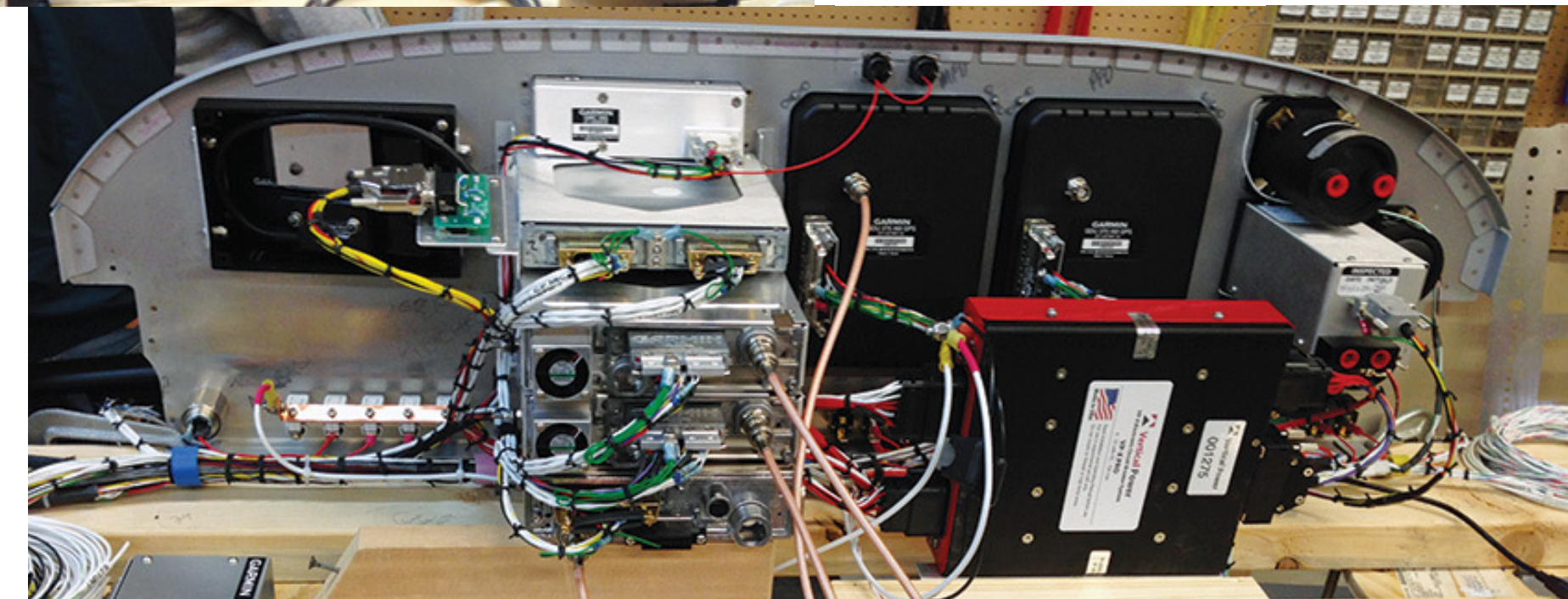
Avionics, Electronics, Circuits, & Wiring

Apollo 11

- Command Module
- Instrument Panel
- DSKY

F-PRVN
SPRUCE GOOSE



NASA TECHNICAL STANDARD 8739.4

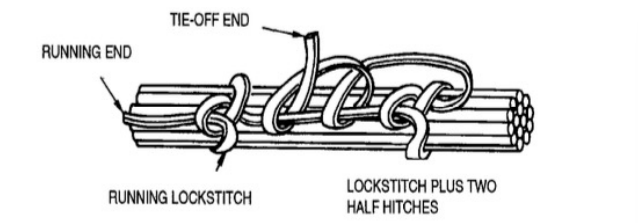


Figure 9-3. Closing Stitch and Single Tape--Illustration

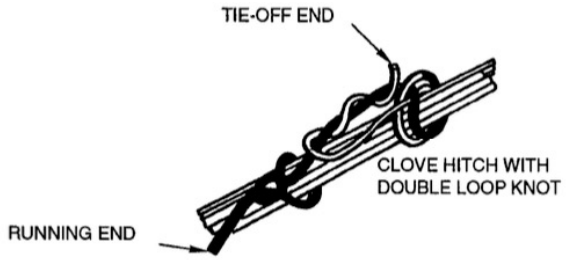


Figure 9-4. Alternate Closing Stitch and Single Tape—Illustration

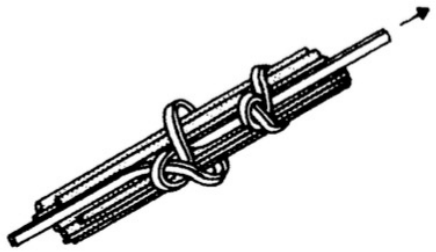
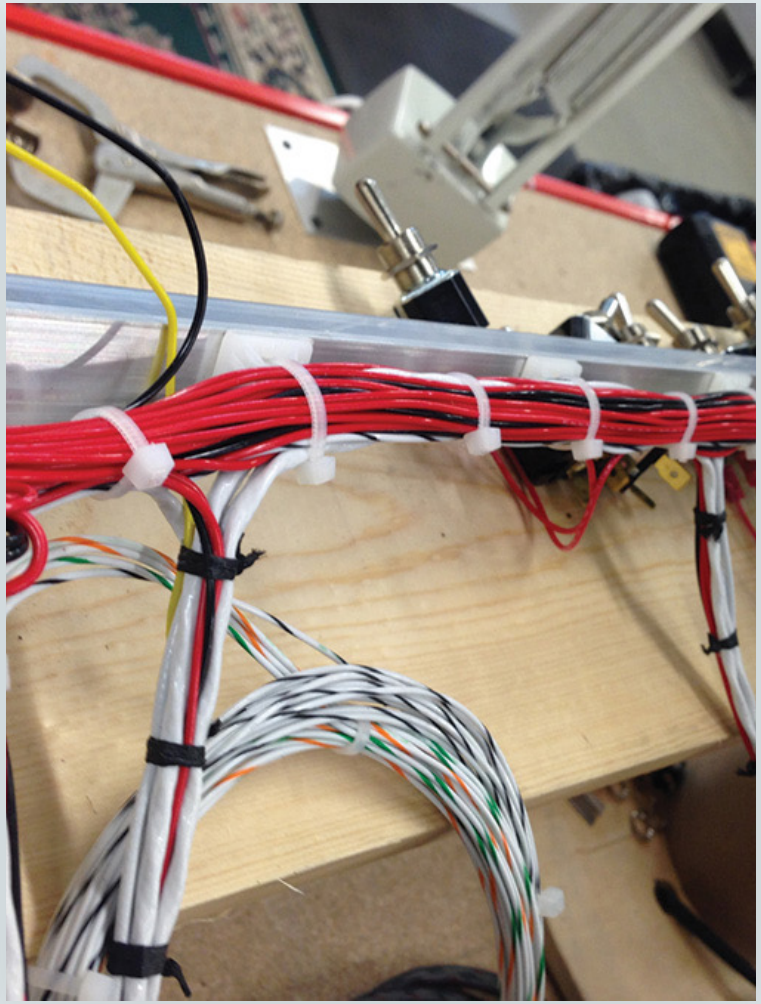
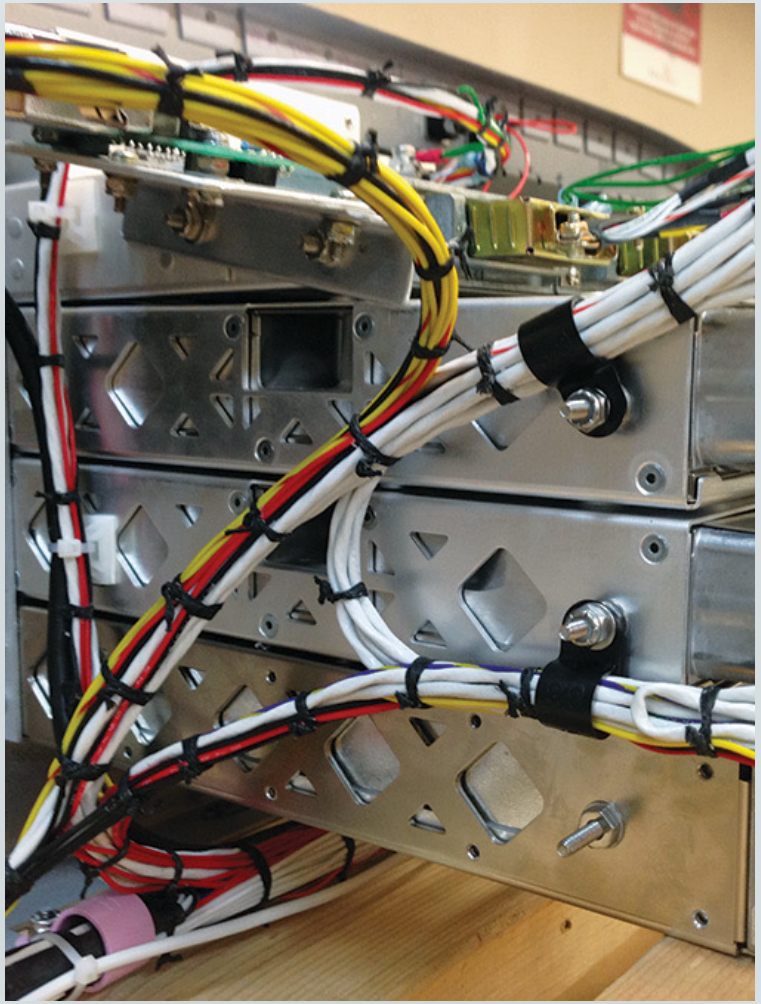
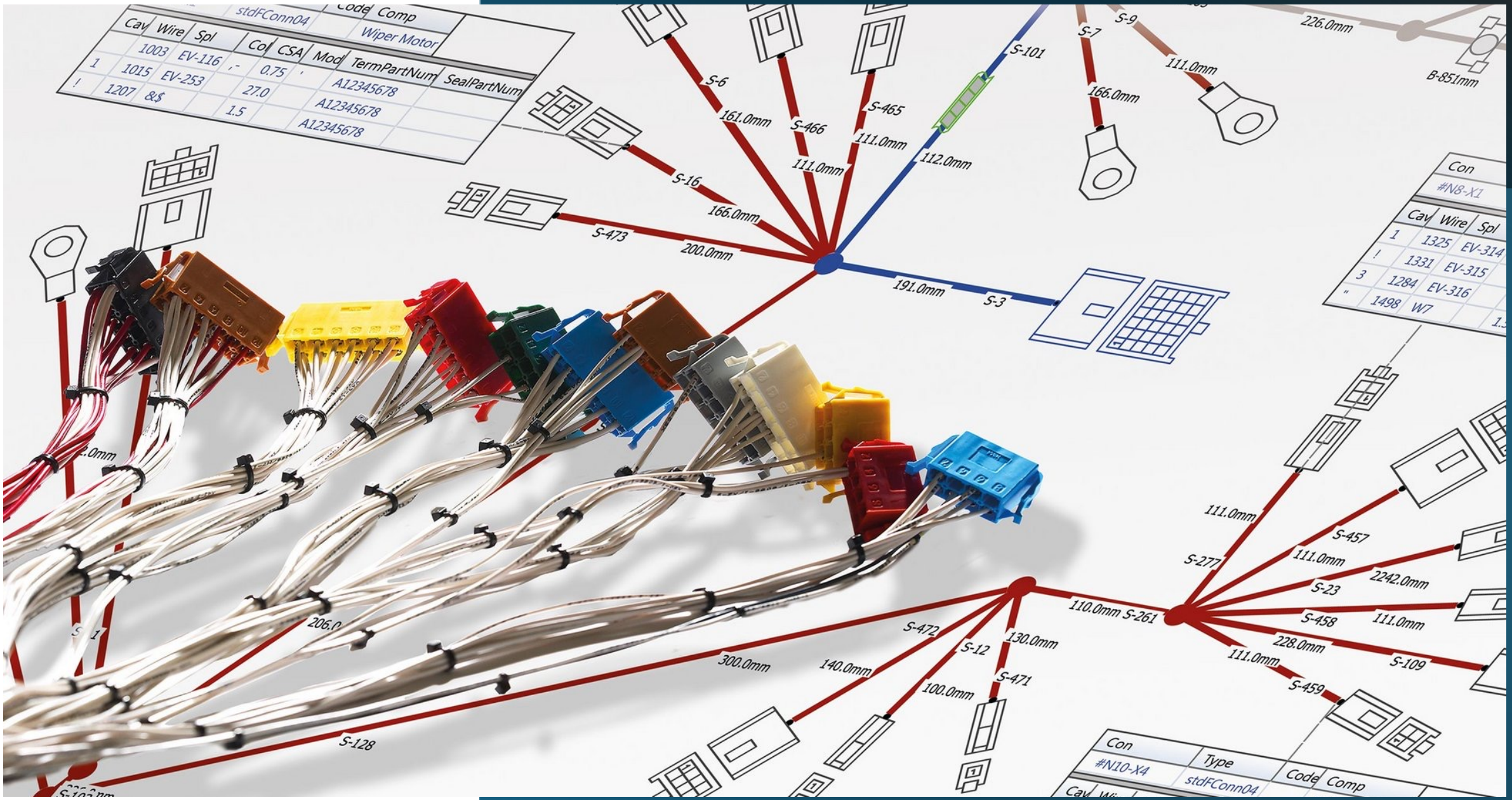


Figure 9-5. Running Lockstitch



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Code Comp
Wiper Motor
Cav Wire Spl Co CSA Mod TermPartNum SealPartNum
1003 EV-116 0.75 A12345678
1 1015 EV-253 27.0 A12345678
! 1207 &$ 1.5 A12345678
S-6
161.0mm
S-466
111.0mm
S-465
111.0mm
S-101
112.0mm
S-7
166.0mm
S-9
111.0mm
226.0mm
B-851mm
S-16
166.0mm
S-473
200.0mm
191.0mm
S-3
Con
#N8-X1
Cav Wire Spl
1 1325 EV-314
! 1331 EV-315
3 1284 EV-316
" 1498 W7
111.0mm
S-457
S-277
111.0mm
2242.0mm
S-23
110.0mm S-261
S-458
111.0mm
228.0mm
S-109
111.0mm
S-459
S-472
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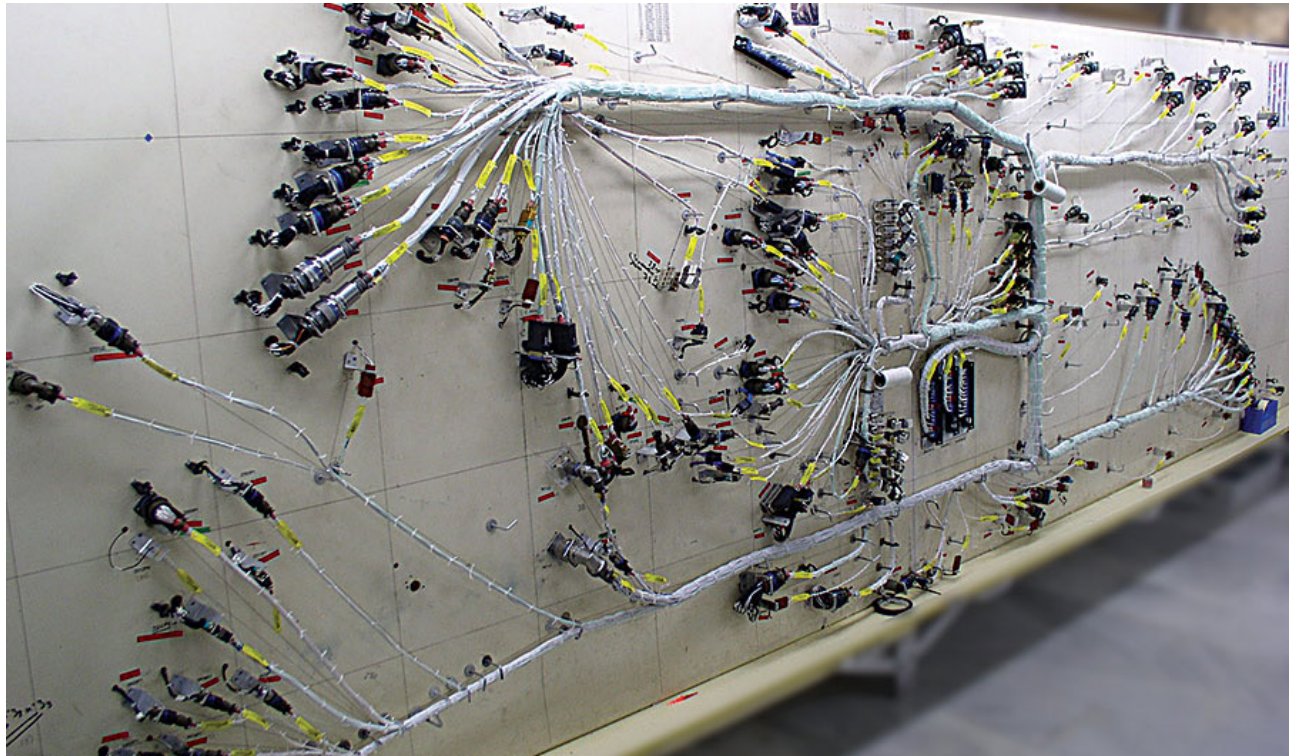
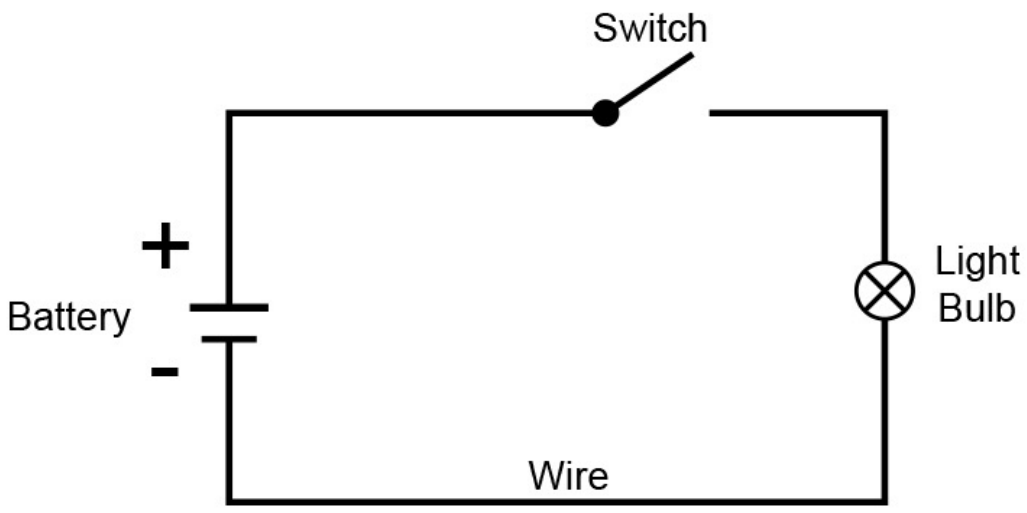
Code Comp



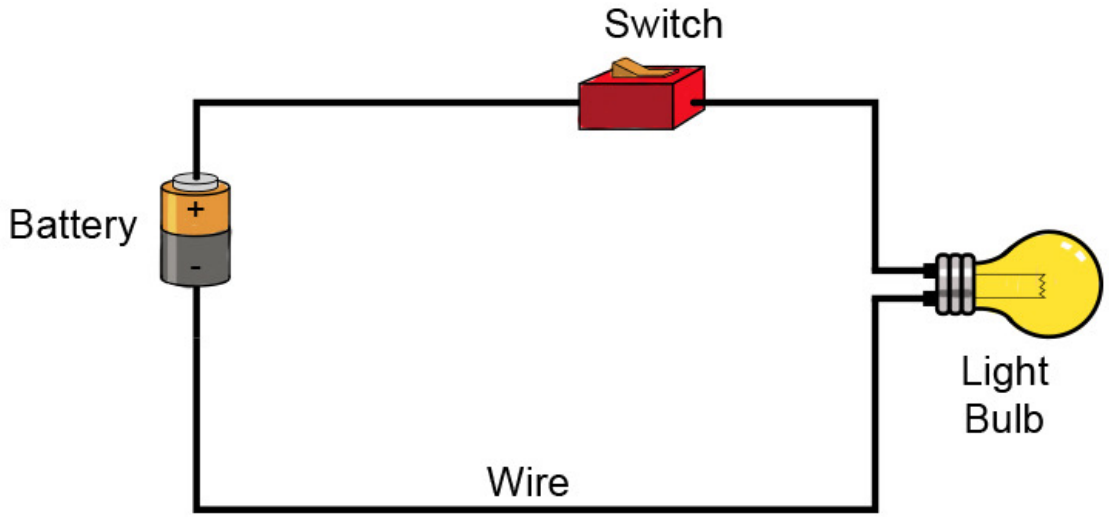
Wire Crimp Terminals

Simple Electrical Circuit

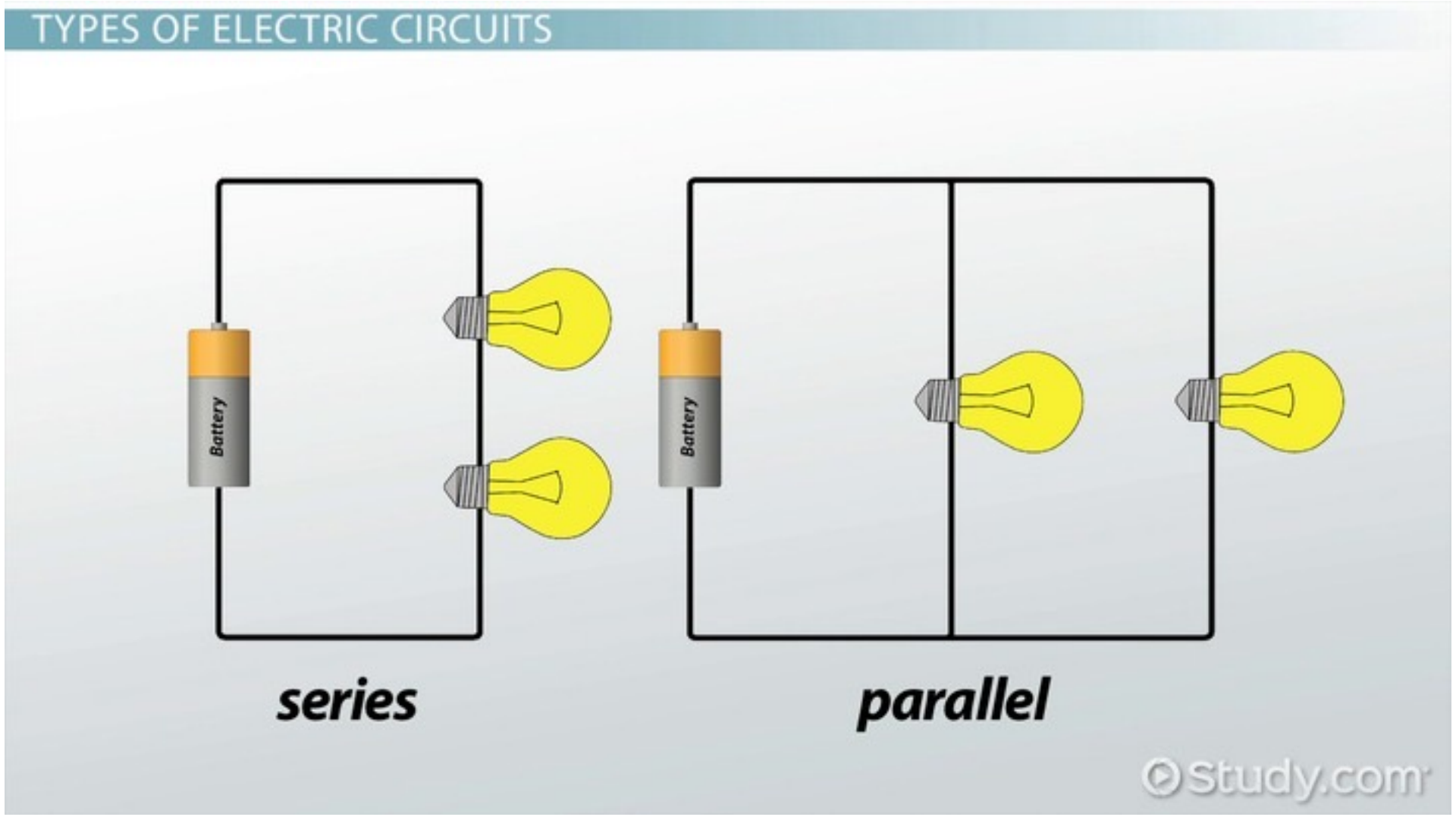
Electrical Schematic Symbols



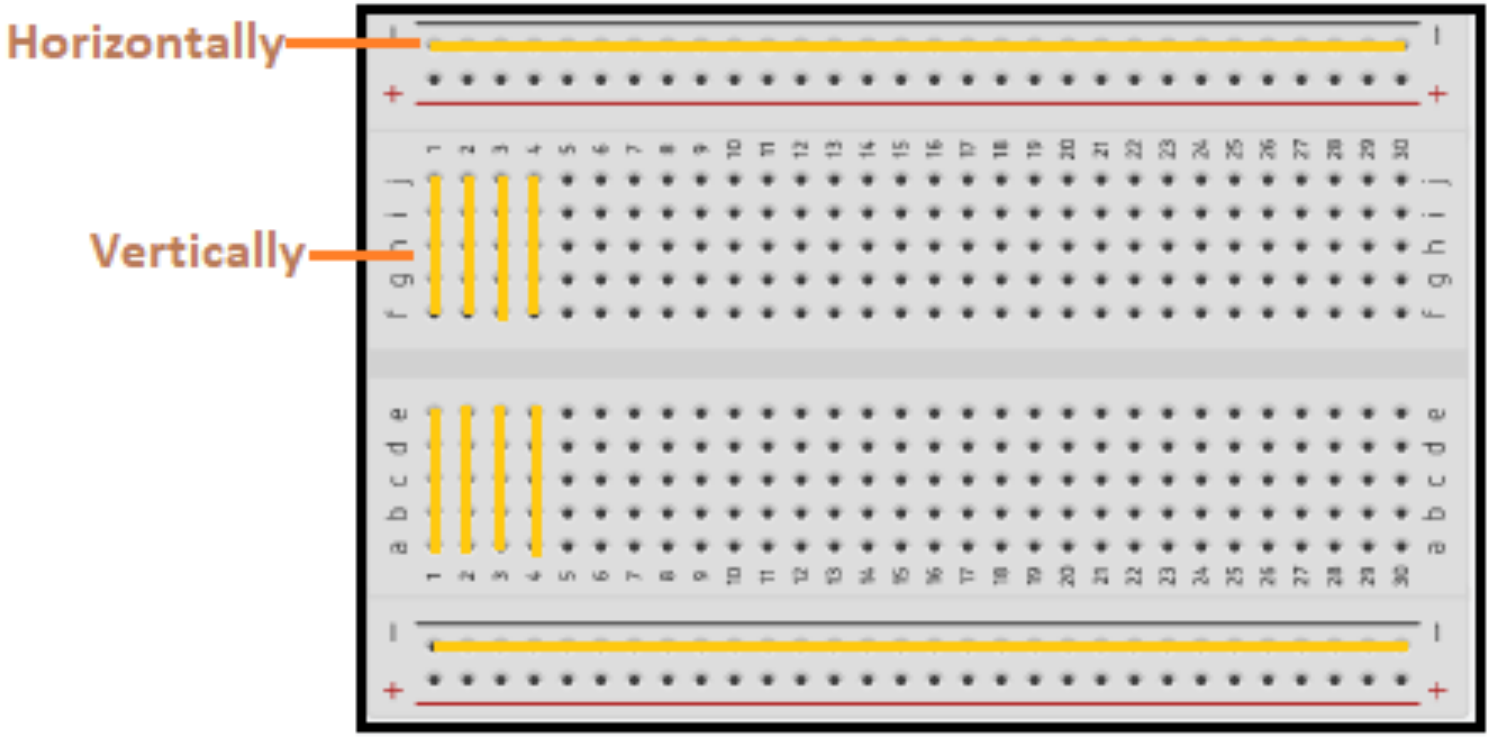
Illustration



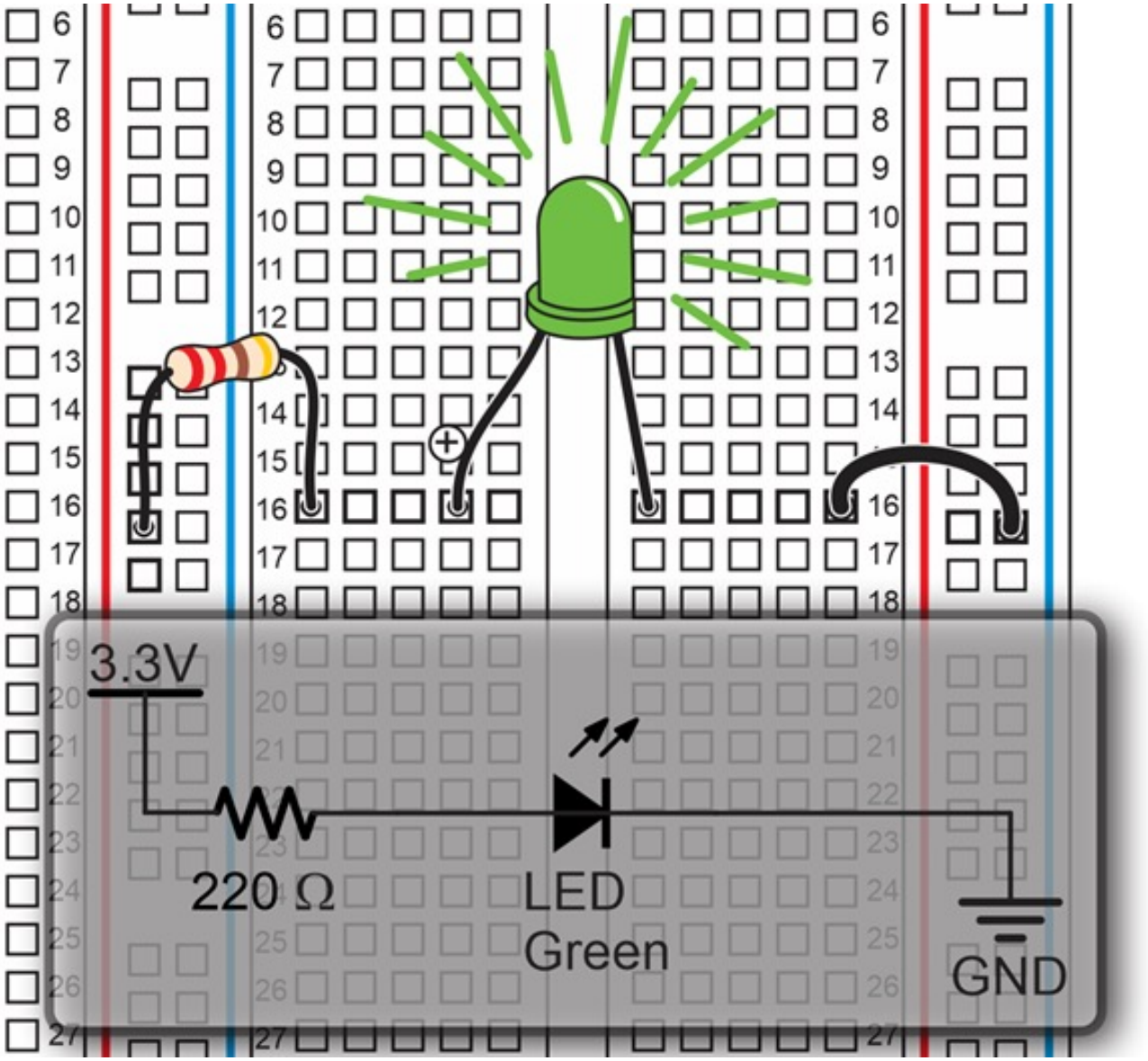
Series vs Parallel

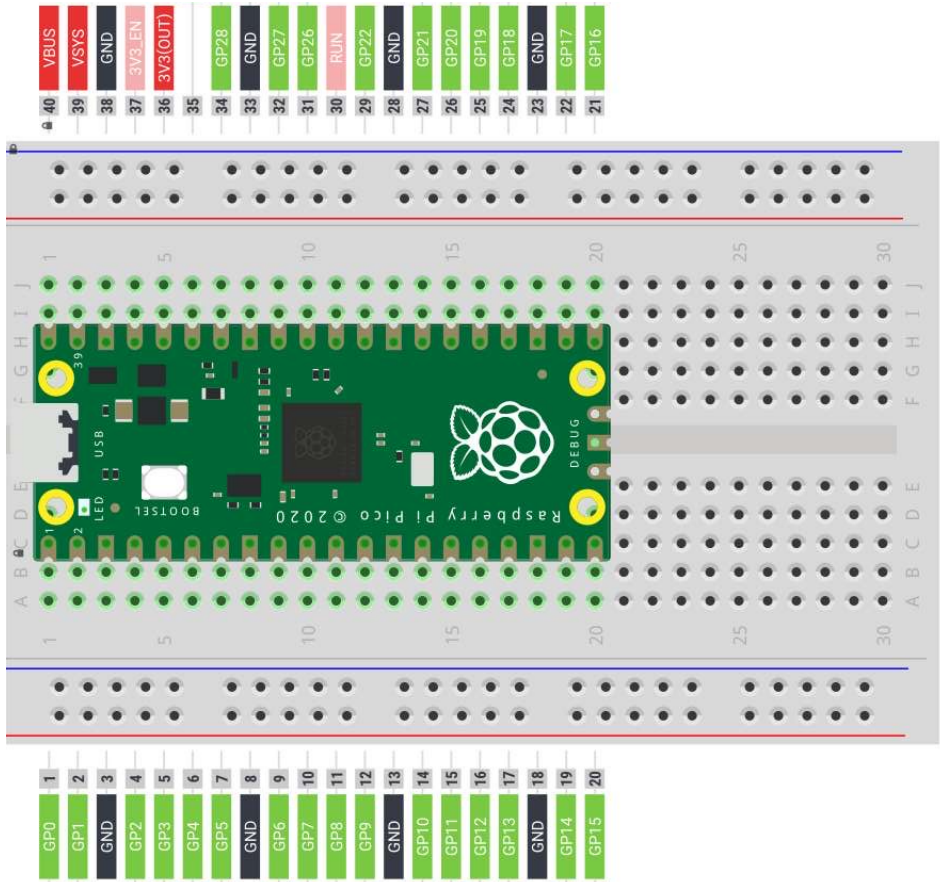


Electronic Breadboard



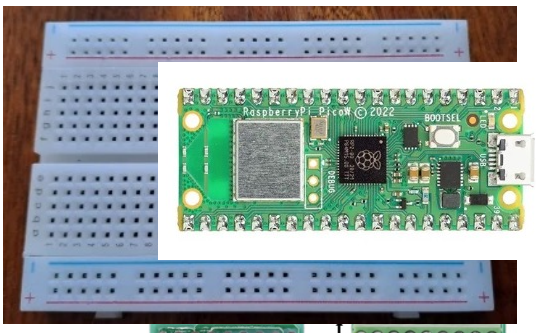
Lighting up an LED on a breadboard

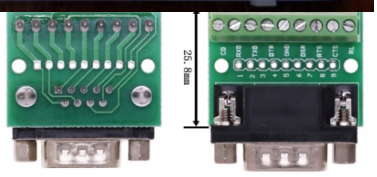



VBUS
VSYS
GND
3V3_EN
3V3(OUT)
GP28
GND
GP27
GP26
RUN
GP22
GND
GP21
GP20
GP19
GP18
GND
GP17
GP16
40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21
Raspberry Pi Pico ©2020
BOOTSEL
LED
USB
DEBUG
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
GP0
GP1
GND
GP2
GP3
GP4
GP5
GND
GP6
GP7
GP8
GP9
GND
GP10
GP11
GP12
GP13
GND
GP14
GP15

VCC GND SCL SDA
心如刀割
QQ
MP3

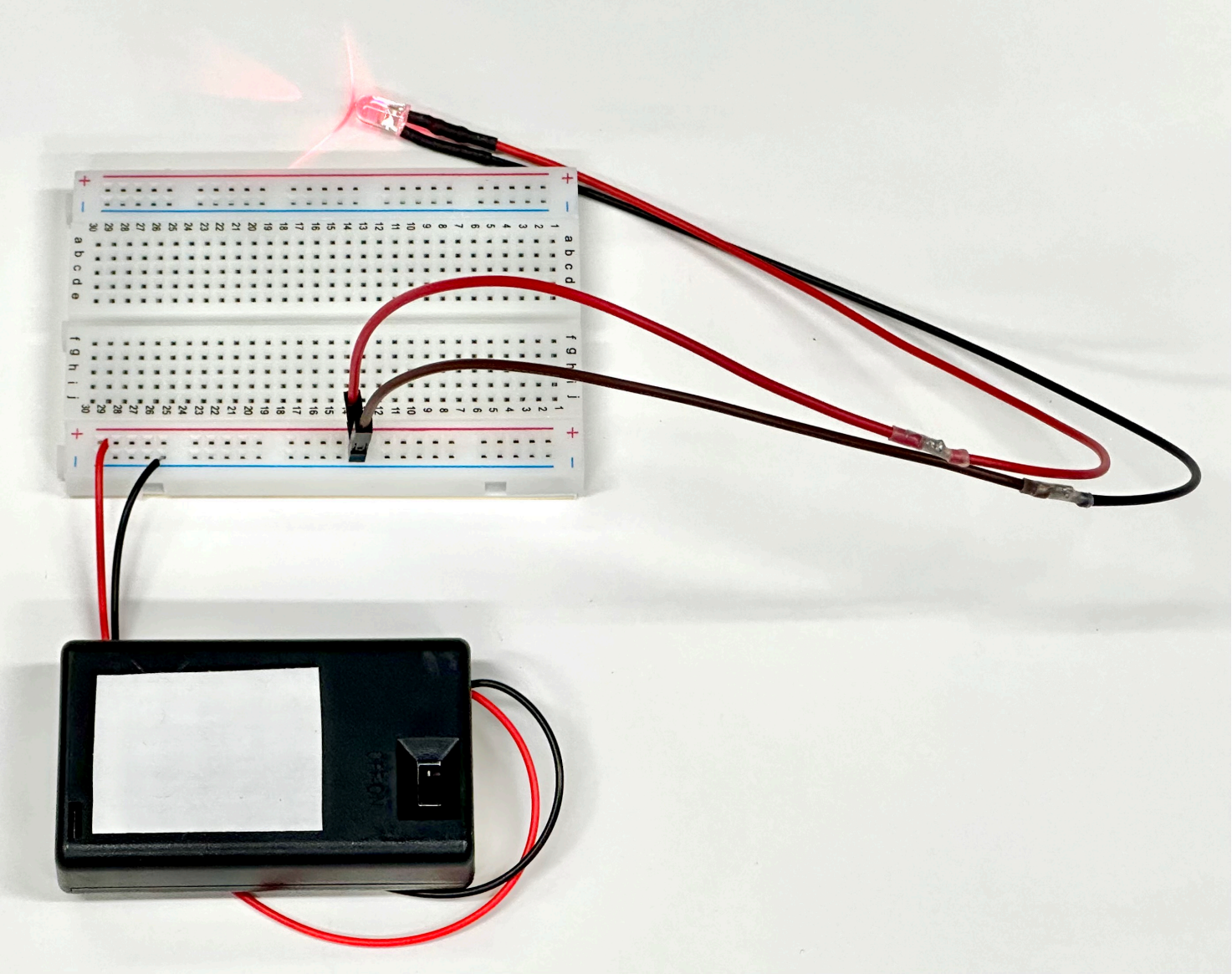
OFF ON


RaspberryPi Pico© 2022
BOOTSEL

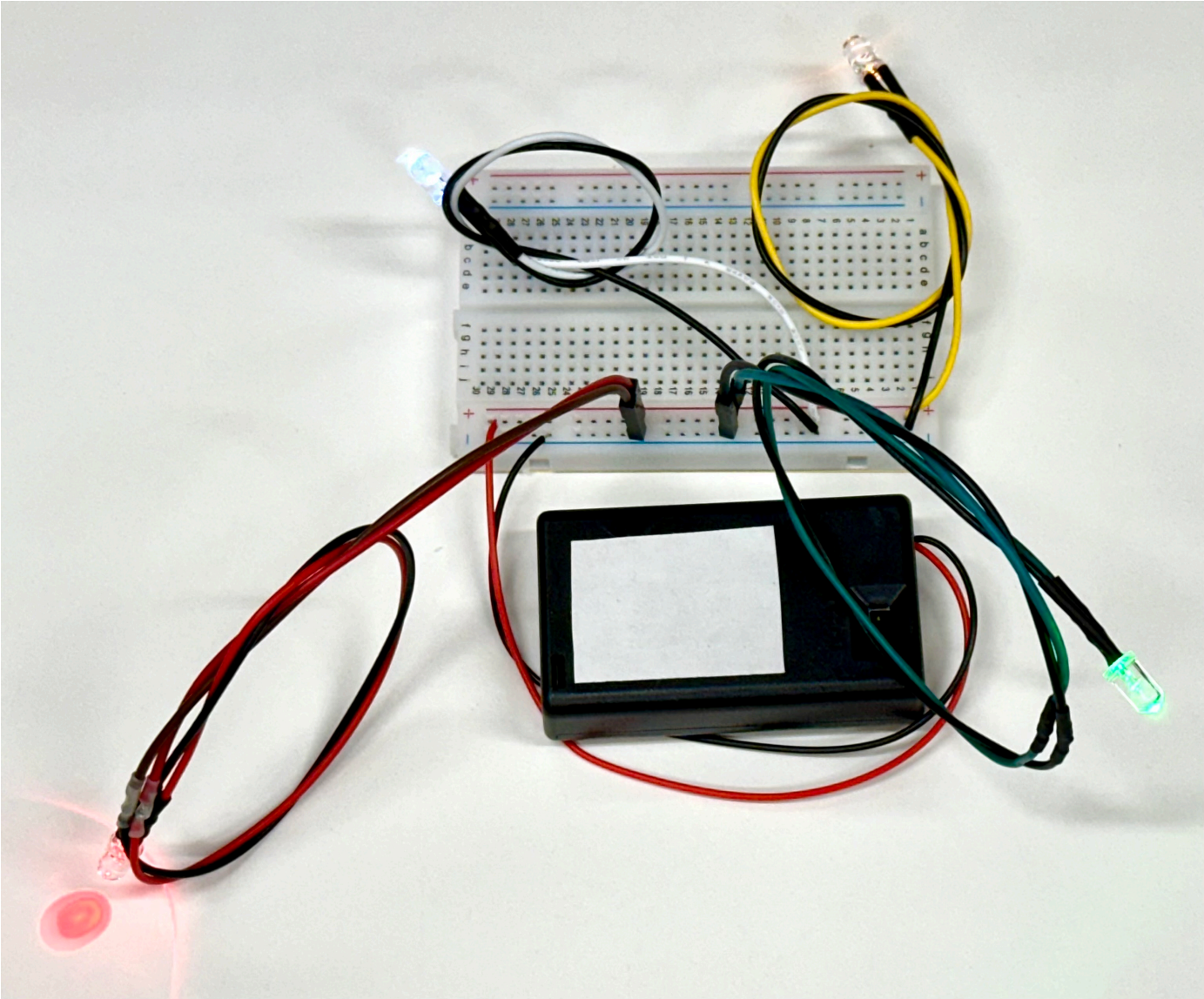

25.4mm

ON OFF
8A 125VAC

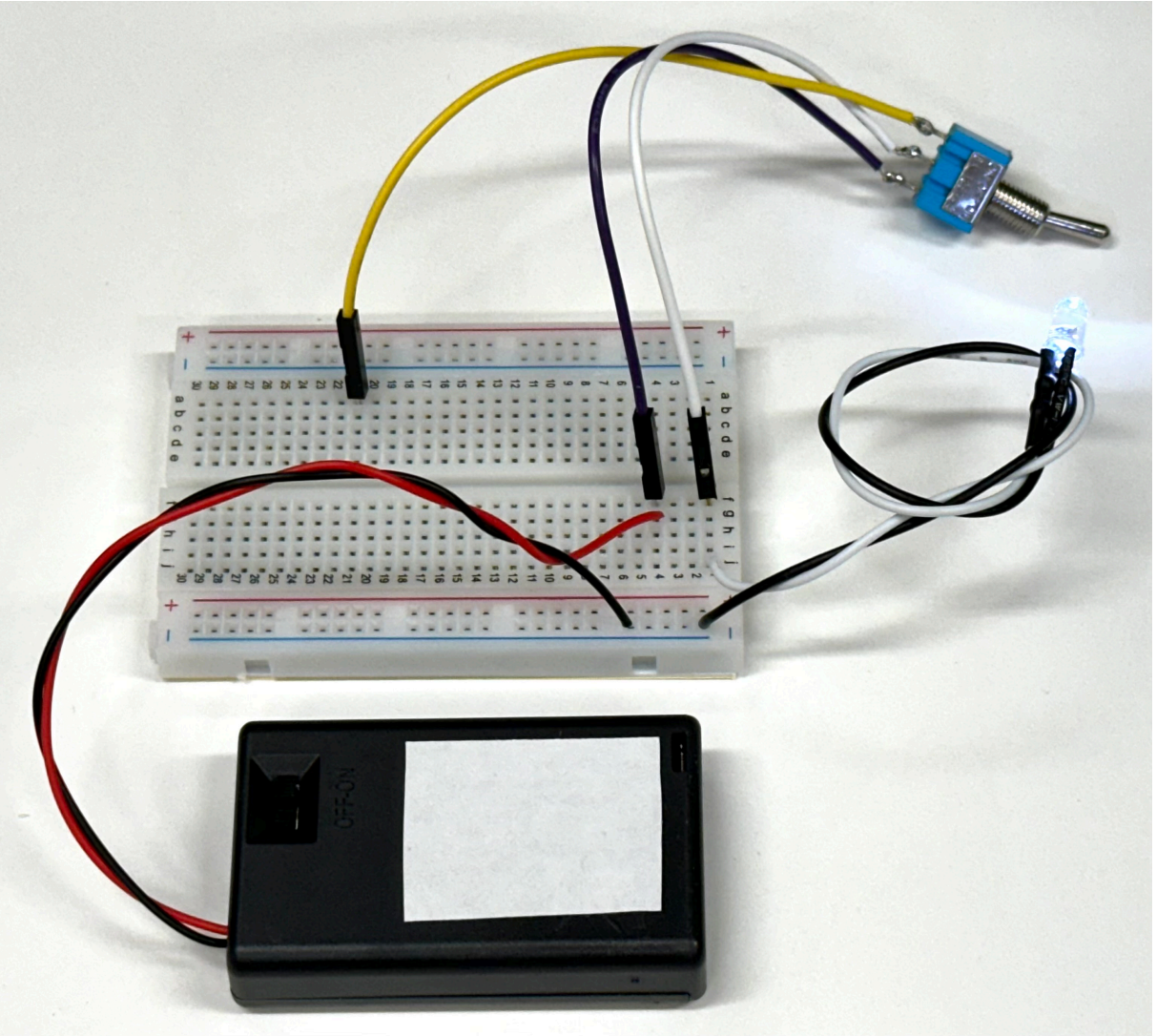
Battery to one LED



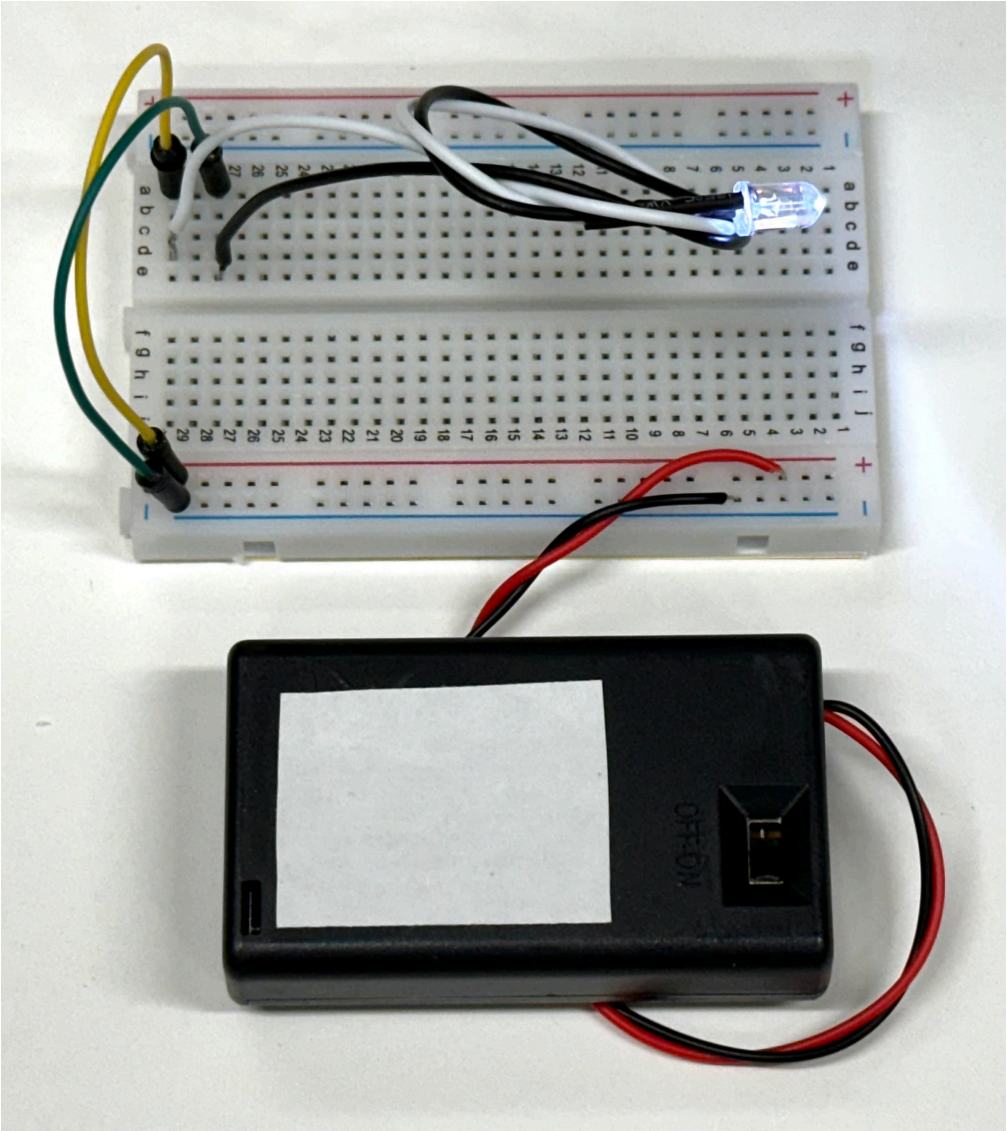
BATTERY TO PARALLEL LEDS



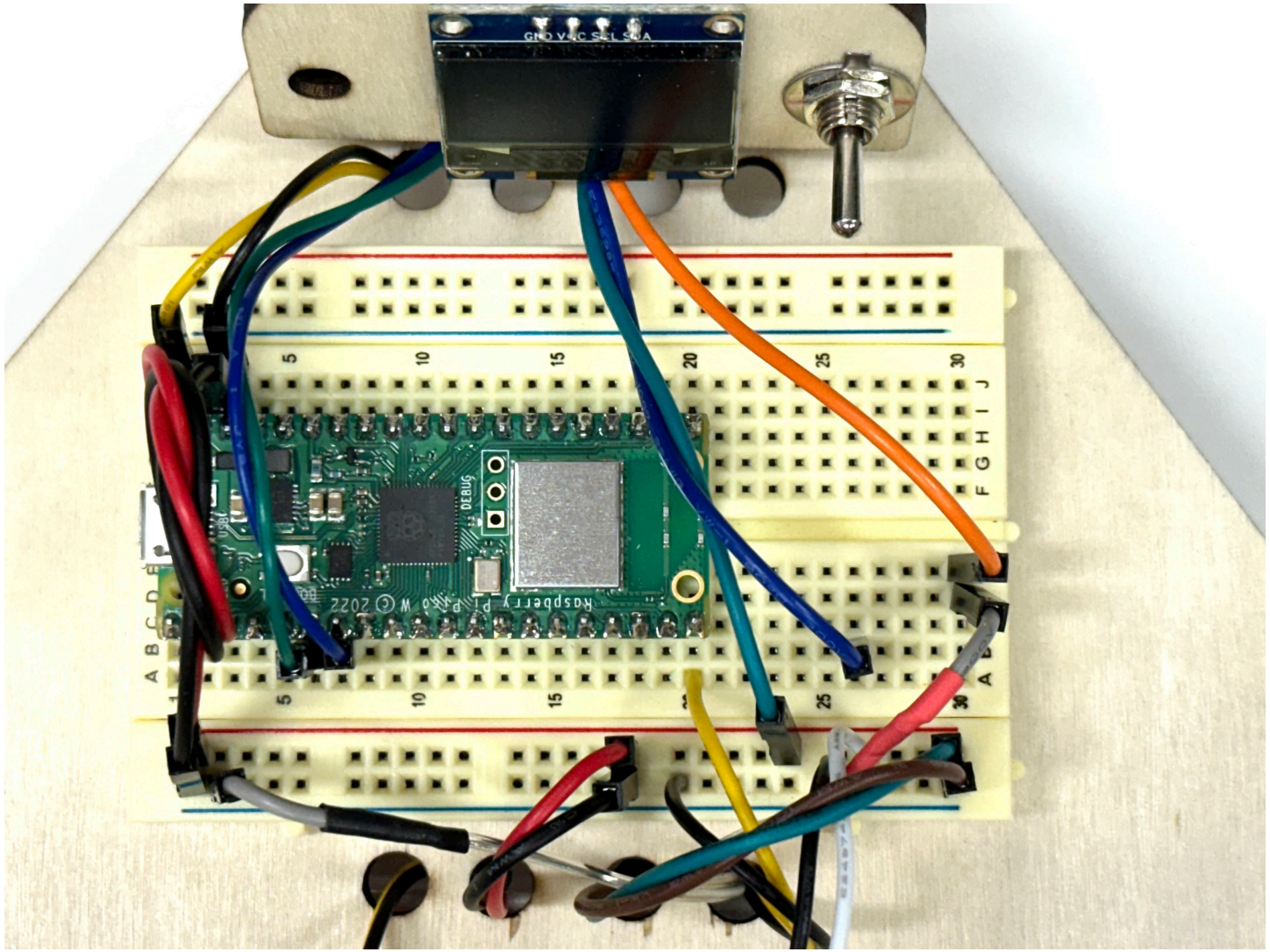
BATTERY TO SWITCH

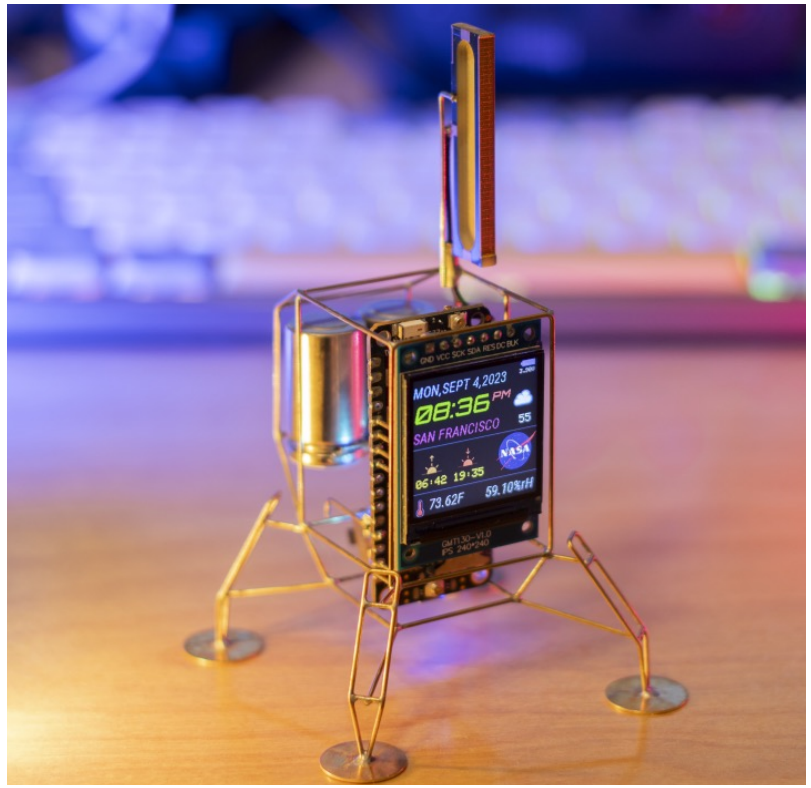


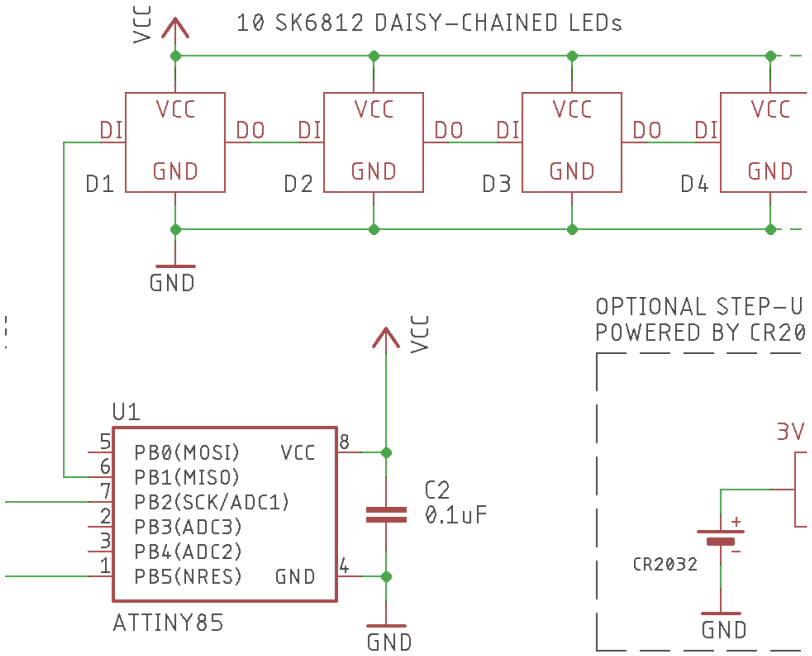
PICO POWER CHECK

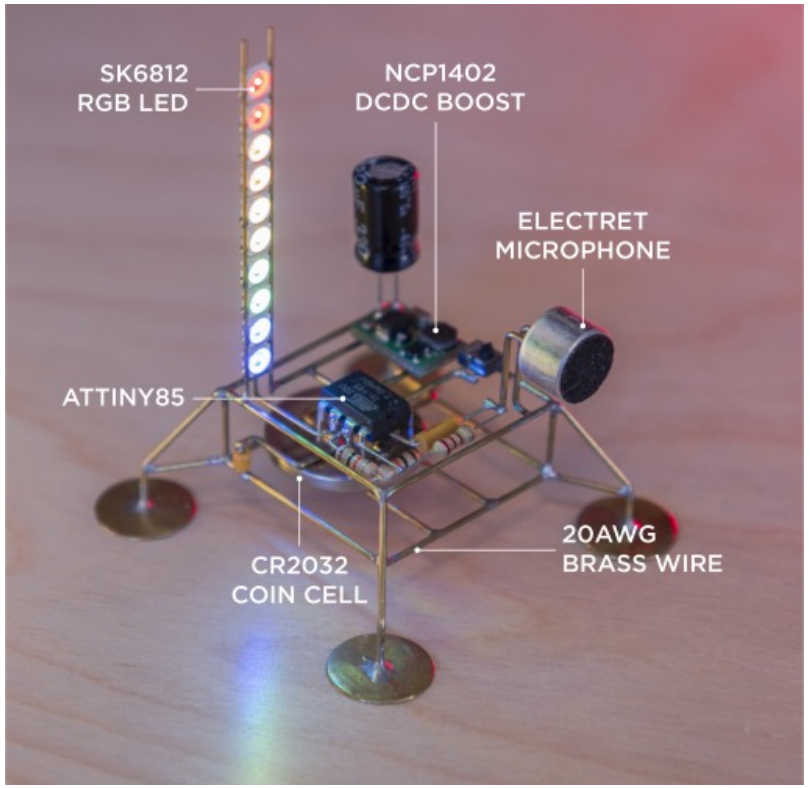


ALL THE WIRES



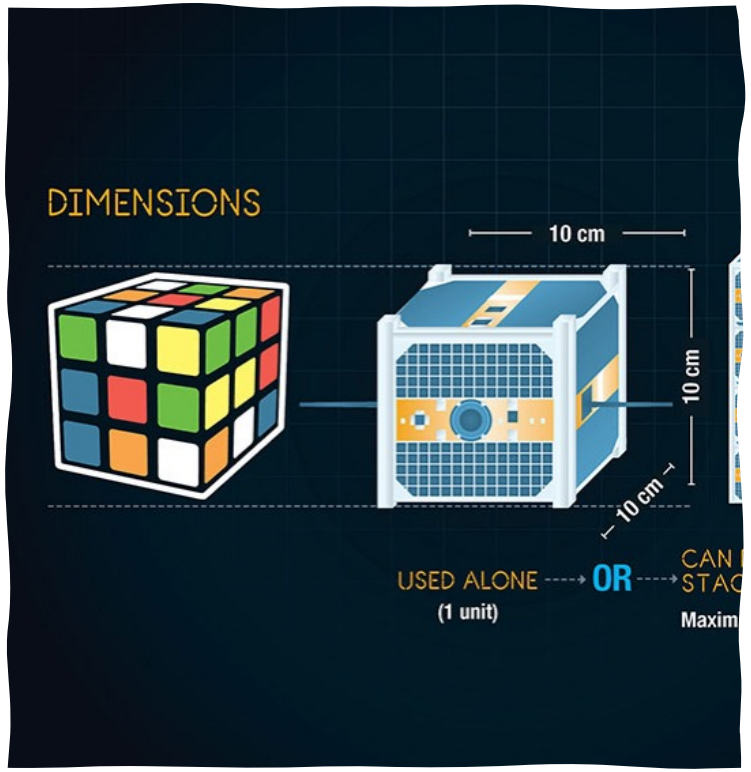


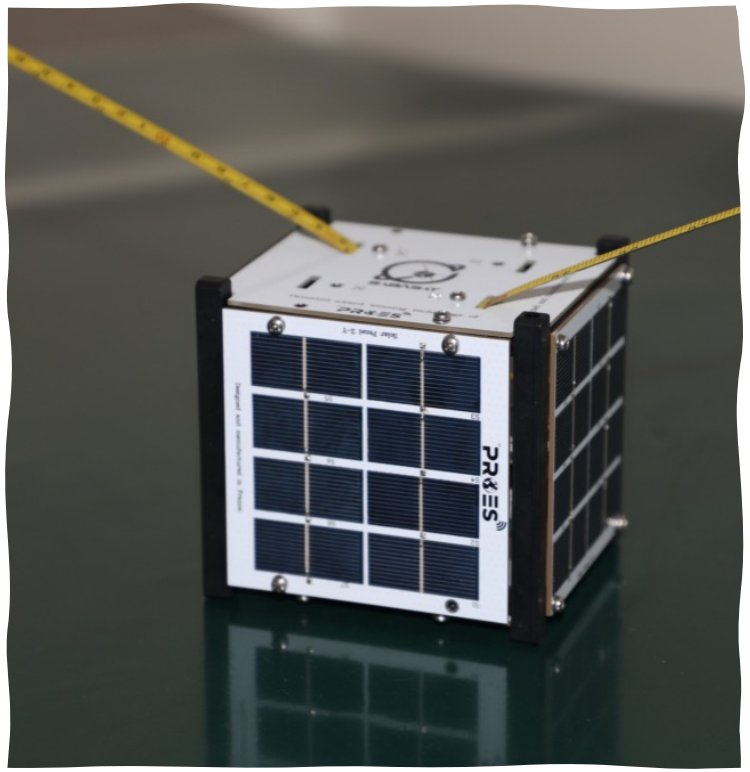


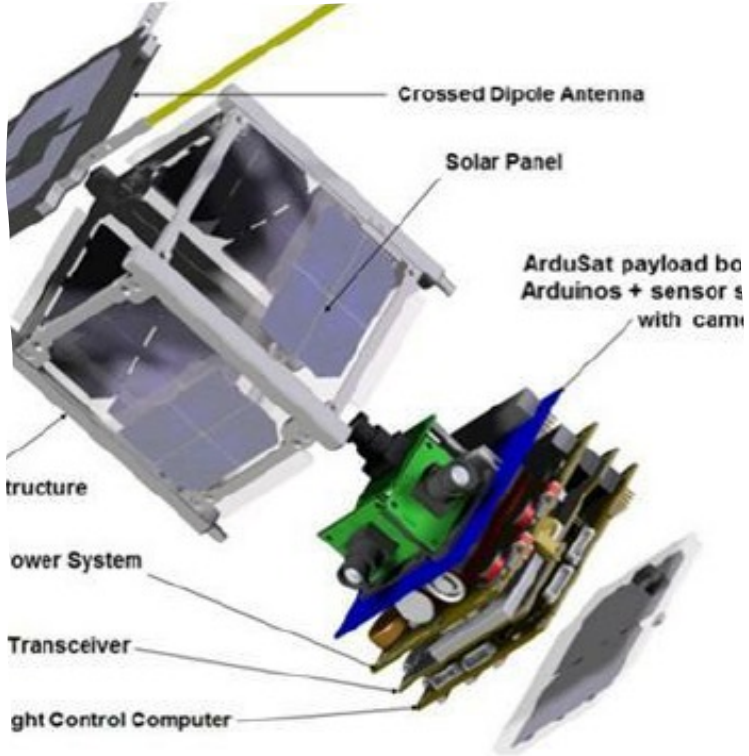


Space Exploration!

https://www.bhoite.com/sculptures/boron-lander/







Cube and Pico Satellites

https://hackaday.com/2021/01/28/open-source-cubesats-ease-the-pain-of-building-your-own/

Balloon to Edge of Space

https://www.stratoflights.com/en/shop/weather-balloon-kit/

LEARN MORE ABOUT THE HARDWARE

- Airplane Kit CAD Model design in OnShape: https://cad.onshape.com/documents/c9cbc31c2adbc42822c68636/w/6a8d3667c5017b7bac36dc30/e/a4ce5cccb7d9eda19cf63fe7
- Microcontroller: Raspberry Pi Pico W, not to be confused with Raspberry Pi Single Board Computer: https://www.raspberrypi.com/documentation/microcontrollers/raspberry-pi-pico.html and https://www.adafruit.com/product/5526
- Add easy I2C Expansion with a QWIIC or STEMMA QT port.
  - https://www.sparkfun.com/qwiic
  - https://learn.adafruit.com/introducing-adafruit-stemma-qt/what-is-stemma-qt

LEARN MORE ABOUT THE SOFTWARE

- MicroPython Programming Editor https://thonny.org/
- Setup: https://learn.adafruit.com/circuitpython-libraries-on-micropython-using-the-raspberry-pi-pico/thonny-setup
- MicroPython Docs: https://docs.micropython.org/en/latest/
- Blink the built-in LED: https://dev.webonomic.nl/blinking-a-led-on-the-raspberry-pi-pico-w
- Connect to the OLED screen: https://circuitdigest.com/microcontroller-projects/interface-raspberry-pi-pico-w-with-oled-display-using-micropython
- More OLED resources: https://www.phippselectronics.com/use-an-oled-screen-with-raspberry-pi-pico-micropython/
- The I2C bus allows connection of many more gadgets than just the OLED screen: https://www.coderdojotc.org/micropython/advanced-labs/06-i2c/
- You can also use Arduino (C/C++) instead of MicroPython if you want: https://www.instructables.com/How-to-Use-Arduino-IDE-With-Raspberry-Pi-Pico-W/

PROJECT FILES

This project and all the files are hosted and accessible on Github:

https://github.com/ageppert/Intro_to_Avionics_Kit