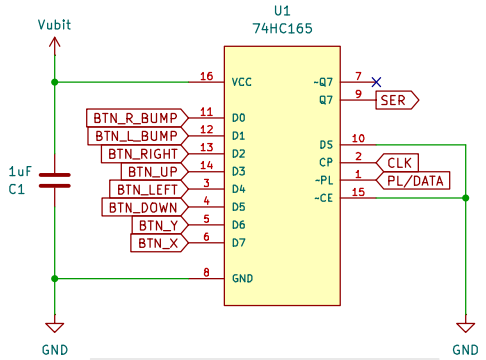
PISO shift register

The 1uF capacitor acts as a decoupling capacitor, stabilizing the power supply by filtering out noise and preventing voltage spikes, which ensures smooth operation of the shift register.

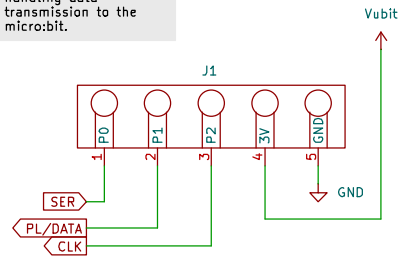
Note that the layout of the shift register below does not exactly match that of the component.



The 74H165 is an 8-bit parallel-in/serial-out shift register. It converts parallel data to serial output, allowing for simultaneous data capture and sequential output.

micro:bit edge connector

P0 is connected to the serial (SER) output of the shift register, handling data transmission to the micro:bit.



P1 is used for the parallel load (PL) control of the shift register and also manages data (DATA) output to the NeoPixels. Configuration and control are implemented via software.

P2 outputs the clock (CLK) signal for the shift register.

NeoPixels

Your task is to add NeoPixels to the next version of the solder:bit Gamepad! You must place 5 LEDs, along with 5 decoupling capacitors, as per the recommendations in the datasheet.

HINT: for schematic examples, look into the datasheet for WS2812B.

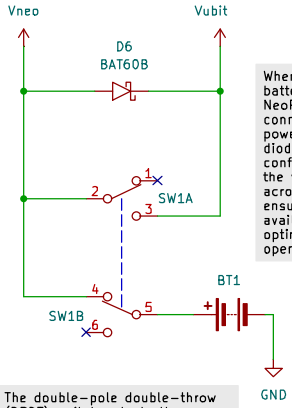
The NeoPixels receive data from the micro:bit's P1 on the edge connector (PL/DATA), allowing for control over their color and brightness. Ensure that there is a 300 Ohm resistor right before the first NeoPixel.

HINT: use a global label for PL/DATA.

Move/delete this box for more room.

Power supply

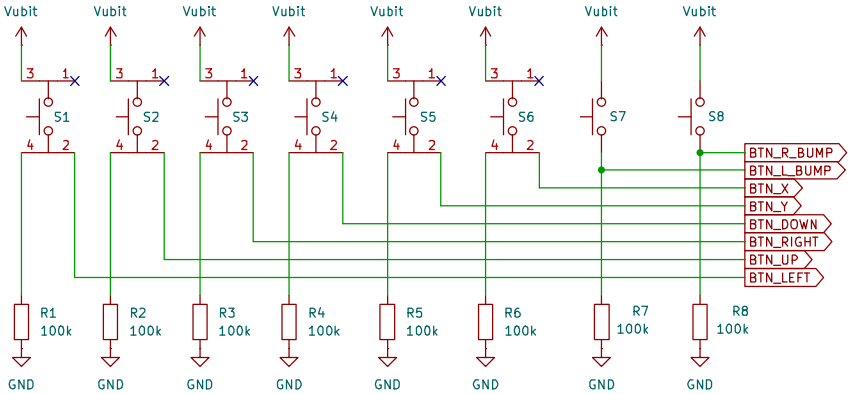
A diode is placed between the micro:bits's power source and the battery connection to prevent current from flowing back to the on-board battery. Schottky diodes also have a lower forward voltage drop compared to standard silicon diodes.



When powered by batteries, the NeoPixels are connected to draw power before the diode. This configuration avoids the voltage drop across the diode, ensuring full voltage availability for optimal NeoPixel operation.

The double-pole double-throw (DPDT) switch selects the power source for the board, allowing a choice between on-board battery power and micro:bit's power source.

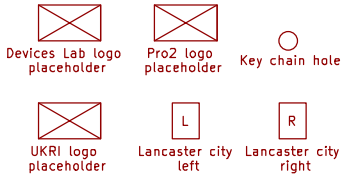
Input buttons



Six 4-pin and two 2-pin tactile buttons are connected to the shift register, each configured with a pull-down resistor to ensure a default low state when unpressed. When a button is pressed, the corresponding shift register input goes high, accurately reflecting each interaction.

Decorative footprints

These footprints are non-functional and included purely for aesthetic purposes.



PCB design walk-through with KiCad
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Title: solder:bit Gamepad

Size: A4	Date: 2024-07-04	**Rev: v0.5**
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