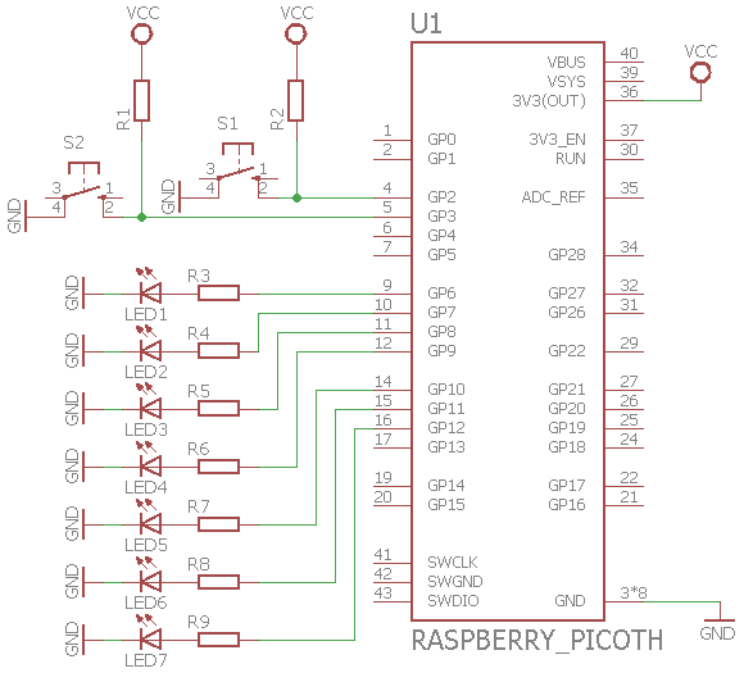
1. Using a Raspberry Pi Pico design an electronic sand glass to act as a timer. In the end, present a small report with the projected finite state machines and the corresponding software implementation.

At the press of a button, six LEDs should be on and, at predetermined intervals, each would switch off until they all are off. An extra LED will then be on, to signal that the time was up.
Another button can be used to pause the timer.

Using the supplied material please assemble the following schematic:

LED	Colour
1	green
2	green
3	yellow
4	yellow
5	red
6	red
7	other



R1 = R2 = 100 KΩ, R3...R9 = 1 KΩ.
Beware of the pin numbers for 3V3(OUT) and GND.
The next steps go from a simple configuration to a more complex one.

a) Use S1 to reset the timer and S2 to pause/continue it.
The interval between each LED going off should be 2 seconds.
When the timer is paused the currently lit LEDs must blink.
Use the serial port to report each button reading, all LED state and the current state for each State Machine.

b) If S2 is “double clicked” (less than 0.5 seconds between presses) the timer should gain an extra interval (one LED up).

c) If there is a long press in S1 (pressed for more than 3 seconds) then it should enter configuration mode. Another S1 long press should exit the configuration mode and stores the current configuration.
Only one LED must be blinking to signal that it entered configuration mode. Each LED will be associated with a different item to be configured. A S1 press changes the item being configured.

Possible option to be configured:

d) (LED1 blinking) Change the interval between each LED going off. Each S2 press rotates between 1, 2, 4 and 8 seconds for the interval. When it is changed, use LED7 to present the current interval. (turn on LED7 for the defined interval)

e) (LED2 blinking) The LED that is going to be switched off will:

* Switch off on the end of its interval.
* For the second half of its interval, the LED must blink.
* Fades out from 100% in the beginning to 0% in the end of the interval.

Each S2 press rotates between these modes, LED7 exemplifies the mode.

f) (LED3 blinking) The end of the time will be signalled by:

* LED7 is on (it is off when counting).
* LED1..6 fast blinking.

Each S2 press rotates between these modes, LED7 exemplifies the mode.