Exercise 28.4.1 #7

1. For NU32 communicates with the encoder counter, I will choose UART2 as UART channel. RX pin on PICO is related to NU32 pin F5 (UART2 TX) and TX pin on PICO is related to pin F4 (UART2 RX).

2. For NU32 reads the INA219B current sensor, I will choose Sda which related to NU32 pin D9, and Scl which related to NU32 pin D10.

3. For NU32 controls the BD6549MUV H-bridge using two direction bit and PWM (which connect to 3.3V for mode), I will choose D0 for INA, and D1 for INB.

4. To implement the 200 Hz position control ISR, I will choose Timer2 with priority 5. For implement the 5 kHz current control ISR, I will choose Timer4 with priority 4.

5. The block diagram shown in below.

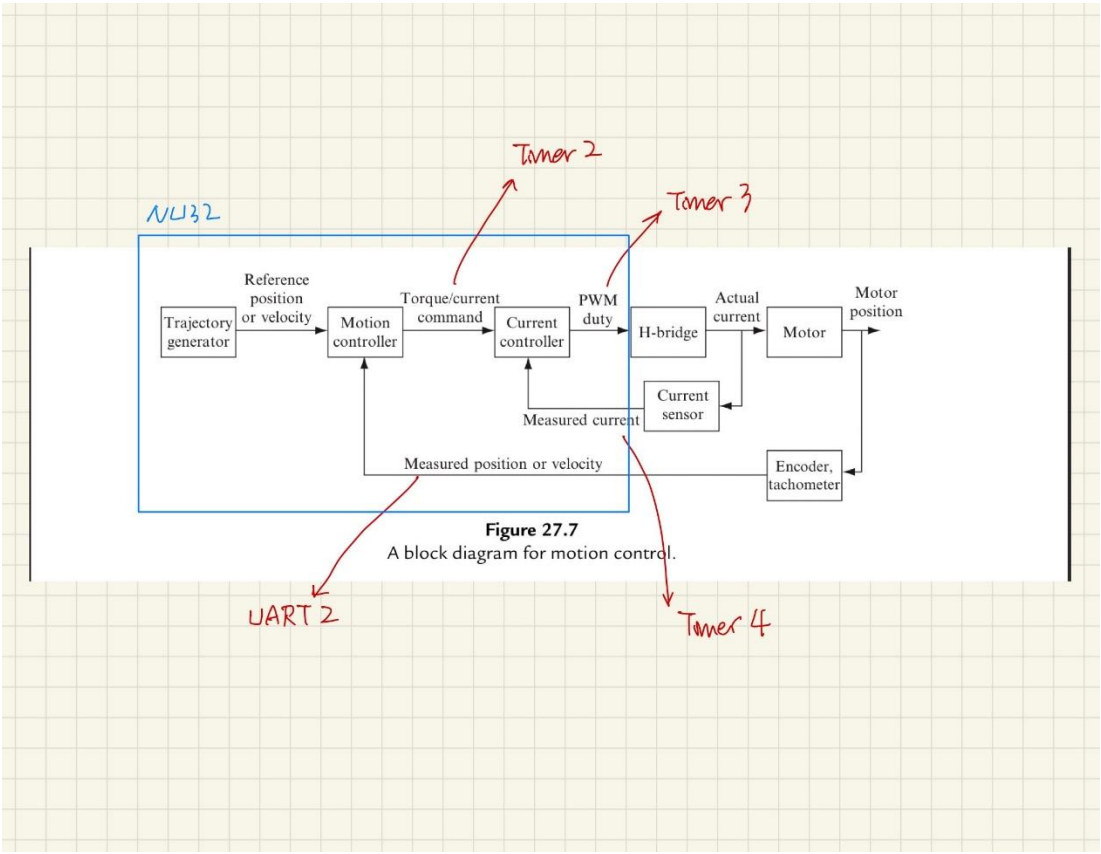
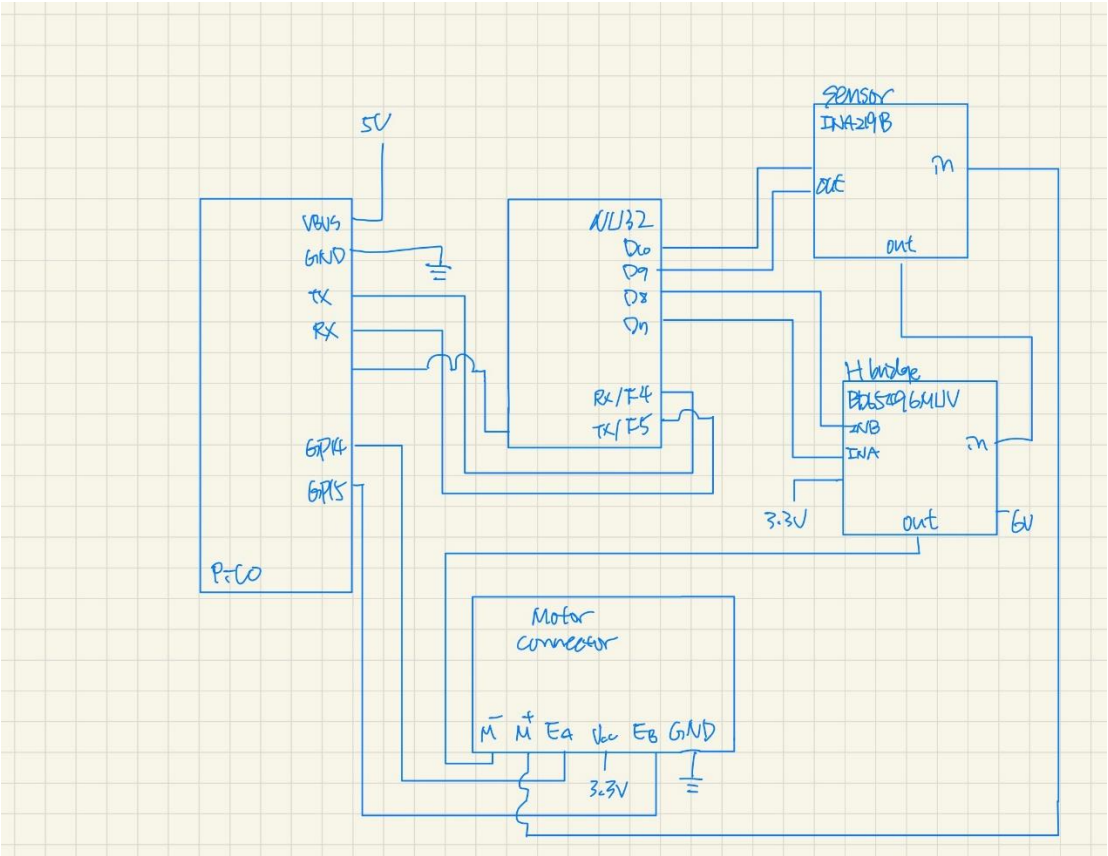


Figure 27.7
A block diagram for motion control.

6. The wiring diagram shown in below.



Exercise 28.4.7 #7

2. V = 6V

   $I_{max} = 2V/R_{motor} = 12/6.8\,\Omega = 1.765A$

3. $I = I_{max} = 1.765A$

   $R = 15\ m\Omega$

   $V_{max} = I_{max}R = 26.471\ mV$

4. $1.65V = G * V_{max}$ -> $G = 62.33$

   $G = 1 + (R2/R1)$ -> $R2/R1 = 61.33$

   $R1 = 6000\,\Omega$, $R2 = 100\,\Omega$

5. $f_c = 200Hz = 1/(2\pi RC)$

   $RC = 0.0007958$

   $R = 8000\,\Omega$, $C = 0.1\ \mu F$

Exercise 28.4.8 #8

The circuit diagram shown in below.