

ME 333 Assignment 8

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Problem 24.5

Here's the waveform plot when the PI control is neglected, just make sure the communication between the PIC and our computer works.

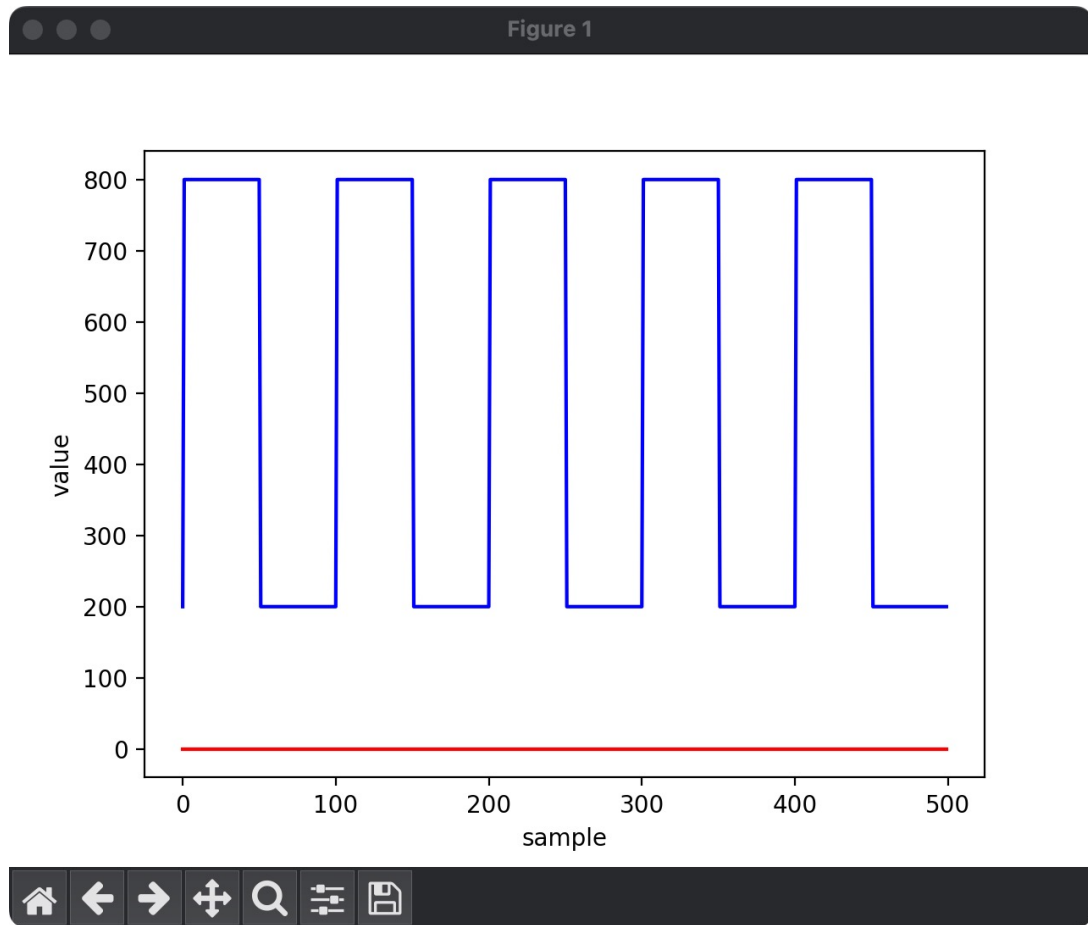


Figure 1: Waveform plot with zero

Problem 24.7

Here's the waveform plot of Reference value and the actual ADC value, but without mapping the PWM OCxRS value to ADC brightness count.

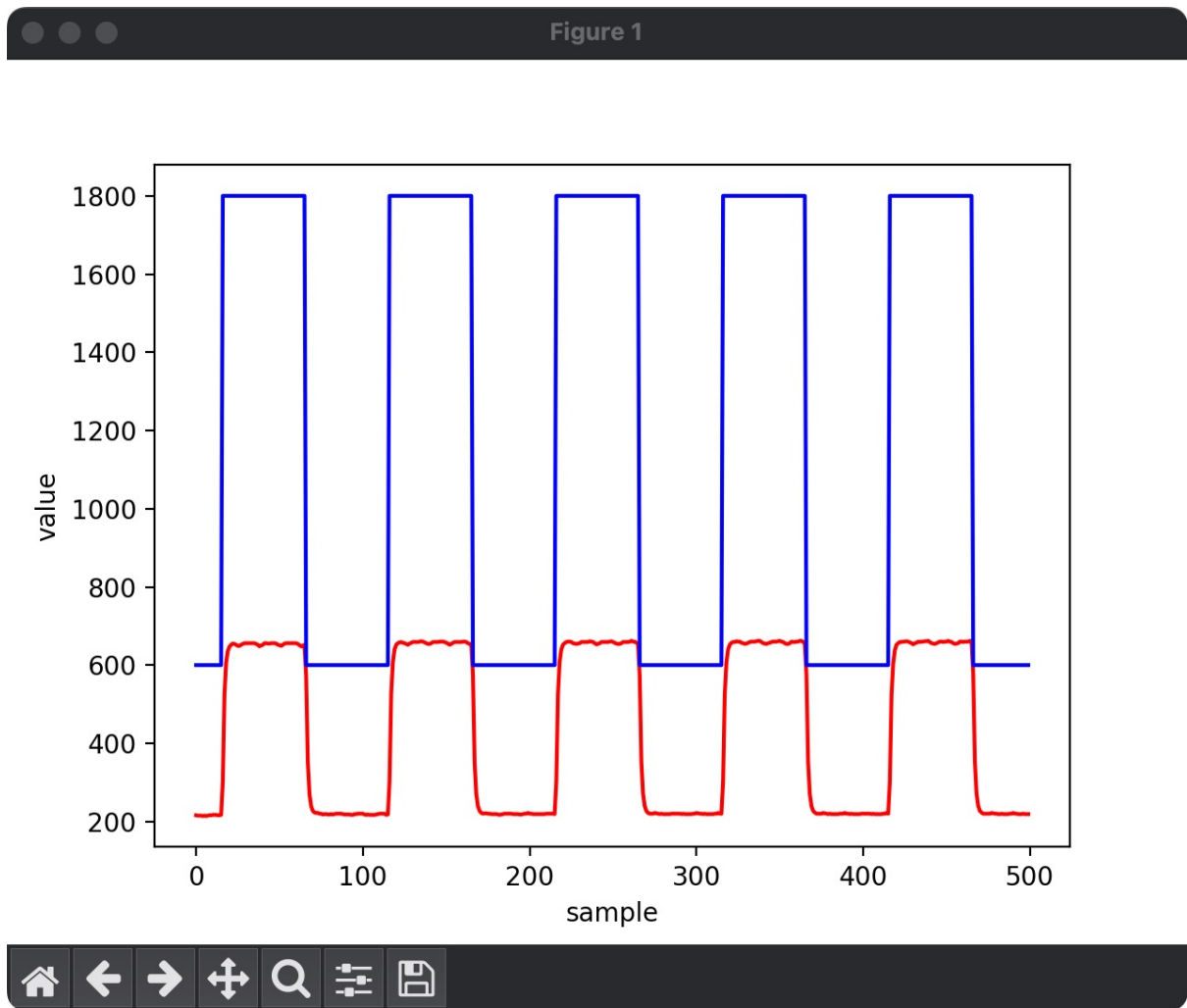


Figure 2: Waveform without mapping and PI control

Problem 24.8

Here are several plots with different combination of the K_p and K_i .

$K_p = 0.1, K_i = 0$

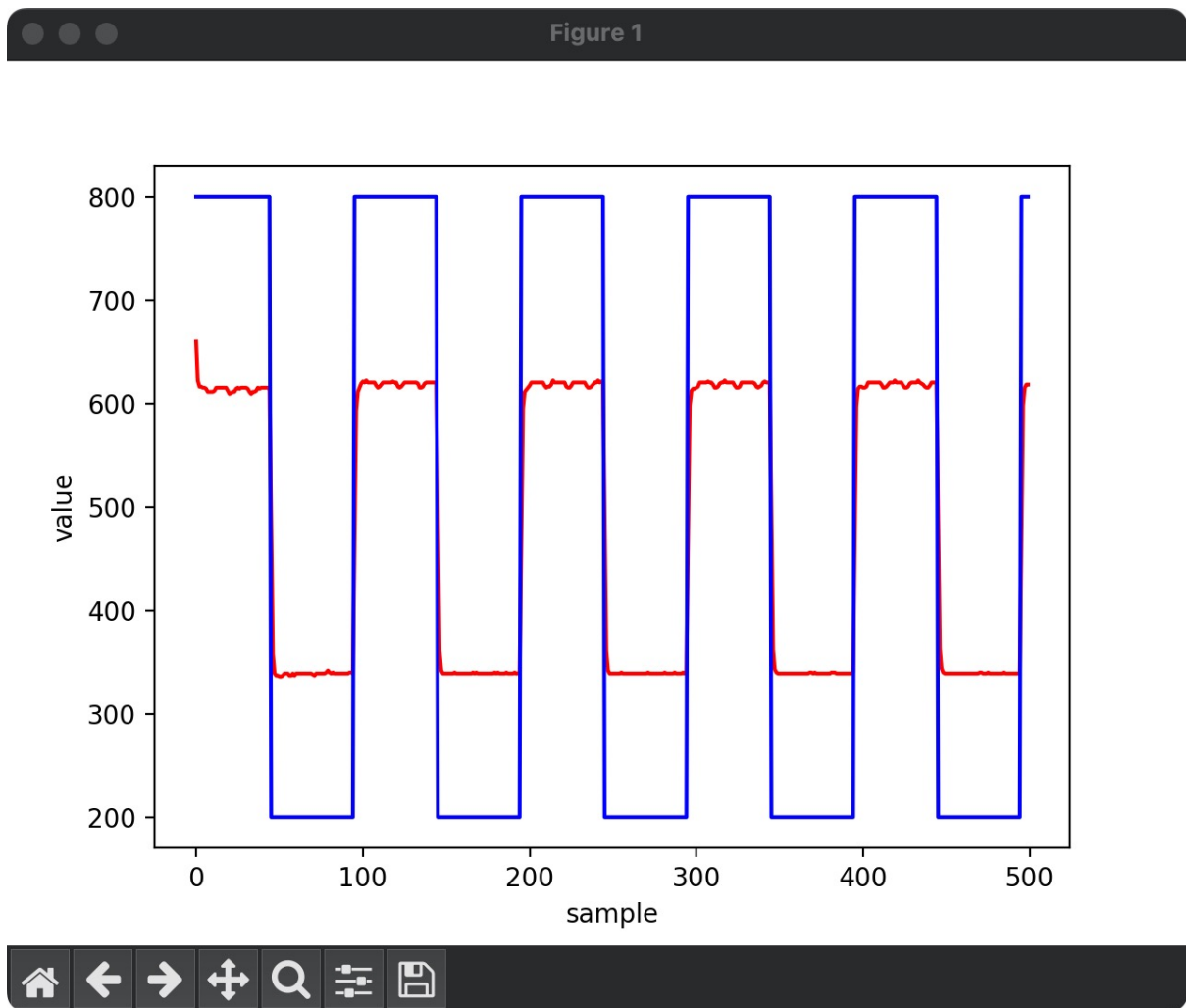


Figure 3: Waveform with PI control, $K_i = 0, K_p = 0.1$

Here I tried to increase the K_i to balance the steady state error.

$K_p = 0.1, K_i = 0.1$

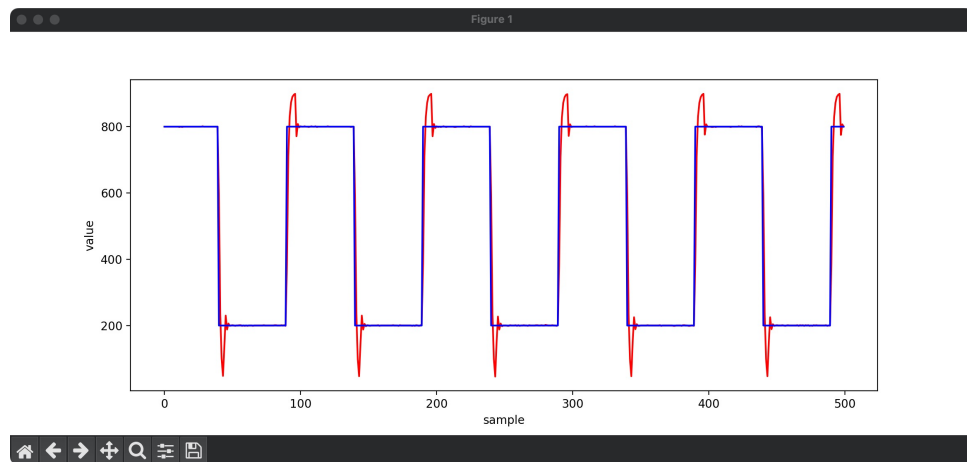


Figure 4: Waveform with PI control, $K_i = 0.1$, $K_p = 0.1$

As shown in the figure, there is a quite big overshoot, settling time respond looks good.

$K_p = 0.5, K_i = 0.015$

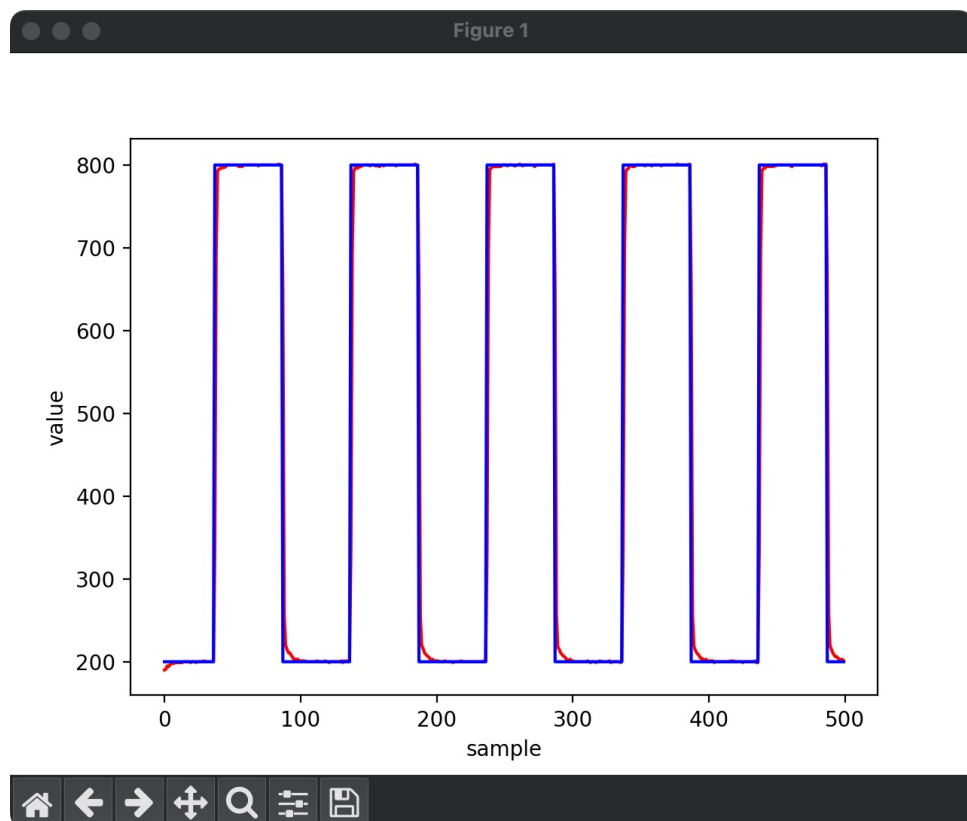


Figure 5: Waveform with PI control, $K_i = 0.015$, $K_p = 0.5$

This plot looks almost perfect, good settling time and no overshoot.

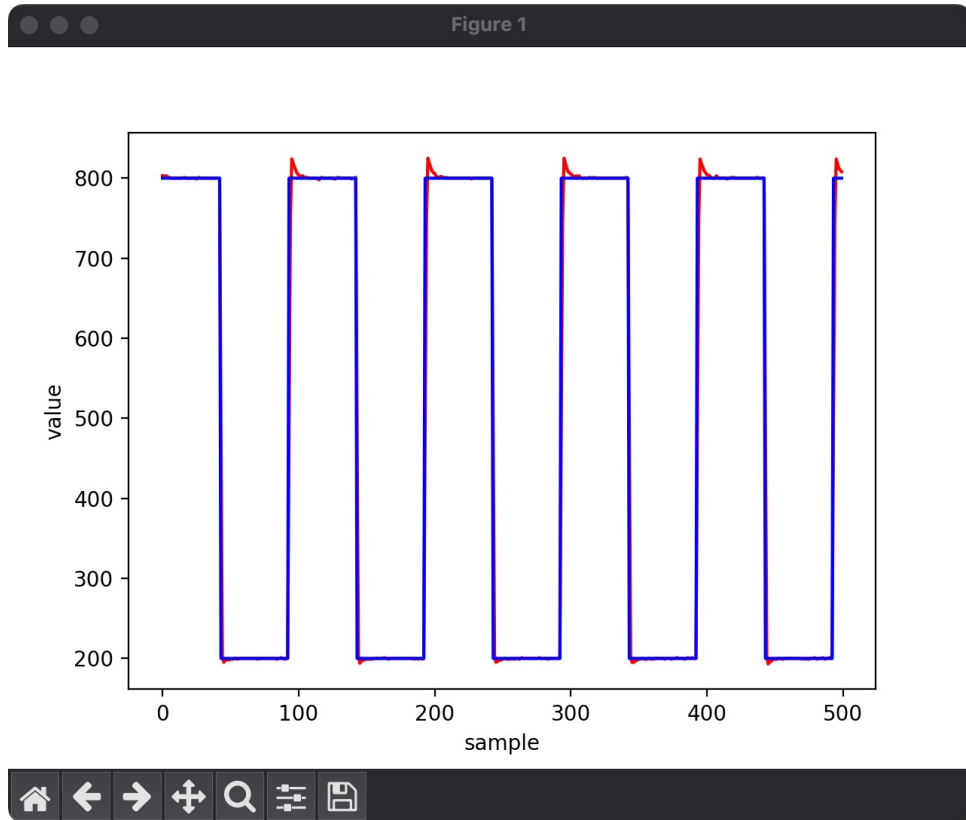


Figure 6: Waveform with PI control, $K_i = 0.02$, $K_p = 0.5$

$K_p = 0.5$, $K_i = 0.02$

Once increase the K_i even a little bit results with the overshoot, which indicates the previous one could be around the best combination.

Here we choose the combination $K_p = 0.5$ and $K_i = 0.015$ as our final plan, which result with the waveform of Figure 5.

The code will be submitted alone with this pdf.