

DSP Lab Final Question

05 December 2021 09:42

GENERATE PWM ON CH1

USE TIMER 1/2

USE TIMER TO TRIGGER ADC

ADC HAS TO SAMPLE INPUT SIGNAL (SAMPLING TIME $F_s/4$)

take average of samples (4) ← *couldn't achieve this*

average of these will be loaded into pwm channel 1

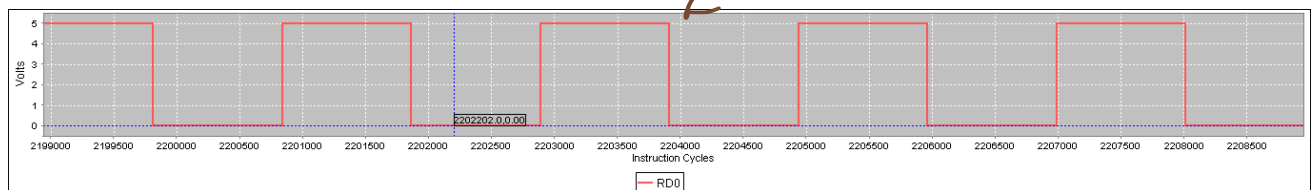
```
30 #include <xc.h>
31 #include <libpic30.h>
32
33 unsigned int read_analog_channel(int n);
34
35 int main()
36 {
37     // Declare a variable for the step time
38     // so that it can be changed easily
39     int v;
40     long step_time = 300000L;
41
42     // Make RD0-3 digital outputs
43     TRISD = 0b1111111111110000;
44     // Configure analog inputs
45     TRISB = 0x01FF; // Port B all inputs
46     ADPCFG = 0xFF00; // Lowest 8 PORTB pins are analog inputs
47     ADCON1 = 0; // Manually clear SAMP to end sampling, start conversion
48     ADCON2 = 0; // Voltage reference from AVDD and AVSS
49     ADCON3 = 0x0005; // Manual Sample, ADCS=5 -> Tad = 3*Tcy = 0.1us
50     ADCON1bits.ADON = 1; // Turn ADC ON
51
52
53
54
55
56 while(1)
57 {
58     // Read the analog channel. The result is an
59     // integer between 0 and 1023 inclusive.
60     v = read_analog_channel(0);
61
62     // Now, update step time.
63     // Because the value get too big for 16-bit ints,
64     // the constant values are explicitly marked as
65     // long values so that the calculation is carried
66     // out using 32-bit ints.
67     step_time = 150000L + 200L * v;
68
69     // Cycle through the four stepper windings
70     LATD = 0b1000; __delay32(step_time);
71     LATD = 0b0100; __delay32(step_time);
72     LATD = 0b0010; __delay32(step_time);
73     LATD = 0b0001; __delay32(step_time);
74
75
76     OC1R = 0;
77     OC1RS = v;
78
79     OC1CONbits.OCM = 0b101;
80     OC2CONbits.OCM = 0b101;
81
82
83     // Configure timer 2 (default timer for output compare)
84     PR2 = 1024; // 20us period
85     T2CONbits.TON = 1; // Enable timer 2
86 }
87
88 return 0;
89 }
```

```

91 // This function reads a single sample from the specified
92 // analog input. It should take less than 2.5us if the chip
93 // is running at about 30 MIPS.
94 unsigned int read_analog_channel(int channel)
95 {
96     ADCHS = channel;           // Select the requested channel
97     ADCON1bits.SAMP = 1;       // start sampling
98     __delay32(30);              // 1us delay @ 30 MIPS
99     ADCON1bits.SAMP = 0;       // start Converting
100     while (!ADCON1bits.DONE); // Should take 12 * Tad = 1.2us
101     return ADCBUF0;
102 }
103

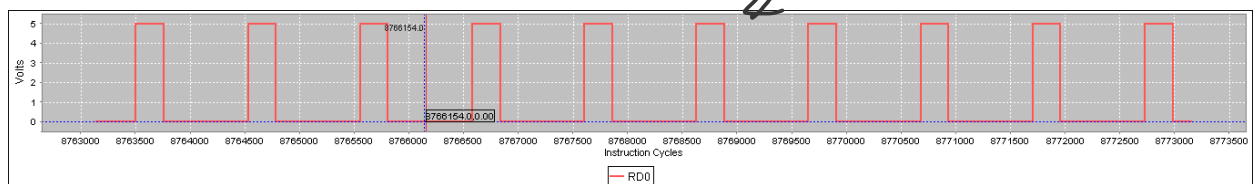
```

$5V \rightarrow 1024 \Rightarrow 2500mV = 512 \Rightarrow D = 0.5$
 50% Duty cycle



Fire	Pin	Action	Value	Units	Comments
	AN0	Set Voltage		2,500 mV	

$1250mV \Rightarrow D = 0.25$
 0.25 Duty cycle



Fire	Pin	Action	Value	Units	Comments
	AN0	Set Voltage		1,250 mV	