/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Author: Group 2 (Hang Xu, Wen Wu, Wenjun Ma)

Date complete: 27/11/2017

Filename: EE2A Experiment3: Integrated Mechatronic Project Wire-Following Signal Generator

Target device: PIC18F27K40

Fuse settings:Default

Program function: Design and build a test signal generator which generates a 1 kHz, 2 kHz

and 1 kHz+ 2 kHz combined signal for the integrated mechatronic project vehicle

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

#include<18F27K40.h>

#use delay(internal=32Mhz,clock\_out) //set main frequency at 32MHz

#use spi(MASTER,DO=PIN\_C3,MODE=0,CLK=PIN\_C5,BITS=8) //set SPI

#pin\_select PWM4=PIN\_A0 //select PIN\_A0 as output of PWM

int16 SineTab1e[3][32]=

{

{2048 ,2447 ,2831 ,3185 ,3495 ,3750 ,3939 ,4056 ,4095 ,4056 ,3939 ,3750 ,3495 ,3185 ,2831

,2447 ,2048 ,1648 ,1264 ,910 ,600 ,345 ,156 ,39 ,0 ,39 ,156 ,345 ,600 ,910 ,1264 ,1648 },//LUT for 1 kHz signal

{2048 ,2831 ,3495 ,3939 ,4095 ,3939 ,3495 ,2831 ,2048 ,1264 ,600 ,156 ,0 ,156 ,600 ,1264

,2048 ,2831 ,3495 ,3939 ,4095 ,3939 ,3495 ,2831 ,2048 ,1264 ,600 ,156 ,0 ,156 ,600 ,1264 },//LUT for 2 kHz signal

{2048 ,2639 ,3163 ,3562 ,3795 ,3845 ,3717 ,3443 ,3071 ,2660 ,2269 ,1953 ,1748 ,1670 ,1715

,1855 ,2048 ,2240 ,2380 ,2425 ,2347 ,2142 ,1826 ,1435 ,1024 ,652 ,378 ,250 ,300 ,533 ,932 ,1456 }

//LUT for combined 1 kHz + 2 kHz signal

};

int Look\_Up\_Table\_Index=0;

int Select\_Table;

struct IO\_Port\_Definition

{

int1 PWM;//PIN\_A0

int unusedA:7;//PIN\_A1..7

int SignalSelect:2;//PIN\_B0..1

int unusedB:6;//PIN\_B2..7

int1 unusedC1;//PIN\_C0

int1 debug;//PIN\_C1

int1 cs; //PIN\_C2

int1 SDO;//PIN\_C3

int1 unusedC2;//PIN\_C4

int1 SCK;//PIN\_C5

int1 unusedC3:2;//PIN\_C6/PIN\_C7

};

struct IO\_Port\_Definition Port;

struct IO\_Port\_Definition PortDirection;

#byte Port = 0xF8D

#byte PortDirection = 0xF88

#int\_timer2

void Timer2\_Service\_Routine(void)

{

if (Port.SignalSelect==0b00)

{

Select\_Table=0;//1 kHz signal

}

if (Port.SignalSelect==0b01)

{

Select\_Table=1;//2 kHz signal

}

if (Port.SignalSelect==0b10)

{

Select\_Table=2;//combined 1 kHz + 2 kHz signal

}

Port.debug = 0b1;

Port.cs = 0b0;//SPI Chip select signal low

spi\_xfer((4096+SineTab1e[Select\_Table][Look\_Up\_Table\_Index])>>8); //High byte(+4096(2^12) for SHDN=1)

spi\_xfer((4096+SineTab1e[Select\_Table][Look\_Up\_Table\_Index])&0x00FF);// Low byte

Port.cs = 0b1;//SPI Chip select signal high

Look\_Up\_Table\_Index=++Look\_Up\_Table\_Index % 32;//if already count to 32, then reset to 0

Port.debug = 0b0;

}

void main()

{

int BWPU;//weak pull up PIN\_B

#byte BWPU = 0x0F18;

BWPU = 0b11111111;

PortDirection.cs = 0b0;//output

PortDirection.PWM = 0b0;

PortDirection.unusedA = 0b0000000;

PortDirection.SignalSelect = 0b11;//input

PortDirection.unusedB = 0b000000;

PortDirection.unusedC1=0b0;

PortDirection.debug=0b0;

PortDirection.cs = 0b0;

PortDirection.SDO=0b0;

PortDirection.unusedC2=0b0;

PortDirection.SCK=0b0;

PortDirection.unusedC3=0b00;

setup\_timer\_2(T2\_CLK\_INTERNAL|T2\_DIV\_BY\_1,249,1);//32kHz

setup\_ccp2(CCP\_PWM|CCP\_USE\_TIMER1\_AND\_TIMER2); // Configure CCP2 as a PWM,CCP2 is paired with Timer 2

setup\_pwm4(PWM\_ENABLED|PWM\_ACTIVE\_LOW|PWM\_TIMER2);

set\_pwm4\_duty(32);//active low for 1us

enable\_interrupts(INT\_TIMER2);// Timer 2 interrupt enable

enable\_interrupts(GLOBAL);// 'Global' interrupt enable

while(1)

{

}

}