CpE301 - Design Assignment 4

Design Assignment 4:
DUE: 4/10/2016
The goal of the assignment is to develop the above code to do the following:

1. Write an AVR C program to generate three PWM signals to drive the RGB LED using TIMERs. Use the OCnX pins to generate the output. Increment individually each PWM period from min. (10%) to max (90%) value, at the same time alter the each PWM duty cycle. The RGB LED will display different colors as the PWM periods are changed and the brightness of the LED with vary with the change in duty cycle.
2. Use the delay subroutine to hold the colors for specific time period.

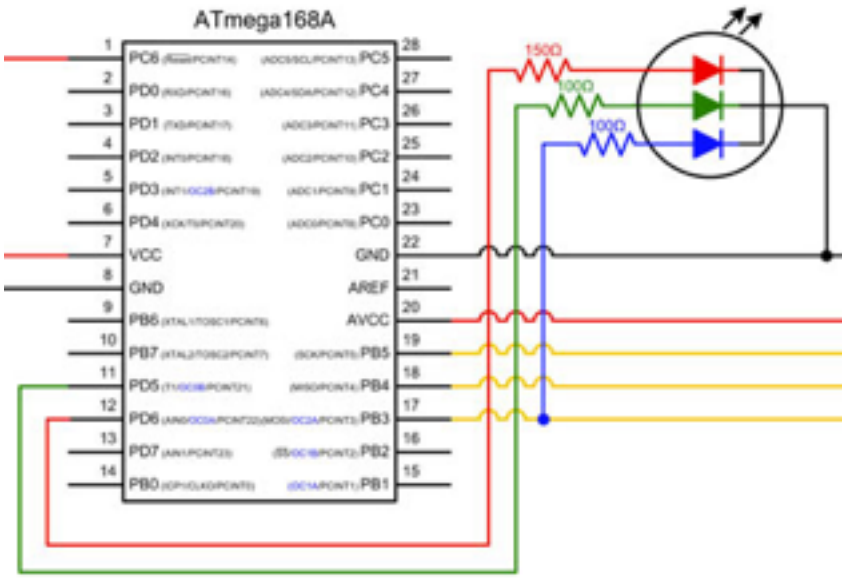
Submission:

The following are required for successful completion of the design assignment:

a. AVR C code that has been compiled and working.
b. The C code should be well documented with explanation of every instruction.
c. A word document that contains the flow chart of the assembly code along with the snapshots of the schematics, components connected on the breadboard and screenshots.

NOTES:

Sample Code:
The below code generates a PWM using Timer0



RGB LED connected to OC0A, OC0B and OC2A. (PD6, PD5 and PB3).

PWM with timers

```
#include <inttypes.h>
#include <avr/io.h>

#define XTAL    16000000L

static void delay(uint16_t us)
{
   while ( us ) us--;
}

int main(void)
{
   uint8_t i = 0;
   DDRB  = 0xff;                // use all pins on PortB for output
   PORTB = 0x00;                 // set output high -> turn all LEDs off
   // set OC1A pin as output, required for output toggling
   DDRD |= _BV(PD5);
   // enable 8 bit PWM, select inverted PWM
   TCCR1A =  _BV(WGM10) | _BV(COM1A1) | _BV(COM1A0);
   // timer1 running on 1/8 MCU clock with clear timer/counter1 on Compare Match
   // PWM frequency will be MCU clock / 8 / 512, e.g. with 4Mhz Crystal 977 Hz.
   TCCR1B = _BV(CS11) | _BV(WGM12);

   for (;;)
   {
      /* dimm LED on */
      for (i=0; i<255; i++)
      {
         OCR1AL = i;        //Note OCR1AL NOT OCR1A
         PORTB=i;           //for debugging
         delay(XTAL/1600);    //delay 10 ms just to slow things down
      }
      /* dimm LED off */
      for( i=255; i>0; i--)
      {
         OCR1AL = i;        //Note OCR1AL NOT OCR1A
         PORTB=i;           //for debugging
         delay(XTAL/1600);    //delay 10 ms just to slow things down
      }
   }
   return 0;
}
```