CPE301 – SPRING 2019

Design Assignment DA4A

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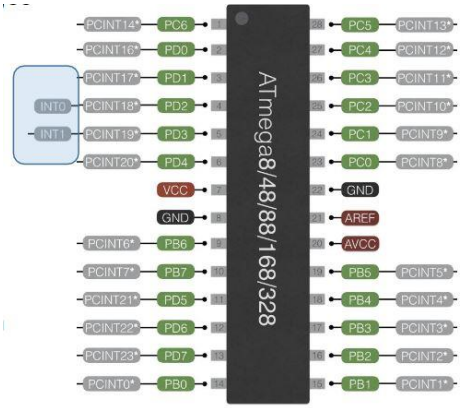
Primary Github address: https://github.com/guerrj1/Submission_DA.git
Directory: DA4A - https://github.com/guerrj1/Submission_DA/tree/master/DA4A

Submit the following for all Labs:

1. In the document, for each task submit the modified or included code (only) with highlights and justifications of the modifications. Also, include the comments.
2. Use the previously create a Github repository with a random name (no CPE/301, Lastname, Firstname). Place all labs under the root folder ESD301/DA, sub-folder named LABXX, with one document and one video link file for each lab, place modified asm/c files named as LabXX-TYY.asm/c.
3. If multiple asm/c files or other libraries are used, create a folder LabXX-TYY and place these files inside the folder.
4. The folder should have a) Word document (see template), b) source code file(s) and other include files, c) text file with youtube video links (see template).

1. COMPONENTS LIST AND CONNECTION BLOCK DIAGRAM w/ PINS

-ATMega328p
-Potentiometer
-Pushbutton
-Male to male wires
-Male to female wires
-Breadboard
-DC motor
-TB6612FNG driver



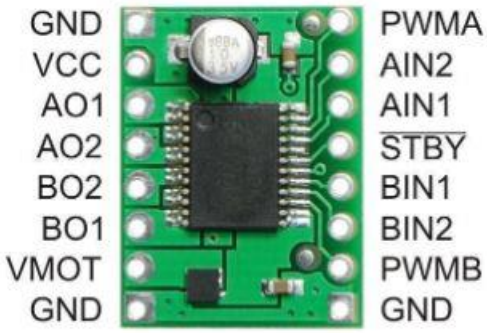
Atmega328P using PB1 for PWM output and PC0 for potentiometer

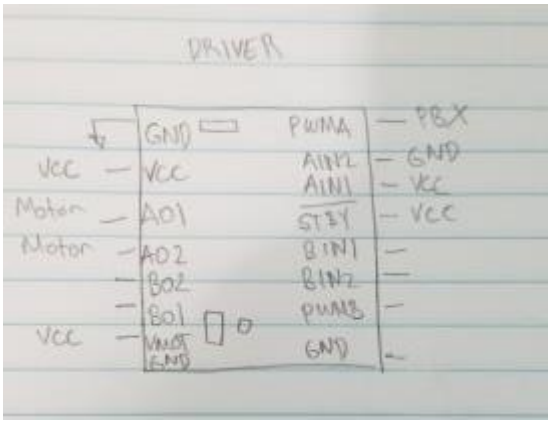
2. DEVELOPED CODE OF TASK 1 C CODE

```
//DA4A

#define F_CPU 16000000UL
#include <avr/io.h>
#include <avr/interrupt.h>
#include <util/delay.h>

volatile unsigned int ADCvalue;            //variable that the ADC value is stored in
char toggle = 0;
void adc_init(void);   //adc function

int main(void)
{
        DDRB = (1<<1);   //set portb1 as outout for PWM
        DDRC = 0;              //setting portc as an input for pushbutton
        PORTB = 0;

        //timer1 intialization
        TCCR1A |= (1<<COM1A1)|(1<<COM1B1)|(1<<WGM11);      //enable PWM, fast PWM and non
inverted mode
        TCCR1B |= (1<<WGM13)|(1<<WGM12)|(1<<CS11);         //setting prescalar to 8
        ICR1 = 9999;                                       //timer1 top value

        PORTC |= (1<<1);        //set pc1 as pushbutton
        PCICR = (1<<PCIE1);
        PCMSK1 = (1<<PCINT9);
```

```
        sei();                  //enable global interrupt

        while (1)
        {
        }
}

void adc_init(void)
{
        // ADC initialization
        DIDR0 = 0x1;               //digital input disable
        ADMUX = (1<<REFS0);        //reference selection; AVcc
        ADCSRA |= (1<<ADEN) |    //enable ADC
        (1<<ADPS2) |   //prescalar 128
        (1<<ADPS1) |
        (1<<ADPS0);
        ADCSRB = 0x0;              //adc control and status register free running mode
}

//interrupt
ISR(PCINT1_vect)
{
        if(!(PINC & (1 << PINC1)))  //if pushbutton is pressed
        {
                _delay_ms(100);       //delay for debouncing

                while(!(PINC & (1 << PINC1)));  //while button is pressed

                if(toggle == 1)
                {
                        PORTB |= (1<<1);
                        ADCSRA |= (1 << ADSC);                          // start adc conversion

                        while((ADCSRA&(1<<ADIF))==0);         // wait for conversion to finish

                        ADCvalue = ADC & 0x03FF;                    //read ADCH and ADCL
                        OCR1A = 10*ADCvalue;                            //duty cycle for PWM
                }

                else if(toggle == 0)
                {
                        OCR1A = 0;
                        PORTB &= ~(1<<1);
                }
                toggle ^= 1;   //xor toggling

        }
}
```

3. SCHEMATICS



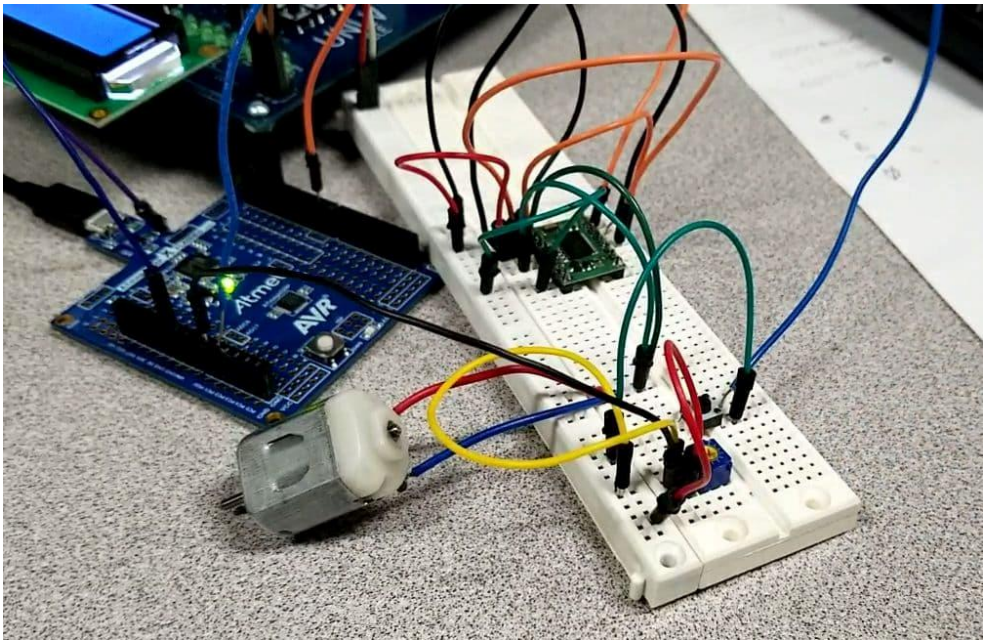


Driver Connection to Atmega328p and DC motor

4. SCREENSHOTS OF EACH TASK OUTPUT (ATMEL STUDIO OUTPUT)

N/A

5. SCREENSHOT OF EACH DEMO (BOARD SETUP)



Atmega328P connected to the driver and motor

6. VIDEO LINKS OF EACH DEMO

https://youtu.be/ByQ1dzutgNI

7. GITHUB LINK OF THIS DA

https://github.com/guerrj1/Submission_DA/tree/master/DA4A

Student Academic Misconduct Policy
http://studentconduct.unlv.edu/misconduct/policy.html

"*This assignment submission is my own, original work*".
Jett Guerrero