CPE301 – SPRING 2019

DA4A

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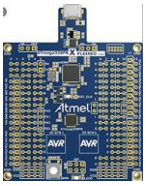
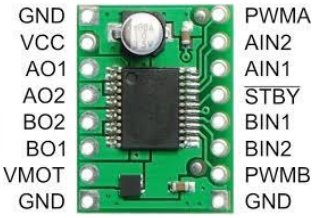
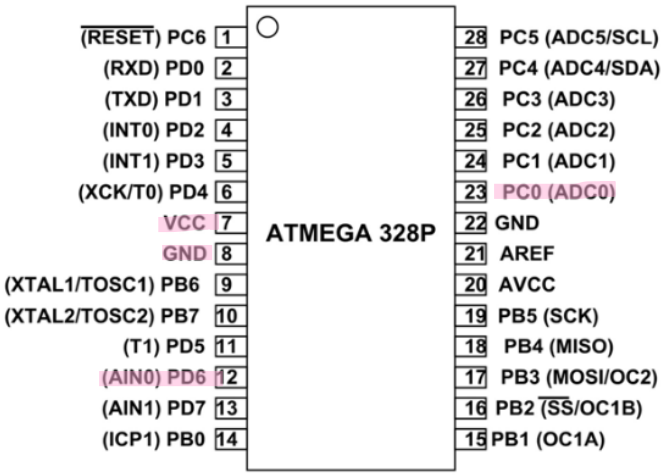
Primary Github address: https://github.com/MeralAbuJaser/Submission_da.git
Directory: https://github.com/MeralAbuJaser/Submission_da/tree/master/DA4A

1. COMPONENTS LIST AND CONNECTION BLOCK DIAGRAM w/ PINS







2. INITIAL/MODIFIED/DEVELOPED CODE OF TASK 1/A

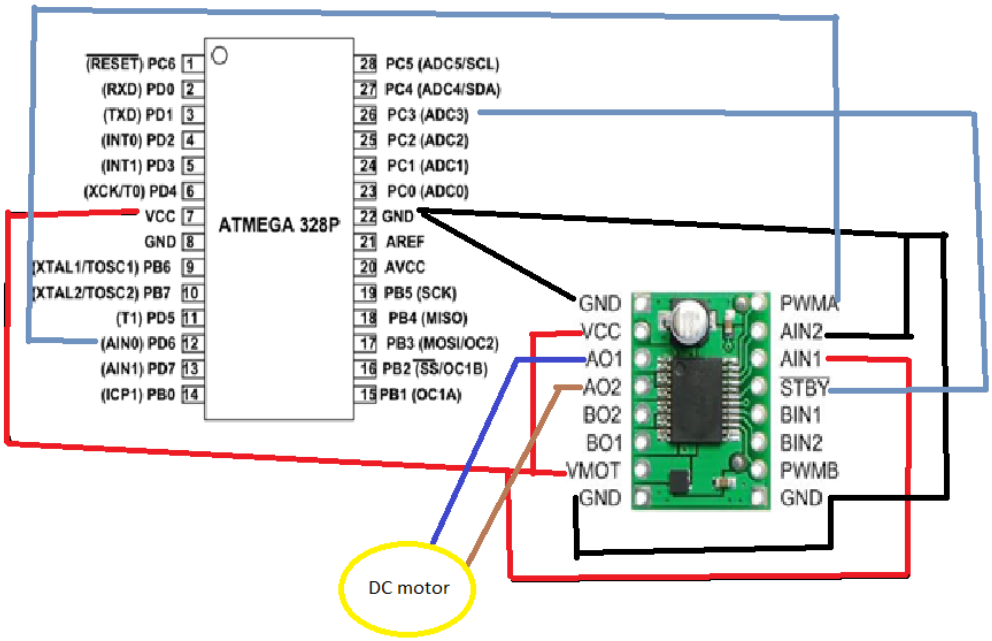
```
/*
 * DA4A.c
 *
 * Created: 5/7/2020 7:18:14 PM
 * Author : Meral
 */
#define F_CPU 16000000UL
#include <avr/io.h>
#include <avr/interrupt.h>

float dutyCycle = 0;
volatile uint8_t power = 0;        //ON/OFF power

float readADC(){
       ADCSRA |= (1<<6);                        //enable ADC conversion
       while (!(ADCSRA&(1<<4)));          //waits until ADIF is set
       ADCSRA |= (1<<4);                        //clear flag
       return ADC;                                    //returns adc read value
}
void enableADC(){
       ADMUX = 0x40;               //right justified
       ADCSRA = 0x87;                    //enables ADC with 128 pre-scaler
}
void enablePWM(){
       TCCR0A = 0x83;                    //fast PWM on OC0A in non-inverting mode
       TCCR0B = 0x02;                    //fast PWM, 1024 prescaler
}
ISR(PCINT1_vect) {
       if (PINC & (1<<PINC1)){
              power = ~power;                                    //invert current state
              if(power){
                     DDRD |= (1<<PIND6);               //output OC0A
                     DDRB &=~(1<<PINB3);
                     enablePWM();
              }
              if(!power){
                     DDRD &= ~(1<<PIND6); //input
                     DDRB |=(1<<PINB3);
              }
       }
       PCIFR = (1<<PCIF1);                      //clear interrupt flag
}
int main(void) {
       DDRC &= ~(1<<PINC0);  //potentiometer input
       enableADC();
       DDRC &= ~(1 << PINC1);      //input
       PCICR = (1 << PCIE1);       //interrupt
       PCMSK1 = (1 << PCINT9);     //pin change interrupt
       sei();                             //enable global interrupt

       while (1) {
              dutyCycle = 95*(readADC()/1023);         //calculated ratio of 95%
              OCR0A = (dutyCycle/100)*255;                    //calculate the duty cycle
       }
}
```

3. SCHEMATICS

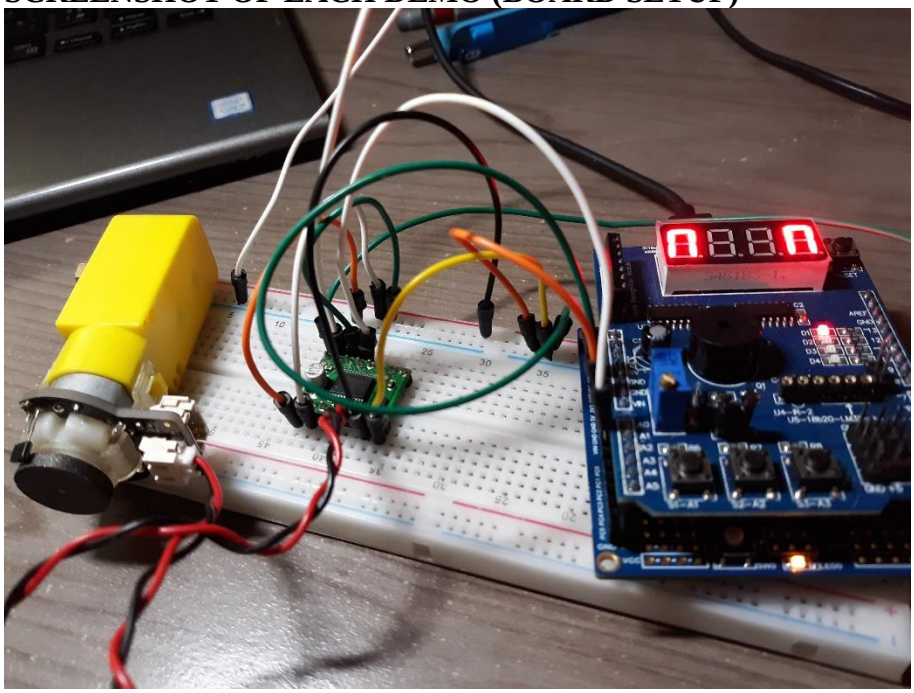


4. SCREENSHOTS OF EACH TASK OUTPUT (ATMEL STUDIO OUTPUT)

```
                Warning: Memory Usage estimation may not be accurate if there are sections other than .text sections in EL
    Done executing task "RunOutputFileVerifyTask".
Done building target "CoreBuild" in project "DA4A.cproj".
Target "PostBuildEvent" skipped, due to false condition; ('$(PostBuildEvent)' != '') was evaluated as ('' != '').
Target "Build" in file "C:\Program Files (x86)\Atmel\Studio\7.0\Vs\Avr.common.targets" from project "C:\Users\Meral\Docume
Done building target "Build" in project "DA4A.cproj".
Done building project "DA4A.cproj".

Build succeeded.
========== Build: 1 succeeded or up-to-date, 0 failed, 0 skipped ==========
```

5. SCREENSHOT OF EACH DEMO (BOARD SETUP)



6. **VIDEO LINKS OF EACH DEMO**
   https://www.youtube.com/watch?v=UyL0j9R-iGk
7. **GITHUB LINK OF THIS DA**
   https://github.com/MeralAbuJaser/Submission_da/tree/master/DA4A

"*This assignment submission is my own, original work*".
Meral Abu-Jaser