CPE301 – SPRING 2019

Design Assignment DA3A

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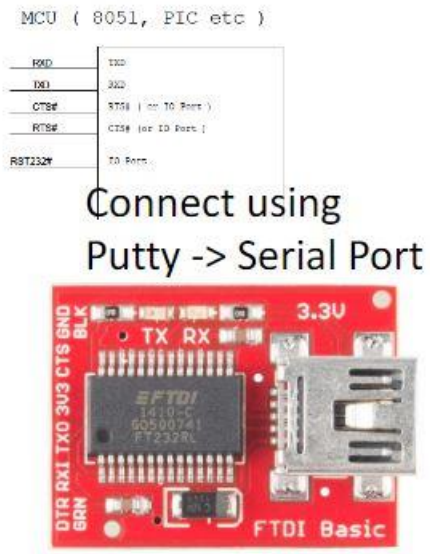
Primary Github address: https://github.com/guerrj1/Submission_DA.git
Directory: DA3A - https://github.com/guerrj1/Submission_DA/tree/master/DA3A

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
-FTDI Basic
-Mini-USB Cable
-Micro-USB Cable
-Male to male wires



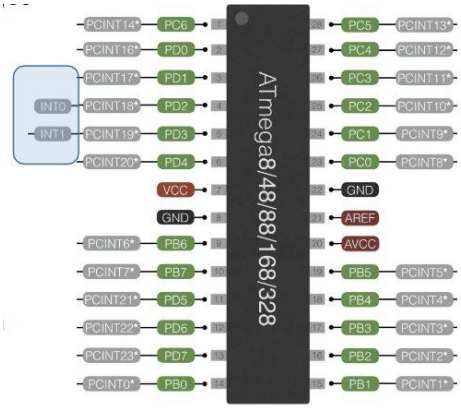
FTDI Chip Connection Diagram

2. DEVELOPED CODE OF TASK 1 C CODE

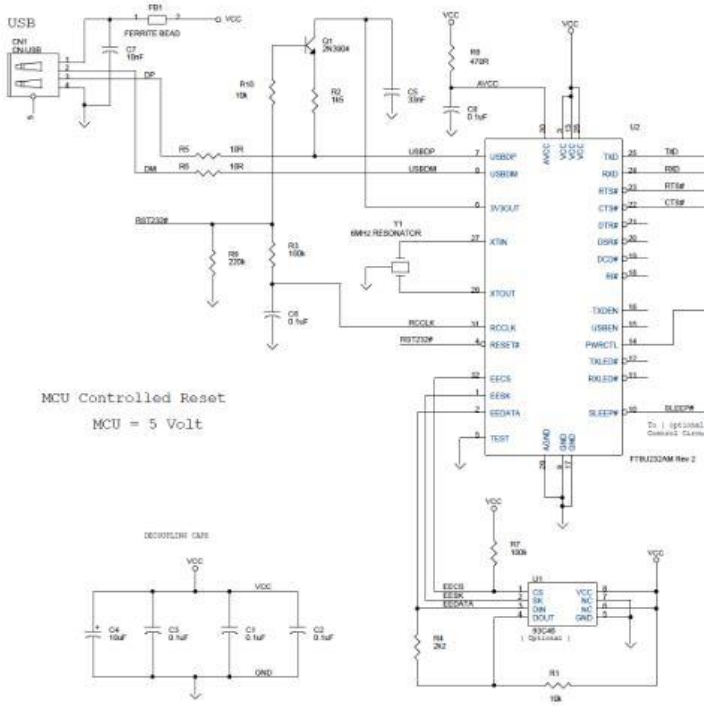
```
//DA3A

#define F_CPU 16000000UL
#define BAUD 9600
#include <avr/io.h>
#include <stdio.h>
#include <util/delay.h>
#include <avr/interrupt.h>

//Function Declarations
void USART_send(char data);
void USART_putstring(char* StringPtr);
void USART_init(void);

char String[] = "Hello World!";  //holds the array of characters
char outs[20];  //number of character spaces
volatile float float_val = 3.14159265;  //floating point value

int main(void)
{
        TCCR1B = 5;           //sets the prescaler to 1024
        TIMSK1 = (1<<TOIE1);  //enables overflow interrupt
        TCNT1 = 49911;        //TCNT1 value the counter counts up to

        USART_init();
```

```
        sei();                //enables the interrupt

        while(1)
        {
        }
}

//interrupt
ISR (TIMER1_OVF_vect)
{
        USART_putstring(String);         //sends the string to the terminal
        USART_putstring("\n");           //line feed
        USART_send('5');                 //sends the value to the terminal
        snprintf(outs, sizeof(outs), "%f\r\n", float_val);  //prints the floating point value
        USART_putstring("\n");           //line feed
        USART_putstring(outs);           //sends the number of spaces
        TCNT1 = 49911;                   //resets the counter to the starting value
}

void USART_init(void)
{
        UBRR0H = 0;
        UBRR0L = (F_CPU/16/BAUD - 1);       //BAUD prescaler
        UCSR0C = _BV(UCSZ01) | _BV(UCSZ00); //8 bit data
        UCSR0B = _BV(RXEN0) | _BV(TXEN0);   //enable rx and tx
}

void USART_send(char data)                 //sends the data to the serial port
{
        while (!(UCSR0A & (1 << UDRE0)));
                UDR0 = data;
}

void USART_putstring(char *StringPtr)      //sends the data to the serial port

{
        while ((*StringPtr != '\0'))
        {
                while (!(UCSR0A & (1 << UDRE0)));
                        UDR0 = *StringPtr;
                                StringPtr++;
        }
}
```

3. SCHEMATICS

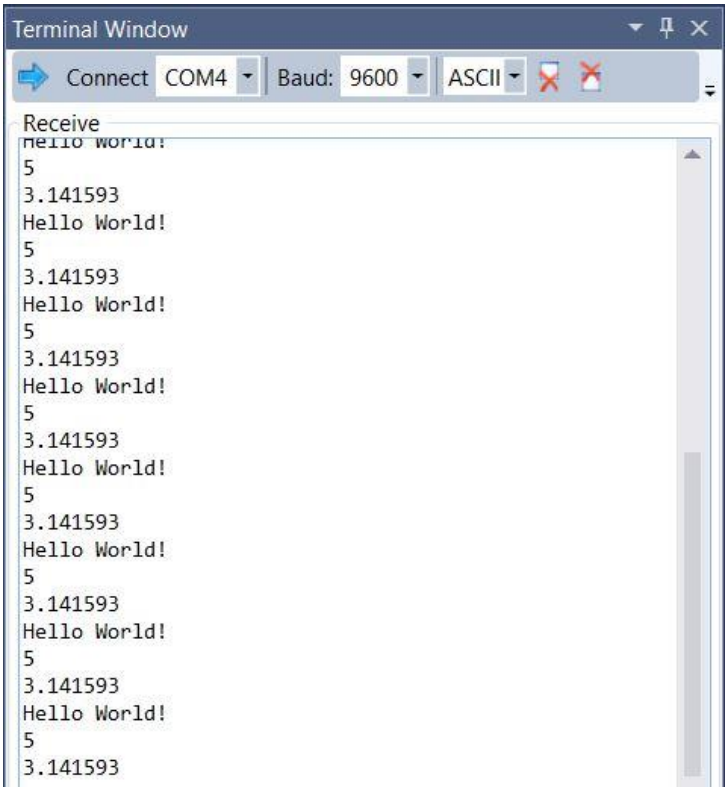


Atmega328P



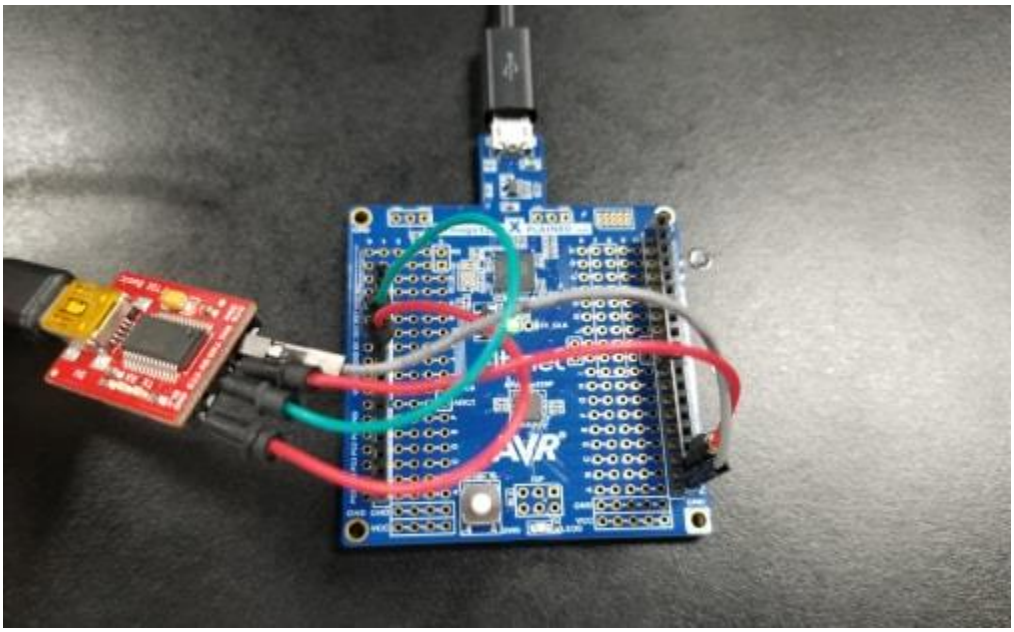
Atmega328P and FTDI Schematic

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



Terminal Window with string, integer and floating point displaying every 1 second

5. SCREENSHOT OF EACH DEMO (BOARD SETUP)



Atmega328P Connected with the FTDI Chip

6. VIDEO LINKS OF EACH DEMO

https://youtu.be/DEnVV_B81GQ

7. GITHUB LINK OF THIS DA

https://github.com/guerrj1/Submission_DA/tree/master/DA3A

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

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