CPE301 – SPRING 2019

DesignAssignment 6

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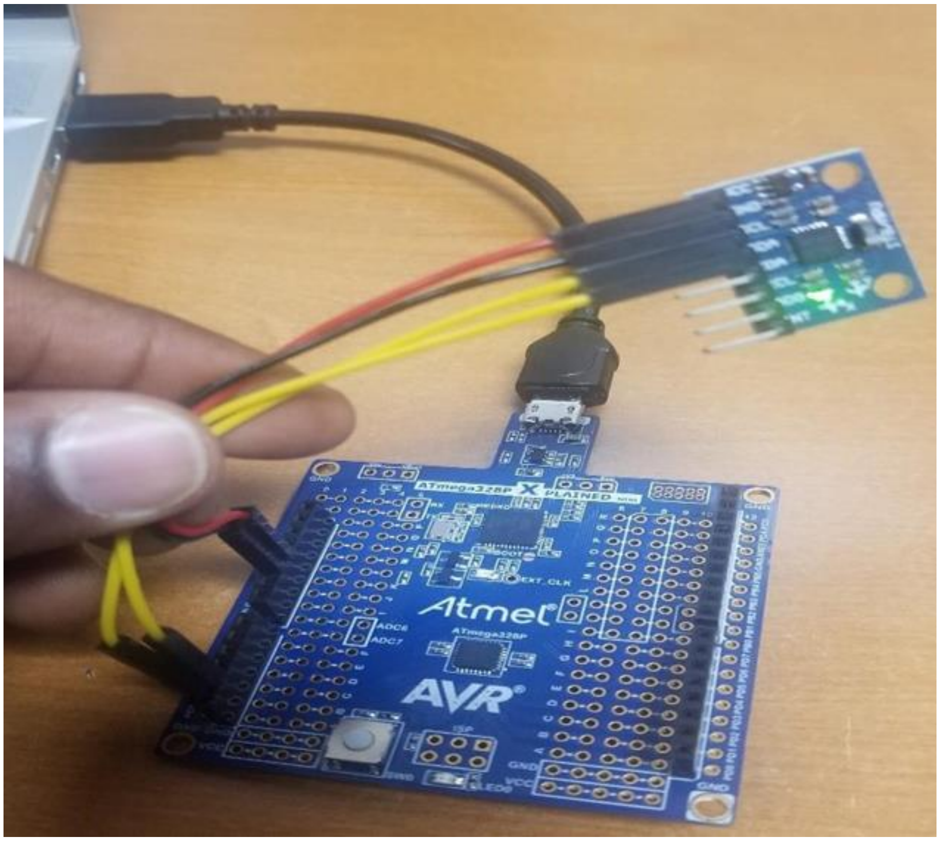
Primary Github address: **https://github.com/Vasty1995/submission_da**
Directory: **Vasty1995/submission_da**

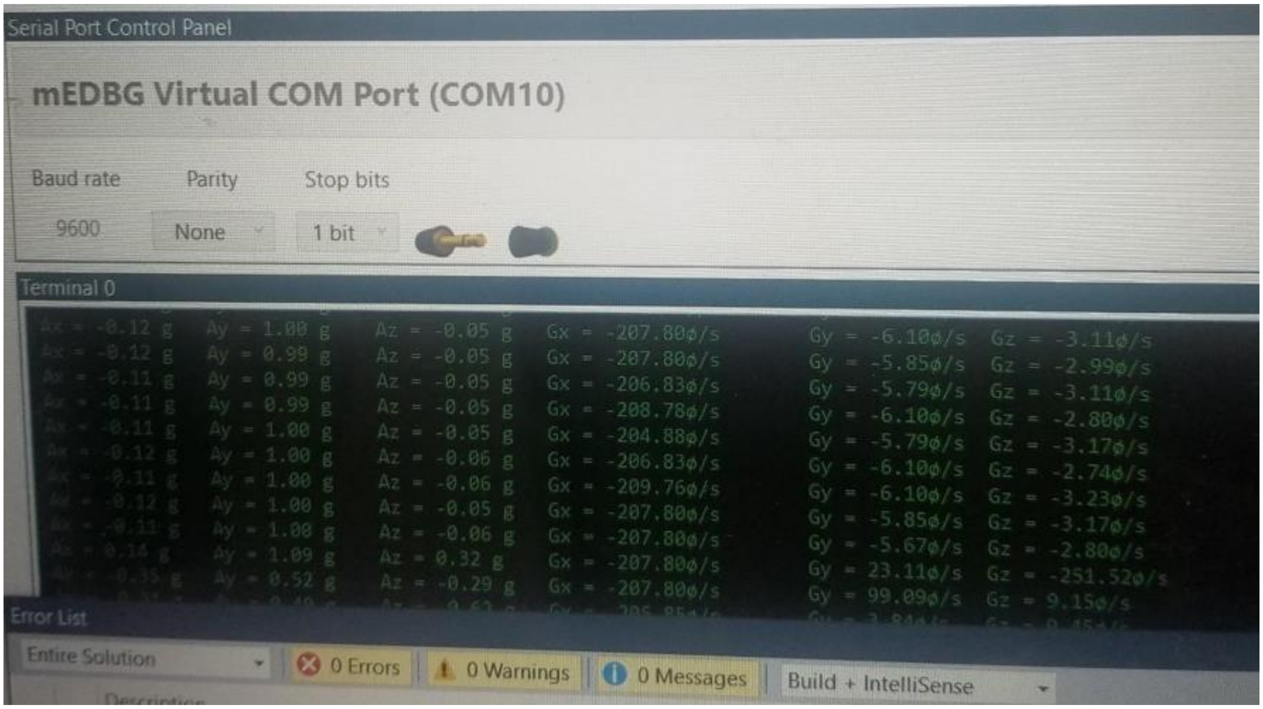
1. INITIAL/MODIFIED/DEVELOPED CODE

```
#define F_CPU 16000000UL
#include <avr/io.h>
#include <util/delay.h>
#include <inttypes.h>
#include <stdlib.h>
#include <stdio.h>
#include "MPU6050_res_define.h" #include
"I2C_Master_H_file.h"
#include "USART_RS232_H_file.h"

float Acc_x,Acc_y,Acc_z,Temperature,Gyro_x,Gyro_y,Gyro_z;

void MPU6050_Init() // Gyro initialization function
{
	_delay_ms(150);
	// Power up time >100ms
	I2C_Start_Wait(0xD0);	// Start with device write address
	I2C_Write(SMPLRT_DIV);	// Write to sample rate register
	I2C_Write(0x07);	// 1KHz sample rate
	I2C_Stop();

	I2C_Start_Wait(0xD0);
	I2C_Write(PWR_MGMT_1);// Write to power management register
	I2C_Write(0x01);	// X axis gyroscope reference frequency
	I2C_Stop();

	I2C_Start_Wait(0xD0);
	 I2C_Write(CONFIG); // Write to Configuration register
	I2C_Write(0x00);	// Fs = 8KHz */
	I2C_Stop();

	I2C_Start_Wait(0xD0);
	I2C_Write(GYRO_CONFIG);// Write to Gyro configuration register
	I2C_Write(0x18);	// Full scale range +/- 2000 degree/C
	I2C_Stop();
```

```
       I2C_Start_Wait(0xD0);
       I2C_Write(INT_ENABLE);// Write to interrupt enable register
       I2C_Write(0x01);
       I2C_Stop();
       }

       void MPU_Start_Loc()
       {
       I2C_Start_Wait(0xD0);      // I2C start with device write address
       I2C_Write(ACCEL_XOUT_H);// Write start location address from where to read
        I2C_Repeated_Start(0xD1); // I2C start with device read address
       }

       void Read_RawValue()
       {
       MPU_Start_Loc();            // Read Gyro values
       Acc_x = (((int)I2C_Read_Ack()<<8) | (int)I2C_Read_Ack());
       Acc_y = (((int)I2C_Read_Ack()<<8) | (int)I2C_Read_Ack());
       Acc_z = (((int)I2C_Read_Ack()<<8) | (int)I2C_Read_Ack());
       //Temperature = (((int)I2C_Read_Ack()<<8) | (int)I2C_Read_Ack());
       Gyro_x = (((int)I2C_Read_Ack()<<8) | (int)I2C_Read_Ack());
       Gyro_y = (((int)I2C_Read_Ack()<<8) | (int)I2C_Read_Ack());
       Gyro_z = (((int)I2C_Read_Ack()<<8) | (int)I2C_Read_Nack());
       I2C_Stop();
       }

       int main()
       {
       char buffer[20], float_[10];
float Xa,Ya,Za;     float
Xg=0,Yg=0,Zg=0;
       I2C_Init();         //Initialize I2C
       MPU6050_Init();            //Initialize MPU6050
       USART_Init(9600);          //Initialize USART

       while(1)
       {
       Read_RawValue();
       //Divide raw value by sensitivity scale factor to get real values
       Xa = Acc_x/16384.0;
       Ya = Acc_y/16384.0;
       Za = Acc_z/16384.0;

       Xg = Gyro_x/16.4;
       Yg = Gyro_y/16.4;
       Zg = Gyro_z/16.4;

       //Output values     dtostrf( Xa, 3,
2, float_ );        sprintf(buffer," Ax = %s
g\t",float_);
       USART_SendString(buffer);
       dtostrf( Ya, 3, 2, float_ );
sprintf(buffer," Ay = %s g\t",float_);
       USART_SendString(buffer);

       dtostrf( Za, 3, 2, float_ );
sprintf(buffer," Az = %s g\t",float_);
       USART_SendString(buffer);

       dtostrf( Xg, 3, 2, float_ );
       sprintf(buffer," Gx = %s%c/s\t",float_,0xF8);
       USART_SendString(buffer);

       dtostrf( Yg, 3, 2, float_ );
       sprintf(buffer," Gy = %s%c/s\t",float_,0xF8);
       USART_SendString(buffer);

       dtostrf( Zg, 3, 2, float_ );
       sprintf(buffer," Gz = %s%c/s\r\n",float_,0xF8);
       USART_SendString(buffer);
       _delay_ms(1000);
       }
       }
```

2. SCREENSHOT OF EACH DEMO (BOARD SETUP)





Baud rate: 9600 Parity: None Stop bits: 1 bit

```
Ax = -0.12 g   Ay = 1.00 g   Az = -0.05 g   Gx = -207.80ø/s   Gy = -6.10ø/s   Gz = -3.11ø/s
Ax = -0.12 g   Ay = 0.99 g   Az = -0.05 g   Gx = -207.80ø/s   Gy = -5.85ø/s   Gz = -2.99ø/s
Ax = -0.11 g   Ay = 0.99 g   Az = -0.05 g   Gx = -206.83ø/s   Gy = -5.79ø/s   Gz = -3.11ø/s
Ax = -0.11 g   Ay = 0.99 g   Az = -0.05 g   Gx = -208.78ø/s   Gy = -6.10ø/s   Gz = -2.80ø/s
Ax = -0.11 g   Ay = 1.00 g   Az = -0.05 g   Gx = -204.88ø/s   Gy = -5.79ø/s   Gz = -3.17ø/s
Ax = -0.12 g   Ay = 1.00 g   Az = -0.06 g   Gx = -206.83ø/s   Gy = -6.10ø/s   Gz = -2.74ø/s
Ax = -0.11 g   Ay = 1.00 g   Az = -0.06 g   Gx = -209.76ø/s   Gy = -6.10ø/s   Gz = -3.23ø/s
Ax = -0.12 g   Ay = 1.00 g   Az = -0.05 g   Gx = -207.80ø/s   Gy = -5.85ø/s   Gz = -3.17ø/s
Ax = -0.11 g   Ay = 1.00 g   Az = -0.06 g   Gx = -207.80ø/s   Gy = -5.67ø/s   Gz = -2.80ø/s
Ax = 0.14 g    Ay = 1.09 g   Az = 0.32 g    Gx = -207.80ø/s   Gy = 23.11ø/s   Gz = -251.52ø/s
Ax = -0.35 g   Ay = 0.52 g   Az = -0.29 g   Gx = -207.80ø/s   Gy = 99.09ø/s   Gz = 9.15ø/s
```

⊗ 0 Errors | ⚠ 0 Warnings | ⓘ 0 Messages

3. VIDEO LINKS OF EACH DEMO

https://youtu.be/pjSLToicMn8

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

"This assignment submission is my own, original work".
Yannick Kengne Tatcha