Design Assignment 6

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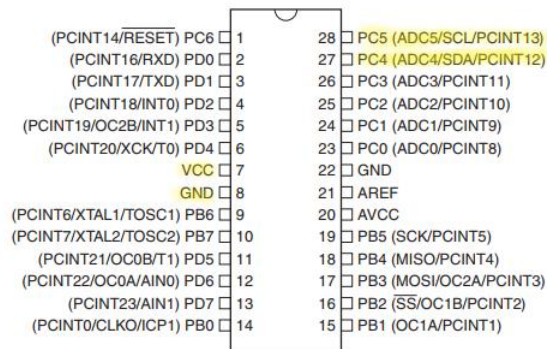Directory:

1. COMPONENTS LIST AND CONNECTION BLOCK DIAGRAM w/ PINS

Atmel Studio 7.0
- Simulator
- Debugger
- Atmega328PB-Xmini
- ICM-20498
- breadboard

ATMEGA328

Port Pin


```
(PCINT14/RESET) PC6 ▯ 1      28 ▯ PC5 (ADC5/SCL/PCINT13)
    (PCINT16/RXD) PD0 ▯ 2      27 ▯ PC4 (ADC4/SDA/PCINT12)
    (PCINT17/TXD) PD1 ▯ 3      26 ▯ PC3 (ADC3/PCINT11)
   (PCINT18/INT0) PD2 ▯ 4      25 ▯ PC2 (ADC2/PCINT10)
(PCINT19/OC2B/INT1) PD3 ▯ 5    24 ▯ PC1 (ADC1/PCINT9)
   (PCINT20/XCK/T0) PD4 ▯ 6    23 ▯ PC0 (ADC0/PCINT8)
                  VCC ▯ 7      22 ▯ GND
                  GND ▯ 8      21 ▯ AREF
(PCINT6/XTAL1/TOSC1) PB6 ▯ 9   20 ▯ AVCC
(PCINT7/XTAL2/TOSC2) PB7 ▯ 10  19 ▯ PB5 (SCK/PCINT5)
   (PCINT21/OC0B/T1) PD5 ▯ 11  18 ▯ PB4 (MISO/PCINT4)
 (PCINT22/OC0A/AIN0) PD6 ▯ 12  17 ▯ PB3 (MOSI/OC2A/PCINT3)
      (PCINT23/AIN1) PD7 ▯ 13  16 ▯ PB2 (SS/OC1B/PCINT2)
   (PCINT0/CLKO/ICP1) PB0 ▯ 14 15 ▯ PB1 (OC1A/PCINT1)
```

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

C Code

```c
int main(void)
{
 float X_a,y_a,z_a;
```

```c
  float X_g,y_g,z_g;
  uint16_t datam;


PORTC |= (1<<5) | (1<<4);                       // enable pull ups for TWI pins


i2c_init();                                               // initialize TWI
USART_init(BAUD_PRESCALLER);            // initialize USART
USART_tx_string("UART Connected!\r\n");

ICM_write(0x7F, 0x20);   // select User Bank 2
ICM_write(0x01, 0x29);   // set gyro rate for 250 with LPF of 17Hz
ICM_write(0x00, 0x0A);    // set gyroscope sample rate for 100Hz
ICM_write(0x14, 0x15);   // set accelerometer low pass filter to 136Hz and the rate to 8G
ICM_write(0x11, 0x0A);    // set accelerometer rate to 100hz


ICM20948_Init();                               // change clksel on icm
ICM20948_verify_whoami();                 // verify we are connected
MAG_enread(AK09916_HXL, 0x08);
ICM20948_InitMAG();
MAG_write(AK09916_CNTL_3, 0x01);
ICM_write(PWR_MGMT_1, 0x80);

MAG_write(AK09916_CNTL_2, 0x08);

_delay_ms(200);

while(1){
accel_x = ICM20948_readreg16(ACCEL_XOUT_H) ;
accel_y = ICM20948_readreg16(ACCEL_YOUT_H);
accel_z = ICM20948_readreg16(ACCEL_ZOUT_H) ;
gyro_x = ICM20948_readreg16(GYRO_XOUT_H) ;
gyro_y = ICM20948_readreg16(GYRO_YOUT_H)  ;
gyro_z = ICM20948_readreg16(GYRO_ZOUT_H)  ;
 datam = ICM20948_readreg16(EXT_SLV_SENS_DATA_00);

X_a = accel_x / 16384;
y_a = accel_y / 16384;
z_a = accel_z / 16384;

X_g = gyro_x / 131;
y_g = gyro_y / 131;
z_g = gyro_z / 131;
```

```
dtostrf( X_a, 3, 2, myfloat );
snprintf(buffer,sizeof(buffer),"ACCEL X: %s g\t",myfloat);
USART_tx_string(buffer);

dtostrf( y_a, 3, 2, myfloat );
snprintf(buffer,sizeof(buffer),"ACCEL Y: %s g\t",myfloat);
USART_tx_string(buffer);

dtostrf( z_a, 3, 2, myfloat );
snprintf(buffer,sizeof(buffer),"ACCEL Z: %s g\t",myfloat);
USART_tx_string(buffer);

USART_tx_string("\r\n");

dtostrf( X_g, 3, 2, myfloat );
snprintf(buffer,sizeof(buffer),"GYRO X:  %s g\t",myfloat,0xF8);
USART_tx_string(buffer);

dtostrf( y_g, 3, 2, myfloat );
snprintf(buffer,sizeof(buffer),"GYRO Y:  %s g\t",myfloat,0xF8);
USART_tx_string(buffer);

dtostrf( z_g, 3, 2, myfloat );
snprintf(buffer,sizeof(buffer),"GYRO Z:  %s g\t",myfloat,0xF8);
USART_tx_string(buffer);

dtostrf( datam, 3, 2, myfloat );
snprintf(buffer,sizeof(buffer),"MAG: %s g\t",myfloat);
USART_tx_string(buffer);

USART_tx_string("\r\n");
_delay_ms(200);
}
}
```
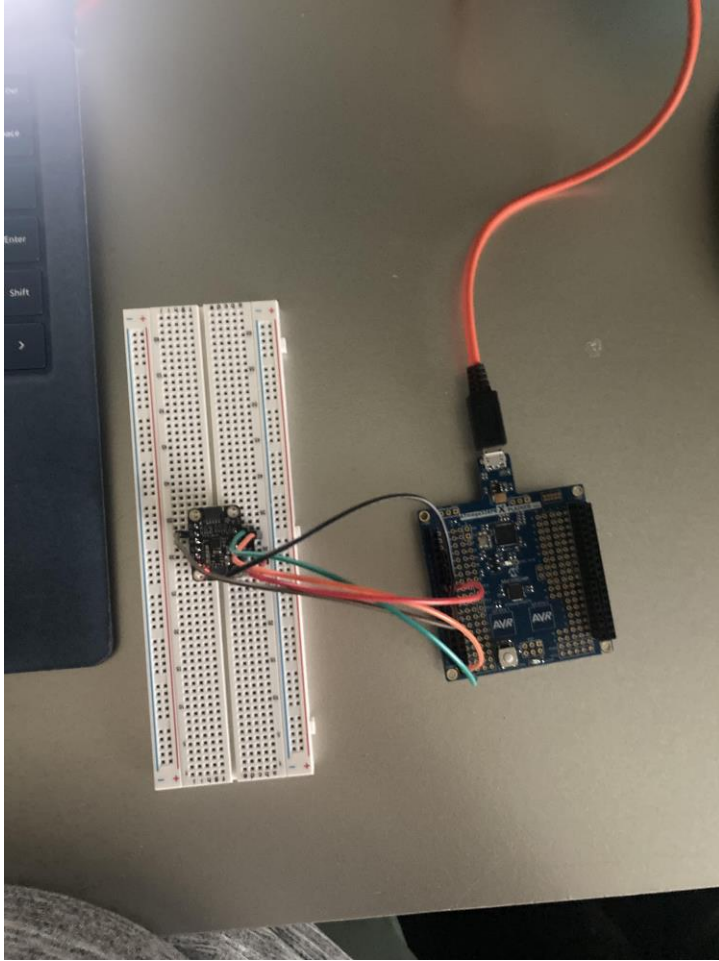
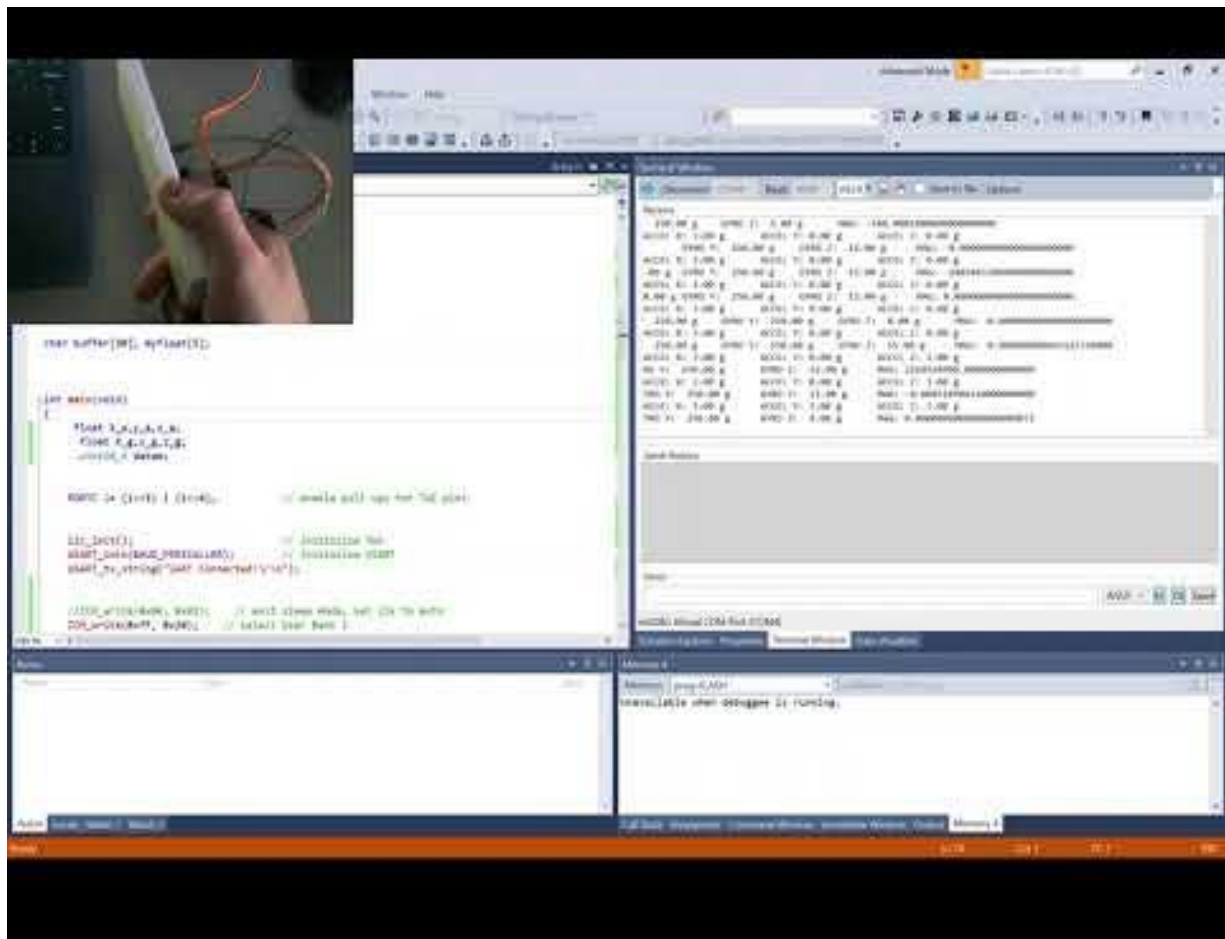**3.   DEVELOPED MODIFIED CODE OF TASK 2/A from TASK 1/A**
N/A
4.   SCHEMATICS

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

N/A

6. SCREENSHOT OF EACH DEMO (BOARD SETUP)

7.   VIDEO LINKS OF EACH DEMO
DA6

8. GITHUB LINK OF THIS DA

https://github.com/AngeloNol/DA_submission