

Supplementary Materials

Arduino codes:

```
#include<Wire.h>

const int MPU2=0x69,MPU1=0x68;

int16_t AcX1,AcY1,AcZ1,Tmp1,GyX1,GyY1,GyZ1;

int16_t AcX2,AcY2,AcZ2,Tmp2,GyX2,GyY2,GyZ2;

//-----\setup loop\-----

void setup(){

    Wire.begin();

    Wire.beginTransmission(MPU1);

    Wire.write(0x6B);// PWR_MGMT_1 register

    Wire.write(0); // set to zero (wakes up the MPU-6050)

    Wire.endTransmission(true);

    Wire.beginTransmission(MPU2);

    Wire.write(0x6B);// PWR_MGMT_1 register

    Wire.write(0); // set to zero (wakes up the MPU-6050)

    Wire.endTransmission(true);

    Serial.begin(9600);

}

//-----\void loop\-----

--

void loop(){

    //get values for first mpu having address of 0x68

    GetMpuValue1(MPU1);
```

```

Serial.print("");

//get values for second mpu having address of 0x69

GetMpuValue2(MPU2);

Serial.println("");

}

//-----\user defined functions\-----

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void GetMpuValue1(const int MPU){

    Wire.beginTransmission(MPU);

    Wire.write(0x3B); // starting with register 0x3B (ACCEL_XOUT_H)

    Wire.endTransmission(false);

    Wire.requestFrom(MPU, 14, true); // request a total of 14 registers

    AcX1=Wire.read()<<8| Wire.read(); // 0x3B (ACCEL_XOUT_H) & 0x3C (ACCEL_XOUT_L)

    AcY1=Wire.read()<<8| Wire.read(); // 0x3D (ACCEL_YOUT_H) & 0x3E (ACCEL_YOUT_L)

    AcZ1=Wire.read()<<8| Wire.read(); // 0x3F (ACCEL_ZOUT_H) & 0x40 (ACCEL_ZOUT_L)

    GyX1=Wire.read()<<8| Wire.read(); // 0x43 (GYRO_XOUT_H) & 0x44 (GYRO_XOUT_L)

    GyY1=Wire.read()<<8| Wire.read(); // 0x45 (GYRO_YOUT_H) & 0x46 (GYRO_YOUT_L)

    GyZ1=Wire.read()<<8| Wire.read(); // 0x47 (GYRO_ZOUT_H) & 0x48 (GYRO_ZOUT_L)

}

void GetMpuValue2(const int MPU){

    Wire.beginTransmission(MPU);

    Wire.write(0x3B); // starting with register 0x3B (ACCEL_XOUT_H)

    Wire.endTransmission(false);

    Wire.requestFrom(MPU, 14, true); // request a total of 14 registers

    AcX2=Wire.read()<<8| Wire.read(); // 0x3B (ACCEL_XOUT_H) & 0x3C (ACCEL_XOUT_L)

    AcY2=Wire.read()<<8| Wire.read(); // 0x3D (ACCEL_YOUT_H) & 0x3E (ACCEL_YOUT_L)

    AcZ2=Wire.read()<<8| Wire.read(); // 0x3F (ACCEL_ZOUT_H) & 0x40 (ACCEL_ZOUT_L)

    GyX2=Wire.read()<<8| Wire.read(); // 0x43 (GYRO_XOUT_H) & 0x44 (GYRO_XOUT_L)

    GyY2=Wire.read()<<8| Wire.read(); // 0x45 (GYRO_YOUT_H) & 0x46 (GYRO_YOUT_L)

    GyZ2=Wire.read()<<8| Wire.read(); // 0x47 (GYRO_ZOUT_H) & 0x48 (GYRO_ZOUT_L)

```

```

//MPU-1

Serial.print(" ");Serial.print(AcX1);

Serial.print(" ");Serial.print(" ");Serial.print(AcY1),

Serial.print(" ");Serial.print(" ");Serial.print(AcZ1),

Serial.print(" ");Serial.print(" ");Serial.print(GyX1),

Serial.print(" ");Serial.print(" ");Serial.print(GyY1),

Serial.print(" ");Serial.print(" ");Serial.print(GyZ1),

//MPU-2

Serial.print(" ");Serial.print(" ");Serial.print(AcX2),

Serial.print(" ");Serial.print(" ");Serial.print(AcY2),

Serial.print(" ");Serial.print(" ");Serial.print(AcZ2),

Serial.print(" ");Serial.print(" ");Serial.print(GyX2),

Serial.print(" ");Serial.print(" ");Serial.print(GyY2),

Serial.print(" ");Serial.print(" ");Serial.print(GyZ2),

delay(1);

}

```

Table S1: MA correction processing durations

The processing durations for 41.5 minutes of data were recorded in 8 channels (8 HbO and 8 HbR) sampled at 10 Hz. The analysis was run with HOMER3 on a PC with a Windows 10 operating system and an intel® core™ i5-7500 @3.4 GHz processor.

Table S1. The processing time for each tested technique.

Methods	Processing time (seconds)
Uncorrected	-
RLOESS	700 ±6
WCBSI	65 ±0.2
Wavelet	62 ±0.2
HWM (head-IMU or probe-IMU)	26 ±6.2
splineSG	21 ±0.3
PCA	17 ±0.5
Spline	17 ±0.4
tPCA	16 ±0.5
CBSI	16 ±0.5

Table S2: Participants.

Table S2. The participant's age, gender, and hair colour

participant	Age	gender	Hair colour
sub-01	34	Male	dark brown
sub-02	34	Female	black
sub-03	26	Female	medium brown
sub-04	33	Female	black
sub-05	29	Female	light brown
sub-06	26	Female	brown
sub-07	29	Male	very dark brown
sub-08	34	Male	black
sub-09	29	Female	brown
sub-10	26	Female	black
sub-11	32	Female	black
sub-12	34	Male	brown
sub-13	29	Female	red
sub-14	24	Male	light brown
sub-15	29	Female	brown
sub-16	24	Female	dark brown
sub-17	24	Female	black