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Summary:

Display temperature and pressure reading, while performing OSU's Phyisics 1250 heat engine lab.

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// Variables

int indexFIR = 0; // Location index for FIR filters

const int num = 150; // Number of samples for analog reads and FIR filter

float sample = 0; // Return value of readAvg for temp and pressure readings

byte serialRead = 0; // Input from terminal

double timer = millis(); // Timer to cycle outputs

#define tPin A1 // Temp pin

float temp = 999; // Final temperature value

int tFIR[num]; // Temp FIR filter array

#define pPin A3 // Pressure pin

float pZoffset = 0; // Pressure zero offest

float pressure = 999; // Final pressure value

int pFIR [num]; // Pressure FIR filter array

void setup()

{

Serial.begin(9600); // Start serial communications

analogReference(EXTERNAL); // Aref pin tied to 3.3V

delay(40); // Wait for pressure sensor to stabilize

sample = 0;

for (int i = 0; i < num; i++) // Calculate average zero offset for pressure sensor

{

sample += analogRead(pPin);

}

sample /= num;

pZoffset = sample; // Set offset to zero pressure reading

}

void loop()

{

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This section is for a serial interface

if (Serial.available()) // Check for input from terminal

{

serialRead = Serial.read(); // Read input

if (serialRead==49) // Check for flag to execute, 49 is asci for 1

{

calcPrint(); // Calculate moving averages and print results to terminal

}

}

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if (millis() > timer) { // Print every 0.5 seconds

calcPrint(); // Calculate moving averages and print results to terminsl

timer += 500; // Increment timer

}

analogRead(tPin); // Pre-read

tFIR[indexFIR] = analogRead(tPin); // Update temp FIR

analogRead(pPin); // Pre-read

pFIR[indexFIR] = analogRead(pPin); // Update pressure FIR

indexFIR = (++indexFIR) % num; // Reset FIR index back to 0 when end of array is reached

}

//Average values in array to generate moving average Finite Impule Response Filter

float avgFIR(int FIR[])

{

float avg = 0;

for (int i = 0; i < num; i++)

{

avg += FIR[i];

}

avg /= num;

return avg;

}

void calcPrint()

{

// calculate pressure

sample = avgFIR(pFIR);

pressure = ((sample - pZoffset) \* .007161458)+100; // 100 is estimated atmospheric pressure

// Calculate temp

sample = avgFIR(tFIR);

temp = .118132 \* sample - 18.6736;

// Print

Serial.print('\n');

Serial.print("Temerature: ");

Serial.print(temp, 1);

//Serial.print(analogRead(tPin));

Serial.print("C - Pressure: ");

Serial.print(pressure);

Serial.print("kpa");

Serial.println('\n');

}