

## For noise disturbance detection in the environment

This code monitors the sound intensity using an LM393 sensor connected to an Arduino UNO board. The used sensor has only a digital output. Therefore, the number of times the sensor detects a sound is summed up over a sampling time called "SAMPLE\_TIME". Then the sum called "sampleBufferValue" is printed on a Serial Monitor and visualized with the Serial Plotter. Additionally, the code allows communication with a LED to provide a visual alarm if the "sampleBufferValue" surpasses a preset Threshold. Regarding the digital outputs, 0 means silence and 1 means noise.

Detailed explanation is given in the [video tutorial](#)

```
const int OUT_PIN = 12;           // The OUTPUT of the sound sensor is
connected to the digital pin D12 of the Arduino
const int SAMPLE_TIME = 10;      // The sampling time in milliseconds, can
be set differently if required
const int Threshold = 90;        // Threshold on decibel value for LED
switching ON, the value has been optimized with respect to the used sampling
time (900 cumulative digital counts  $\approx$  90 dB from "Schall")

unsigned long millisCurrent;      // current time
unsigned long millisLast = 0;    //previous time
unsigned long millisElapsed = 0; // difference between current time and
previous time (time interval)

int sampleBufferValue = 0;        // initiate the sum of digital outputs
over the sampling time
int led = 8;                     // LED on pin 4 of Arduino
int dB = 0;                      //initiate sound intensity dB value

void setup() {

    Serial.begin(9600);           //Arduino starts serial communication with
baud rate 9600
    pinMode(led,OUTPUT);         // the LED is connected as output for alarm
purpose
}

void loop() {

    millisCurrent = millis();     //the current time is
assigned to the dedicated variable
    millisElapsed = millisCurrent - millisLast; //the elapsed time is updated
    if(digitalRead(OUT_PIN) == HIGH){ //HIGH means noise
        sampleBufferValue++;        //increments the sum variable
by 1
    }
    if (millisElapsed > SAMPLE_TIME) { //if the elapsed time surpasses
the sampling time, print the sampleBufferValue and test threshold for alarm
```

```
    dB = 0.0666 *(sampleBufferValue) + 30.223; //linear regression to
calculate the decibel value based of the rough calibration of the sensor
response
    Serial.println(dB);                                // print decibel values on the
Serial Monitor
    Serial.print("dB");                                // print sound unit decibel
    if (sampleBufferValue > Threshold) {               // test if the threshold is
surpassed
        digitalWrite(led, HIGH);                       //blink LED 2 ms ON and 1 ms OFF
        delay(2);
        digitalWrite(led, LOW);
        delay(1);
    }
    digitalWrite(led, LOW);                             // the LED is turned off to be
ready for the next sample
    sampleBufferValue = 0;                             // re-initialization of the
sampleBufferValue variable for the new sampling time
    millisLast = millisCurrent;                         // update the previous time to be
the start for the next sample
}
}
```

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Last update: 2023/01/05 14:38

