

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](#)

Sound_Detection.ino

```
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 ≈ 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

