

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  $\approx$  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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