For noise disturbance detection in the environment

This code is meant to monitor 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 (laptop) 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.

```
 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
  }
}
```