For noise disturbance detection in the environment

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/* This code is meant to monitor the sound intensity using LM393 sensor
connected to 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.
// The code allows to communicate  with a LED in order to provide a visual
alarm if the "sampleBufferValue" surpasses a preset Threshold  "Threshold"
*/

// 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
```

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  }
   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
  }
}
```