## 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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