Multidimensional Sensing Techniques

Assignment 2 – Audio Sensors

You can collect up to 18 points in this assignment

Deadline: 08.10.2021 at 23:55

All course work is individual. *Discussing the course tasks, assignments and specific issues with other course participants is allowed and even encouraged. However, you should be the only author of all the solutions you provide in this assignment. Team work, pair programming or copying solutions or program code from other persons is consider plagiarism and it will be handled following the Åbo Akademi protocol for such cases.*

The aim of this lab is to get familiarized with audio sensors. In this assignment you will need to connect audio devices to your computer. You will modify and run a script to analyse the mean and variance of the input volume.

You will be using python for this lab with the provided script. The script has several dependencies which need to be installed before you can run the script. Install them through the *'pip install NAME'* command on your computer. Before you run the script, connect as many microphones (at least two) to your computer as possible to function as your audio sources, you can also connect for example your android devices to your computer using third-party software such as droidcam or WO Mic. Here are few links related to the use of a mobile phone as a microphone on a PC:

[How to use your Android smartphone camera and microphone as a PC webcam](#)

[How to Use Your Smartphone as a Windows Microphone](#)

[How to use iPhone mic on PC?](#)

The curious are encouraged to implement the script from scratch if you have enough time, the following sources were used as a base for the script: https://people.csail.mit.edu/hubert/pyaudio/

A handy tutorial using the same template: https://www.youtube.com/watch?v=AShHJdSIxkY

Assignment instructions

1. (2 points) Read and understand the code in the provided python-script. Make the GUI display the signal volume for each sensor (the code is there; you just need to put the right variable in the label).

2. (4 points) Calculate the combined mean and variance of the current volume signal displayed.

3. (8 points) Store 100 volume signals in the buffer and calculate the mean and variance for each sound source separately.

4. (4points) Extend the script to detect if one or several sources are faulty. Test this by covering one of the sources (microphone).

Report instructions

You should upload all the implemented and used code for this lab on a GitHub Classroom repository. You should create your group repository from the following link:

https://classroom.github.com/a/QLJ1zP-M

The report document should contain:

- Your full name and student number at ÅA
- A direct link to your source code on GitHub.
- Each page of your submission should have a page number
- **Pay attention to the readability of your report!**

You should write a report documenting the work performed during the exercise. The report should contain information on:

- What you did
- How you did it
- Why you did it this way
- The results of your work
- How your solution could be improved/generalized

You are encouraged to provide pictures, graphs, screenshots, diagrams etc. Anything that help understanding your solutions should be included in your report. If you use content (pictures, graphs, etc.) from other sources, remember to properly cite and provide a reference to the used external source(s).

At the end of the report you should also provide a reflection on what you learned during this exercise. This section could provide answers to the following questions:

- What did you learn?
- Did anything surprise you?
- Did you find anything challenging? Why?
- Did you find anything satisfying? Why?

The expected size for this report is 3-5 pages of content.

Name you report file Assignment2_YourName.pdf and upload your report in PDF format on moodle before the deadline.