**Feedback sheet for final version of sonification on chemical sensors:**

***Introduction video:*** <https://www.youtube.com/watch?v=-I8y_FUYg9Q>

***Example 1:***

<https://soundcloud.com/yuna-787448399/v5-alertrange-10-chn1-4/s-HQE30pUJp6k?in=yuna-787448399/sets/sonificationprotoptype_version5/s-WHKBASX0Ivy&si=2b560095393745fc87f8b96d57587715&utm_source=clipboard&utm_medium=text&utm_campaign=social_sharing>

***Example 2:***

<https://soundcloud.com/yuna-787448399/v5-alertrange-10-chn13-16/s-yKxnrnSGiLA?in=yuna-787448399/sets/sonificationprotoptype_version5/s-WHKBASX0Ivy&si=c5822d37fdd84bcbbae5d8128362c990&utm_source=clipboard&utm_medium=text&utm_campaign=social_sharing>

**Questions:**

1. Do you think this design helpful for monitoring data during a calibration session?

I think this design has good potential. Over time and multiple listening, I have two key problems:

1. This probably originates within me and my inadequate training of using hearing. Namely, It is very hard for me to identify and understand what exactly I am listening/hearing. I am constantly trying to visualize signals and compare the visual cue to hearing. Thus, I confuse myself very quickly and I quickly lose track. I had to watch the instruction video many times just to understand the connection between signals in visual terms (e.g. stable, unstable) versus in sound terms (pitch). I am afraid that I still do not have a full comprehension of how pitch helps. In other words I expect much less variations (possibly because I ‘see’ much less variations in signal visually).
2. Perhaps four sensors is too many. Given that I lose lots of energy trying to understand pitch, I quickly get saturated and I am not able to make a big difference between sensor ‘one’ after a few repetitions. To make things worse, I constantly have a picture of the signal in my head and I am aware that it takes some time for a signal to visually stabilize. So, I noticed that I pay less attention to the first few sounds and then get confused when I do not hear sounds of constant pitch at a point when I expect the signal to be stable (visually).

Perhaps I just need more training (time) and also maybe a slower introduction, i.e. a smaller number of sensors (maybe just two).

2. Can you observe abnormal behaviours in data streams through this design? If yes, do you think you rely more on pitch information or click sound?

Click sound helps me significantly more. Given my answer to Q1, after a few listening to the introductory video, I noticed that the click sound helps me identify anomalies. I also noticed that I almost entirely ignored pitch and focused on the click sound.

3. Do you think that the click sound mechanism can accurately reflect the severity of problems in data stream?

I believe yes. While in this example, a click sound was chosen to reflect a random variation between consecutive signals (e.g. 5) one can actually specify what would constitute a variation that would make a theoretical sense (e.g. we can define a parameter called “drift” which may indicate that the signal is stable within for example ±5% of average which is perceived then as a “stable” signal). So a click sound triggered if the signal is outside of a “stable” signal would be very helpful.

4. Can you easily deduce from this sonification whether there are any problematic sensors within a group and subsequently identify them?

I am afraid that I was not able to while using the pitch alone. Click sound helped me a lot and only once I was able to focus on it, I was able to identify a problematic sensor.

Again, even though I listened the intro before listening the first sonification, I was not able to hear click sound initially. Listening to the intro for the 2nd and then 3rd time and then sonified files, I realized that the click sound exists and its value in my understanding of sonifications.

In all honesty (and with a bit of joking), I was questioning my ability to hear two different things at the same time (pitch and click). As if I had to focus only on one thing. Which, for me, the click sound came as a saviour 😊)

5. Do you feel it hard to notice any changes in sonified data after listening to it for a period of time?

Yes, I very quickly get saturated. However, I always had a similar problem with listening to music. I listen to albums and very quickly get saturated and songs start blending. I always preferred to listen a random authors and genres to sort of shake it up. Even to this day, I am not able to discern lyrics – I still do not know the lyrics to my favourite songs. I probably just do not have the capacity to listen to more than just one sound (so to speak). It is either music or lyrics, but not both at the same time.

I have a similar problem even with podcasts. I notice that quickly (10-15 min) my mind starts wandering and I lose track of the story. I have to actively focus on listening. Mind you, I listen to podcasts while driving (my daily commute is ~65min one way) which is a pretty automatic activity. i.e. I drive on “autopilot” mode, so I would think that I should have the ability (or mental capacity) to focus on listening. But my mind wanders off and I often find myself thinking about activities that await me that day. So I quickly forget what I was listening to no matter how interesting the podcast is.

In summary, I get saturated quickly, but not necessarily because sonification is bad/boring. More likely this is my own personal problem with the ability to process or focus on sound.

6. Any other suggestions/questions/description of feeling:

I think I provided lots of thinking above and my insight/context to my own personal apprehension of sounds in general and of sonifications 😊