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# Breathless: A Performative Sensor-to-Sound Installation

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This proposal draws on the conglomeration of several layers of affective markers collected from my body as ongoing months-long recordings during exposure to live audio-visual feed of protests in Iran for the past 7 months, marked as emotionally-intensive events for those in exile with families in Iran such as myself. Machine learning will then be used as a strategy to make sense of the durational data towards sonification which will then be mediated by my live biological signals during a performance. The goal behind this 20-minute-long performance is to enable the unfolding in the sound along with the live aspect to create a strong sensory spatial-temporal representation of historical trauma of a nation with a turbulent history where the affective and atmospheric sensations are made felt. The human-machine hybrid, meanwhile, manifests affect through compressing, compiling, segmenting, sampling, and granulating of data as an act of sense making out of such pools of data.

**Keywords:** Affective Computing, Machine Learning, Sound Performance, Quantified Self.

## Overview

*Breathless* is an effort to communicate ineffability and sensorial-corporeal dimension of lived experiences of collective trauma, particularly ongoing historical trauma tied to turbulent socio-political history. In so doing, I plan to build an interactive experience rooted in (im)materiality of performative-atmospheric media (Salter 2014), dynamic sound in this context, for an ecology that sits outside homogeneous space-time and the Western-oriented habitual forms of listening. To this end, I have been collecting my breathing patterns as a sound library while acquiring biological signals[1] from myself using a wearable that forms a database to be sonified[2] and integrated into a sound installation activated by a live performative component. My aim behind this experimental interactive performance is to excavate and reconstruct textures from affective intensities of traumatic experiences towards activating audience's precognitive registers leading to a complex milieu of "affect as interaction" (Boehner et al. 2007).

## Description

**Figure 1:** Empatica E4 worn around my wrist.

This proposal is founded upon collecting affective markers from my body to be integrated in a sound piece activated by a live component. The base layer of the sound is composed of breathing patterns, voiced and non-voiced gestures associated with breathing, e.g., sighing, swallowing saliva, moving lips, and sniffling. This compilation is currently being made by ongoing months-long recordings of these somatic responses during exposure to live audiovisual feed of the protests that have been at their height in Iran for the past 7 months which especially manifest as emotionally-intensive events for those in exile with families in Iran such as myself. The recordings library will then be composed into a single track using a Generative Adversarial Network (GAN) architecture. Meanwhile, the biological signals acquired from me using the Empatica E4 wristband (Fig. 1 and 2) during the same time-frame also form a database where patterns found therein become sonified and woven into the breathing patterns.[3] I will then take a listener-centered approach towards designing the sound for an aesthetic outcome using the raw audio outputted by the machine as well as spatializing the result for an immersive sonic experience.

1. Biological signals are the hallmark of the operative logic of 'affective computing' that is meant to develop intelligent devices and systems to recognize, analyze, categorize, and eventually simulate patterns that emerge in signals such as blood volume pulse and skin conductance associated with one's psychosomatic state. Such data pervasively collected and shared via personal wearables under the banner of 'quantified self' movement are the seedbed nourishing the dataveillance machinery. My project, thus, is an antithesis and an act of soft resistance against such a logic.
2. Data sonification is here taken as an alternative to data visualization which is the predominant pathway chosen to make sense of data. Similar to data visualization, sonification is simultaneously a technical and an artistic approach with results dependant on the vision and aesthetic decisions of the artist-scientist.
3. Using Variational Autoencoder (VAE), an Artificial Neural Network (ANN) architecture.

The live component of the project consists of acquiring biosignal data from myself to be streamed to a Digital Audio Workstation (Ableton Live)[4] that receives them as numerical data via Open Sound Control protocol[5] and maps them into dynamic changes (e.g., reverbs, granulations, and distortions) tied to synthesizer parameters of the composed piece while I will be watching videos of protests. The goal behind this 20-minute-long proposed project is to allow the unfolding in the sound driven by my affective response during the live performance create a strong sensory spatial-temporal representation where the affective and atmospheric sensations are made felt in the body (Hartelius 2020).

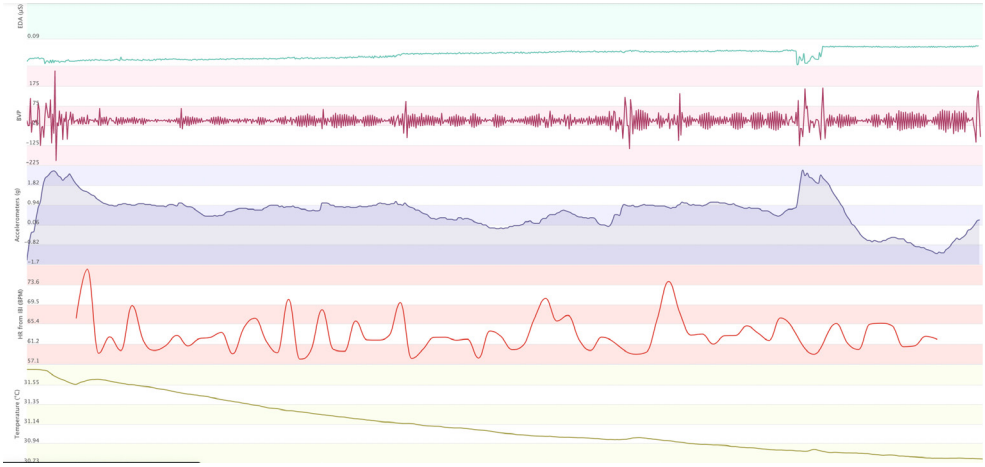

**Figure 2:** Visualization of a sample of my biosignals captured by E4 wristband. From top to bottom: EDA (Electrodermal Activity), BVP (Blood Volume Pulse), ACC (Accelerometer), HR (Heart Rate-derivative of BVP), and skin temperature.

## Thematic Statement

The proposed piece composed between the human-machine hybrid (Haraway 1991; Hayles 1999, 2017; Suchman 2012) has the ambition to unfold the repetitious and yet continuously changing loops of a constructed sound that withholds the traumatic affective gestures. The aim is to allow the performance intensities bleed into the sensor-to-sound flow for a sonic experience marked by affect that sits outside the homogeneous space-time and the habitual forms of listening where the atmospheric sensations are transmitted to the audience for an embodied communication. Through this approach, I aim to render the ineffability of exile tied to socio-political oppression palpable through the language of the sensate body that speaks of the psychosomatic complexity of such experiences. The human-machine interdependence mediates the data processing and clustering while compressing, compiling, segmenting, sampling, and granulating sonic data and sonified data as acts of sense making out of such durational pools of data.[6]

4. https://www.ableton.com/en/

5. Designed at the Center for New Music & Audio Technologies (CNMAT) by Matt Wright and Adrian Freed in 1977, OSC is an encoding for live data communication especially designed and commonly used for multimedia musical performances but also functional between any hard and software endpoints that target real-time data exchange.

6. Aside from the creative use, the integration of AI in this project offers a critical dimension, questioning the reliance of AI in general on the universalized assumption of cognition and

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logic as markers of intelligence attached to Western gendered norms while discounting affect, embodiment and situatedness; and data-driven AI in particular on large disembodied datasets gathered without consent that perpetuate social inequalities (Crawford 2021; Weber & Prietl 2021). This project in contrast not only integrates durational somatic data to represent notions such as situatedness and embodiment classically ignored by quantification and classification obsession of the AI "breakthrough" but also focuses on realities of gendered, marginalized, racialized, and politicized lives, far distant from the normative target of technochauvinist corporate capitalism.