# Techno-empathy 2.0

Yoyo-Yiyao Zhang
Royal College of Art
London, United Kingdom
10045626@network.rca.ac.uk

Aven-Le Zhou Ph.D.*
Industrial Design
Xi'an Jiaotong-Liverpool University
Suzhou, China
Computational Media and Arts
Hong Kong University of Science and Technology
Guangzhou, China
aven.le.zhou@gmail.com

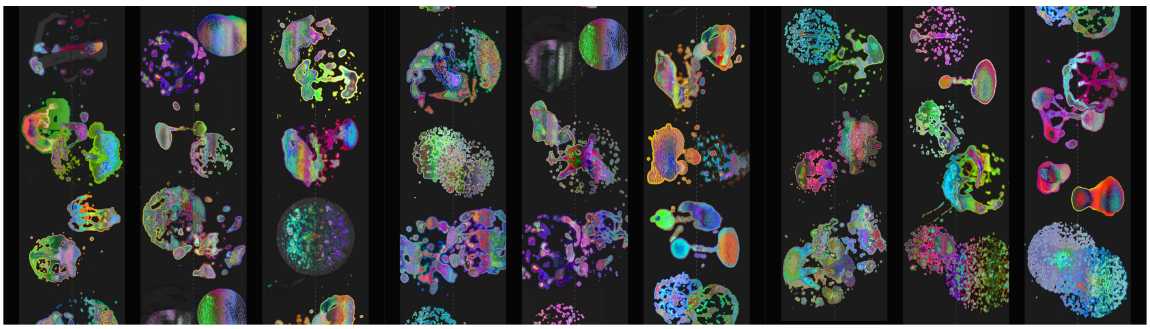

**Figure 1: Printout scroll of the accumulated iterative emotion visualizations.**

## Abstract

*Techno-empathy 2.0* is an interactive art installation that explores the relationship between humans through real-time biofeedback and emotion visualization. Utilizing heart rate data, the work visualizes the participants' accumulated emotions, generating visual experiences that dynamically reflect and iteratively amplify their emotional interactions. By representing emotional states through iterative, particle-based, dynamic visuals, *Techno-empathy 2.0* fosters empathy and deepens interpersonal connections. This work offers a new artistic approach that illustrates how technologies can enhance collective care and human connection.

## CCS Concepts

• **Applied computing** → **Media arts**; • **Human-centered computing** → **Visualization**; **Collaborative and social computing**.

## Keywords

Empathy, Iterative Emotion Visualization, Interactive Art

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*Corresponding Author.


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## 1 Introduction

Techno-empathy 2.0 emerged from several artistic inquiries: Can emotions, which primarily emerge through complex psychological and sociological mechanisms such as emotional contagion and self-regulation, manifest through technologies? Can technology amplify and deepen interpersonal emotional connections and thus foster collective care? How may technologies profoundly impact interpersonal interactions and empathize with one another?

Techno-empathy 2.0 is an interactive art installation that translates real-time heart rate data into immersive, iterative visual experiences. Participants witness visual representations of their own and others' emotional states through dynamic, particle-based visuals evolving responsively to their physiological inputs. By utilizing advanced biofeedback systems and custom visualization mappings, the installation continuously captures and visualizes the dynamic interplay of emotions between participants. The emotional engagement and accumulated empathy are presented as both real-time and accumulated archive of emotion visualizations, and their tangible printouts, i.e., the scroll in Fig. 2 and 3.

## 2 Interaction

During a 15-second data collection window, the current participant $N$ watches a visual stimulus $X_n$ (i.e., a video) on a screen while their emotional responses are captured as a heart rate data stream for a two-part real-time processing. First, their emotion visualization $V_n$ is generated. Then, this visualization is used to transform and transcribe the video $X_n$ into a new overlaid composition, combining

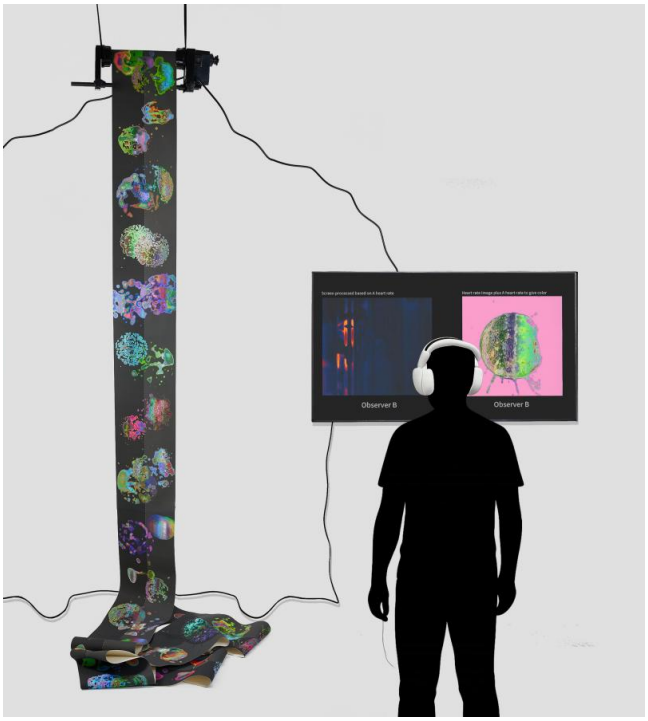


**Figure 2: *Techno-empathy 2.0* setup with the roll-printer.**

**Figure 3: The audience views the emotion visualization scroll.**

the baseline stimulus and the participant's emotional response and resulting in a new visual stimulus $X_{n+1}$.

In the following window, the next participant $N + 1$ views $X_{n+1}$, generating their own emotion visualization $V_{n+1}$, which in turn transforms the stimulus into $X_{n+2}$, and so on. This recursive layering drives an ever-deepening affective spiral, in which the evolving visuals continually recalibrate and resonate between each participant pair (i.e., $N$ and $N + 1$), in an accumulative manner. A monitor continuously plays the visual stimulus footage generated from the previous session, i.e., by the participant in the prior time window. All emotion visualizations are also continuously printed on a scroll via the roller-printer (see Fig. 2 and 3). A documentation and video essay about this project can be found at this anonymous link: https://youtu.be/MIeM0RI1o4A?si=QMpWkcYRWNG6_YC-

## 3 Technical Rider

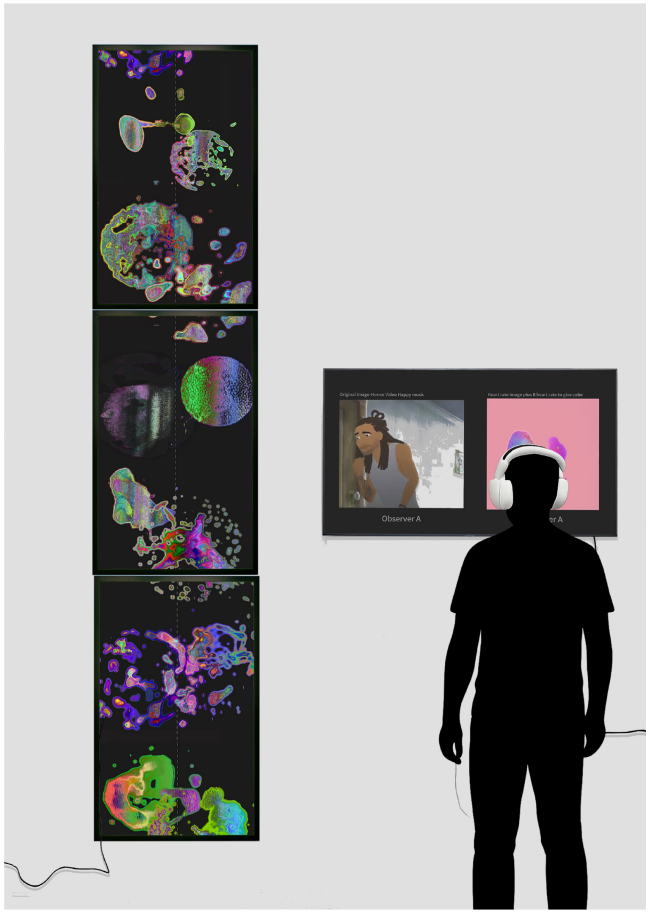


**Figure 4: Installation reconfiguration with physical displays.**

To support a travel-friendly setup for the on-site VINCI 25' Art Gallery exhibition, we reconfigure the roller-printer setup in Fig. 2 into an all-screen display (Fig. 4). A column of three vertically stacked 27-inch portrait monitors emulates the cascading "print" effect by displaying the accumulated emotion visualizations from all previous participants. A fourth screen (also in Fig. 4) plays the current visual stimulus for the active participant.

**Hardware, software, and space requirements:** In the initial version of *Techno-empathy* [1], we used a heart rate sensor for emotion detection and visualization. To add the EEG signal in the current iteration, we use a Muse headband. Additionally, one laptop or PC (Intel i7, 16 GB RAM) equipped with a multi-output GPU or HDMI splitter, running custom *TouchDesigner* software that processes heart rate data streams and drives four displays. A space

of approximately *3m × 2m* is recommended to allow participants to stand and engage comfortably.

## References

[1] Yoyo Yi-Yao Zhang and Aven-Le Zhou. 2025. Techno-empathy: Iterative Emotion Visualization. In *Proceedings of the 2025 Conference on Creativity and Cognition (C&C '25)*. Association for Computing Machinery, New York, NY, USA, 807–812. doi:10.1145/3698061.3726941