# Augmenting Humans

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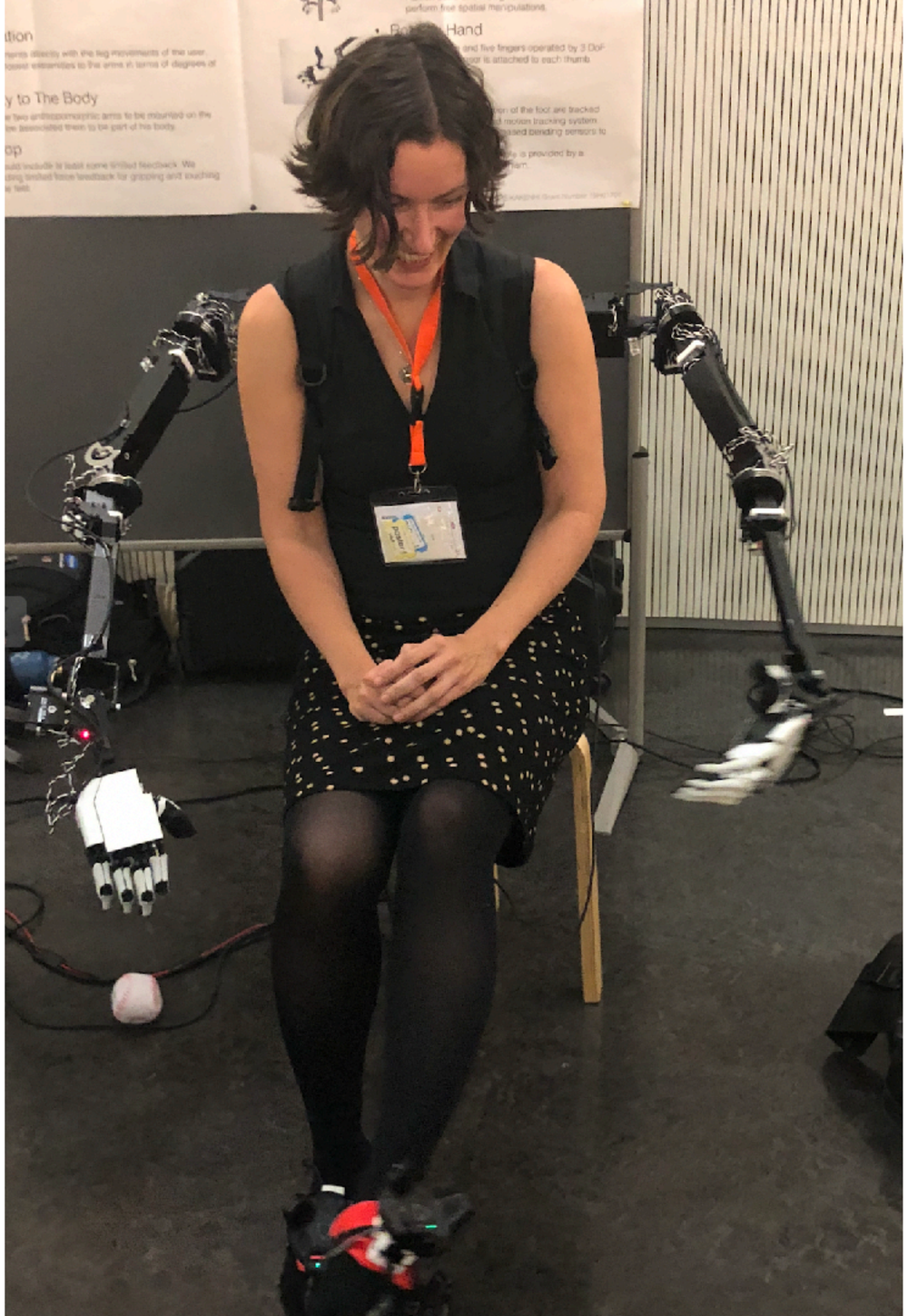
https://bit.ly/ai-augmented-zip



# Dagstuhl Seminar 25422
# Cognitive Sensing and Interaction

***https://www.dagstuhl.de/25422***

With the computers surrounding us in everyday life, worn on our bodies, the performance bottle neck is

**Human Attention.**

Key challenge: intuitive cooperation between humans and computers

**Activity Recognition, Context-Aware Systems**
Using a Combination of Sensors, Signal Processing, Applied Machine Learning to Support Users in Everyday Situations

# System Development

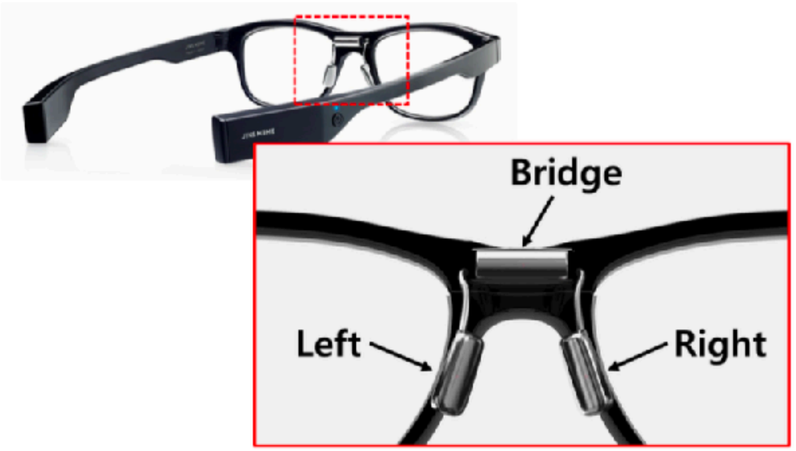
J!NS MEME and more

# Is this how our brains work when we interact with the world?

https://www.sciencedirect.com/science/article/pii/S1053811918306505

# Cognitive Activity Tracking in Everyday Life

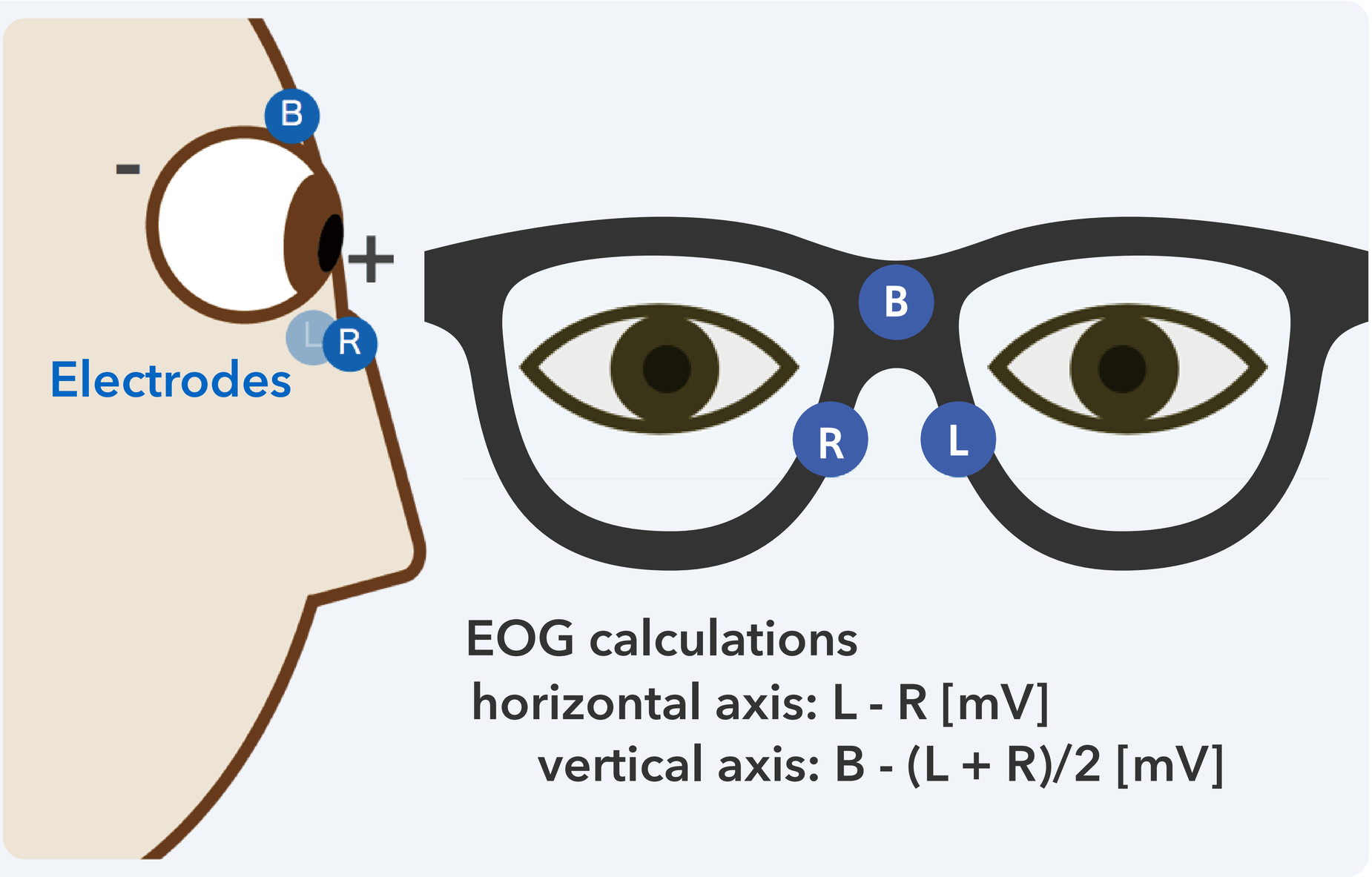
# Overview of J!NS MEME




J!NS MEME

3-axis accelerometer
3-axis gyroscope
2-axis EOG

# J!NS MEME - Electrooculography

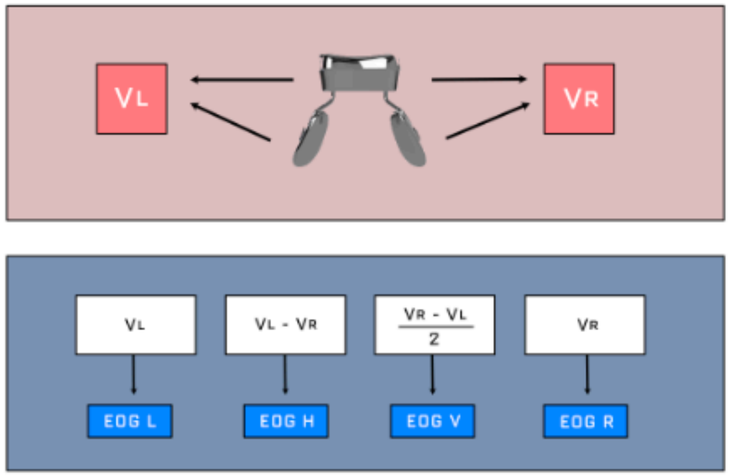


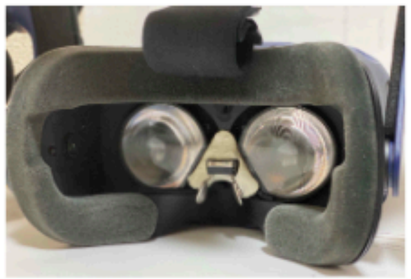

EOG calculations

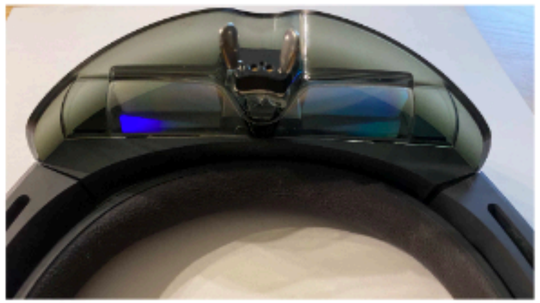
horizontal axis: L - R [mV]

vertical axis: B - (L + R)/2 [mV]

# MEME 3.0

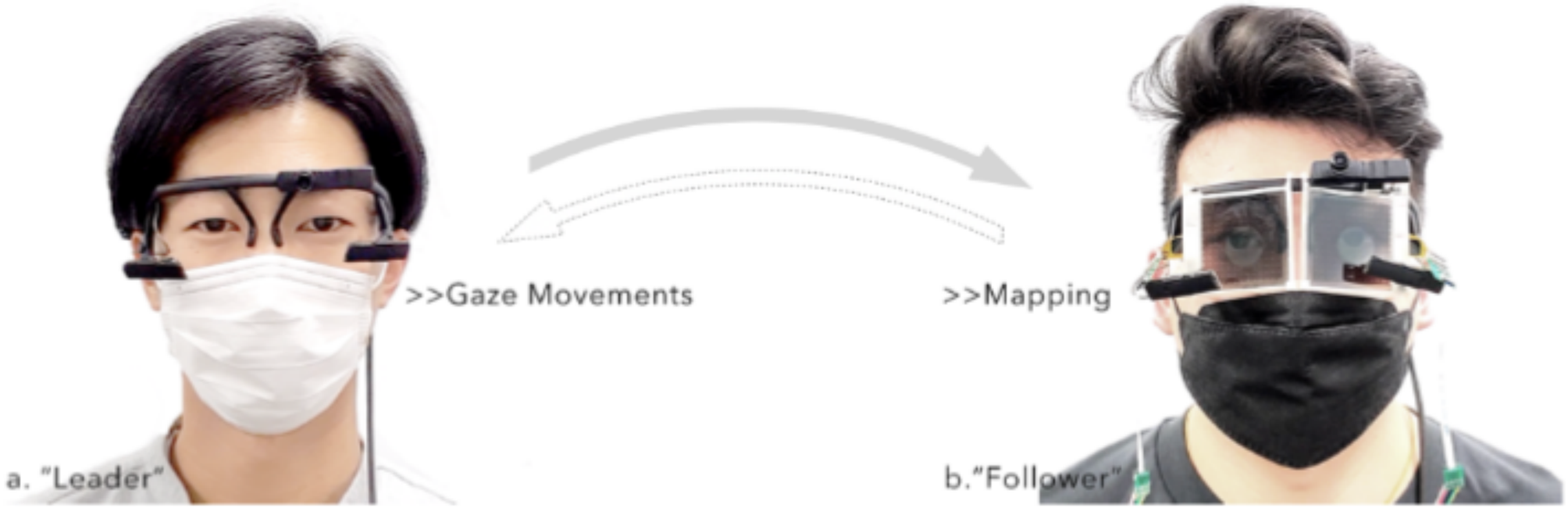




# Can we share our visual perception with others?

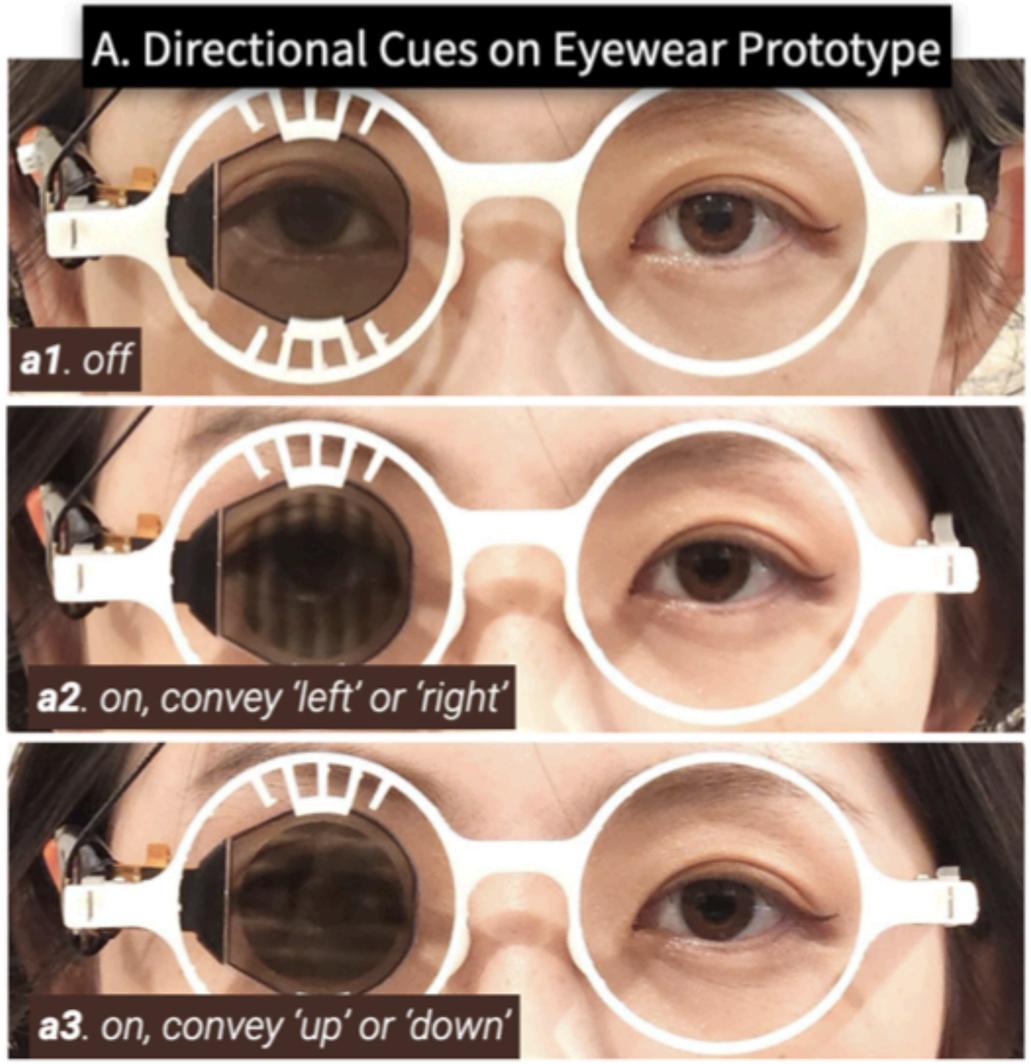
## GazeSync (IUI 2022)

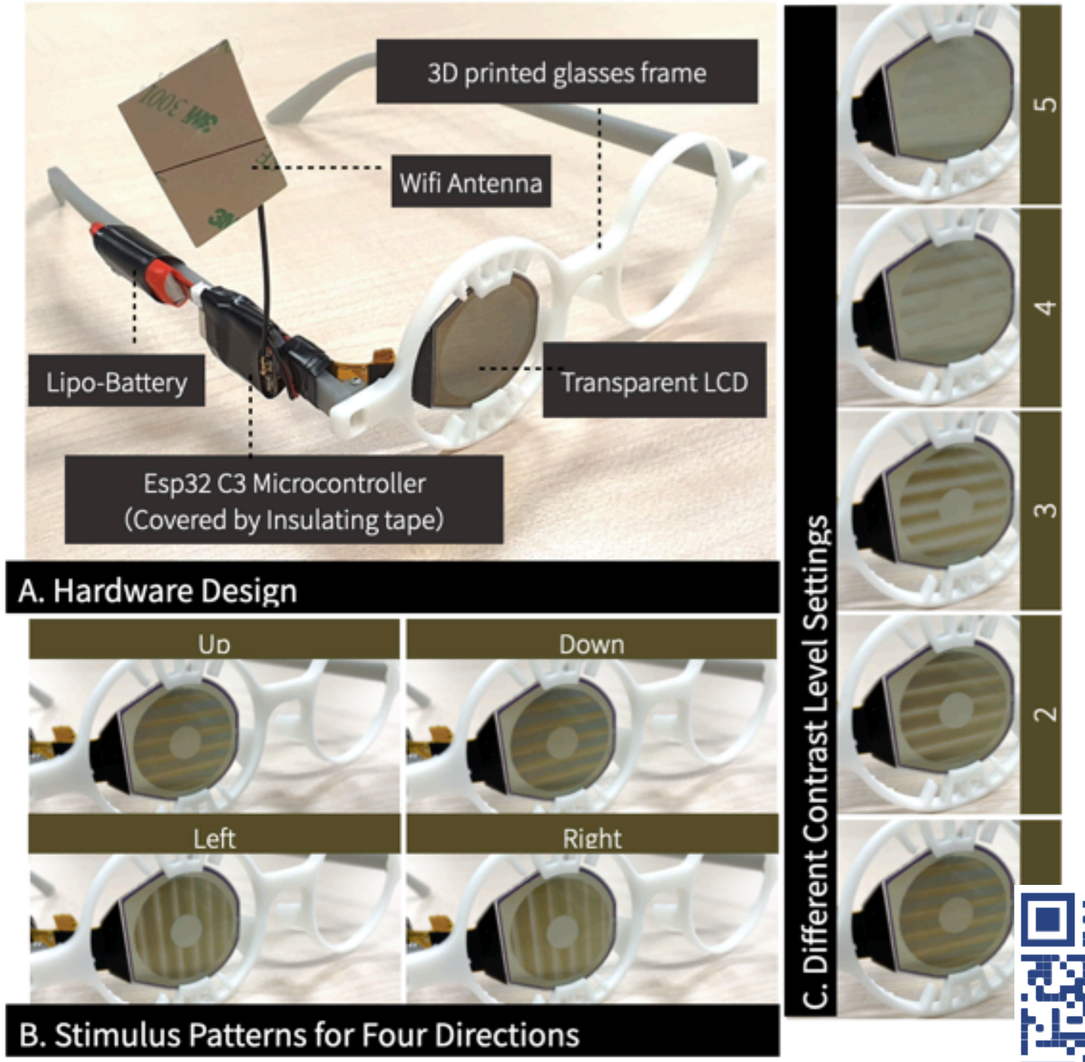



GazeSync: Eye Movement Transfer using an Optical Eye Tracker and Monochrome Liquid Crystal Displays. IUI 2022.

*Eye movement mapping* ⇨

# Directional Cues using Peripheral Vision



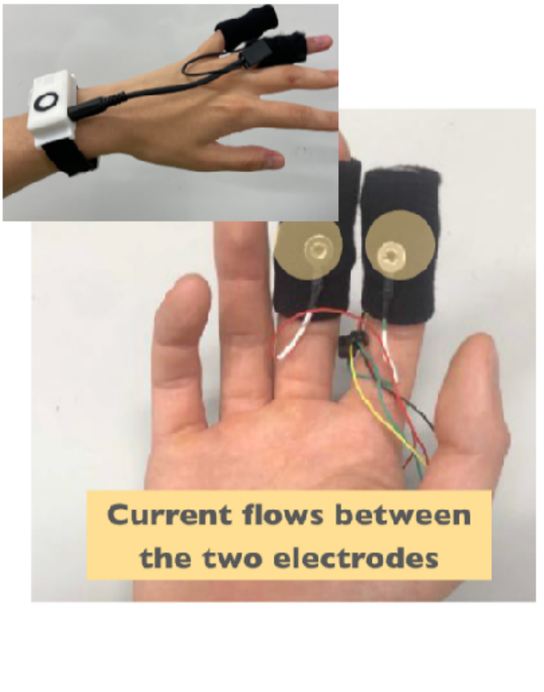

Beyond Symbols: Motion Perception Cues Enhance Dual-Task Performance with Wearable Directional Guidance

# Physiological Sensing Platform

## Electrodermal Activity and Blood Volume Pulse

For larger scale deployments, live streaming

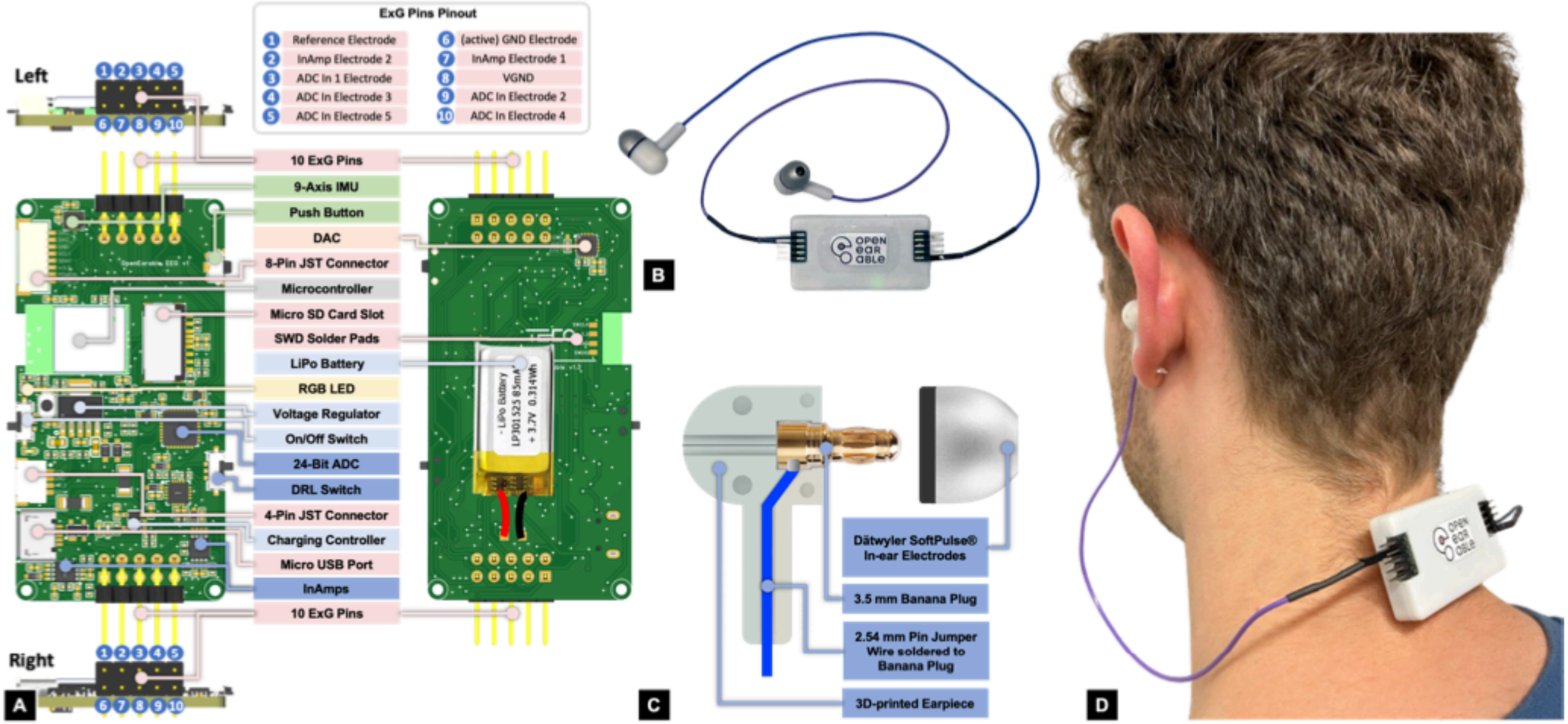
Electrodermal Activity and Blood Volume Pulse.



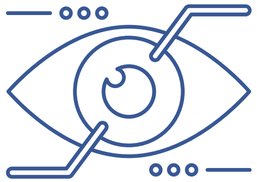


# OpenEarable ExG

## Open-Source Hardware for Ear-Based Biopotential Sensing Applications



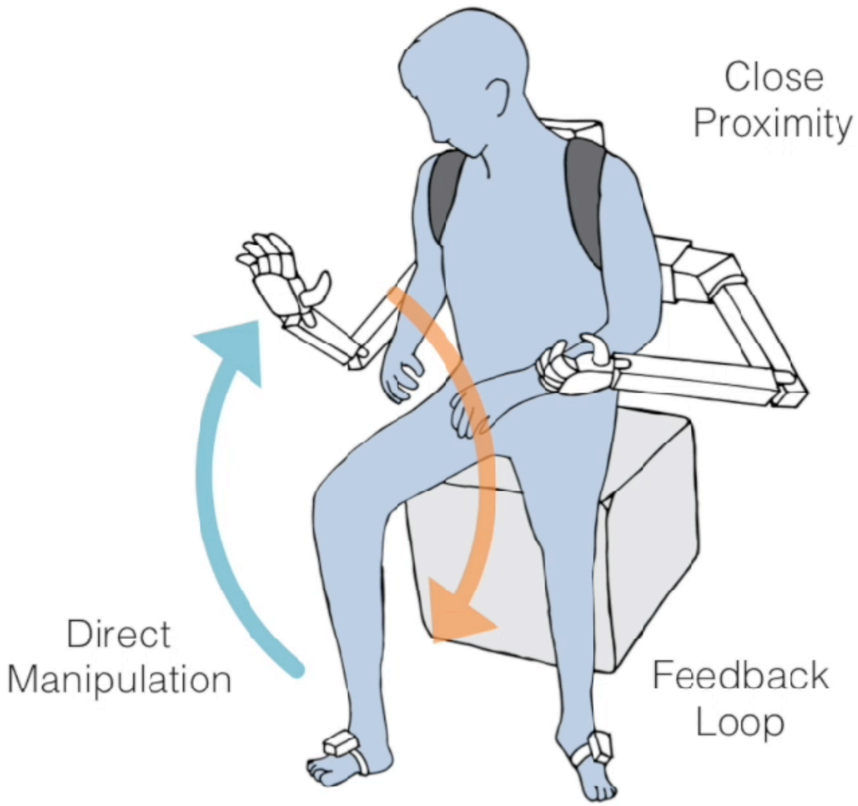

Philipp Lepold, Tobias Röddiger, Tobias King, Kai Kunze, Christoph Maurer, and Michael Beigl. 2024. OpenEarable ExG: Open-Source Hardware for Ear-Based Biopotential Sensing Applications. In Companion of the 2024 on ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp '24). Association for Computing Machinery, New York, NY, USA, 916–920. https://doi.org/10.1145/3675094.3678480



# Augmented

HCI Studies and beyond

# Explore how can Tech overlap with our bodies




Saraiji, M. H. D., et al. "MetaArmS: Body remapping using feet-controlled artificial arms."
*The 31st Annual ACM Symposium on User Interface Software and Technology*. ACM, 2018.

# JST Moonshot Effort

https://www.jst.go.jp/moonshot/en/index.html

MOONSHOT
RESEARCH & DEVELOPMENT PROGRAM

**Goal 1** Realization of a society in which human beings can be free from limitations of body, brain, space, and time by 2050.

Program Director **HAGITA Norihiro**
Chair and Professor, Art Science Department, Osaka University of Arts

**Goal 2** Realization of ultra-early disease prediction and intervention by 2050.

Program Director **SOBUE Gen**
Chairperson,
Aichi Medical University

**Goal 3** Realization of AI robots that autonomously learn, adapt to their environment, evolve in intelligence and act alongside human beings, by 2050.

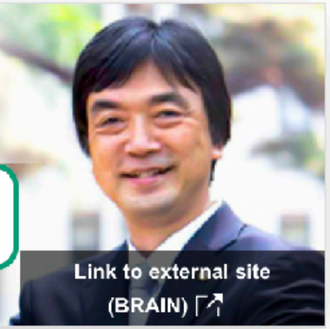
Program Director **FUKUDA Toshio**
Visiting Professor, Institute of Innovation for Future Society, Nagoya University

**Goal 4** Realization of sustainable resource circulation to recover the global environment by 2050.

Program Director **YAMAJI Kenji**
President, Director-General of the Research Institute of Innovative Technology for the Earth (RITE)


**Goal 5** Creation of the industry that enables sustainable global food supply by exploiting unused biological resources by 2050.

Program Director **CHIBA Kazuhiro**
President, Tokyo University of Agriculture and Technology




**Goal 6** Realization of a fault-tolerant universal quantum computer that will revolutionize economy, industry, and security by 2050.

Program Director **KITAGAWA Masahiro**
Director, Center for Quantum Information and Quantum Biology, The University of Osaka

Cybernetic being

MOONSHOT
RESEARCH & DEVELOPMENT PROGRAM

内閣府／科学技術振興機構・ムーンショット型研究開発事業・目標１

# 身体的共創を生み出すサイバネティック・アバター技術と社会基盤の開発

## Cybernetic Avatar Technology and Social System Design for Harmonious Co-experience and Collective Ability

https://cybernetic-being.org

# How will human bodies and lives change in the era of “Cybernetic beings”, where bodies and technology merge through Cybernetic Avatars?

Cybernetic being

MOONSHOT
RESEARCH & DEVELOPMENT PROGRAM

## ① Cognitive Augmentation

**A body that can freely draw out your potential according to the situation and environment**

## ② Parallel Agency & Experience Sharing

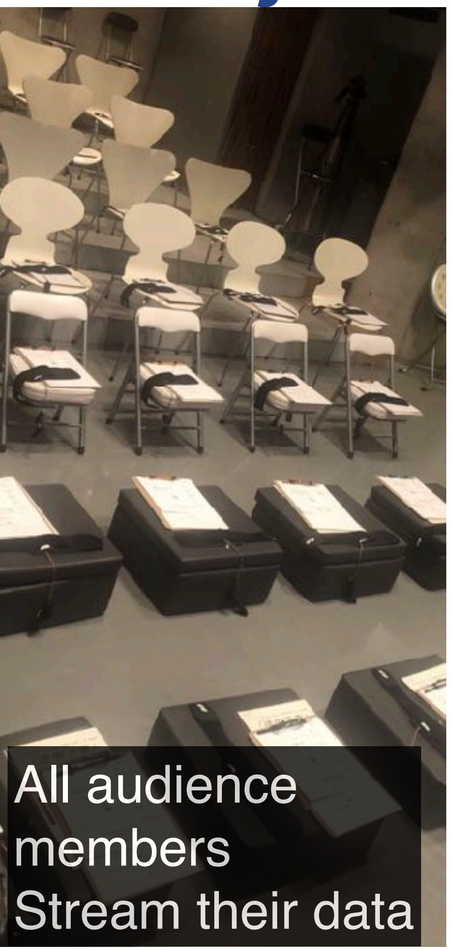
**Multiple bodies that can perceive and act in different spaces at the same time**

## ③ Collective Abilities

**A body that can combine multiple peoples’ skills to go beyond individual capabilities**

# Putting the Audience on Stage

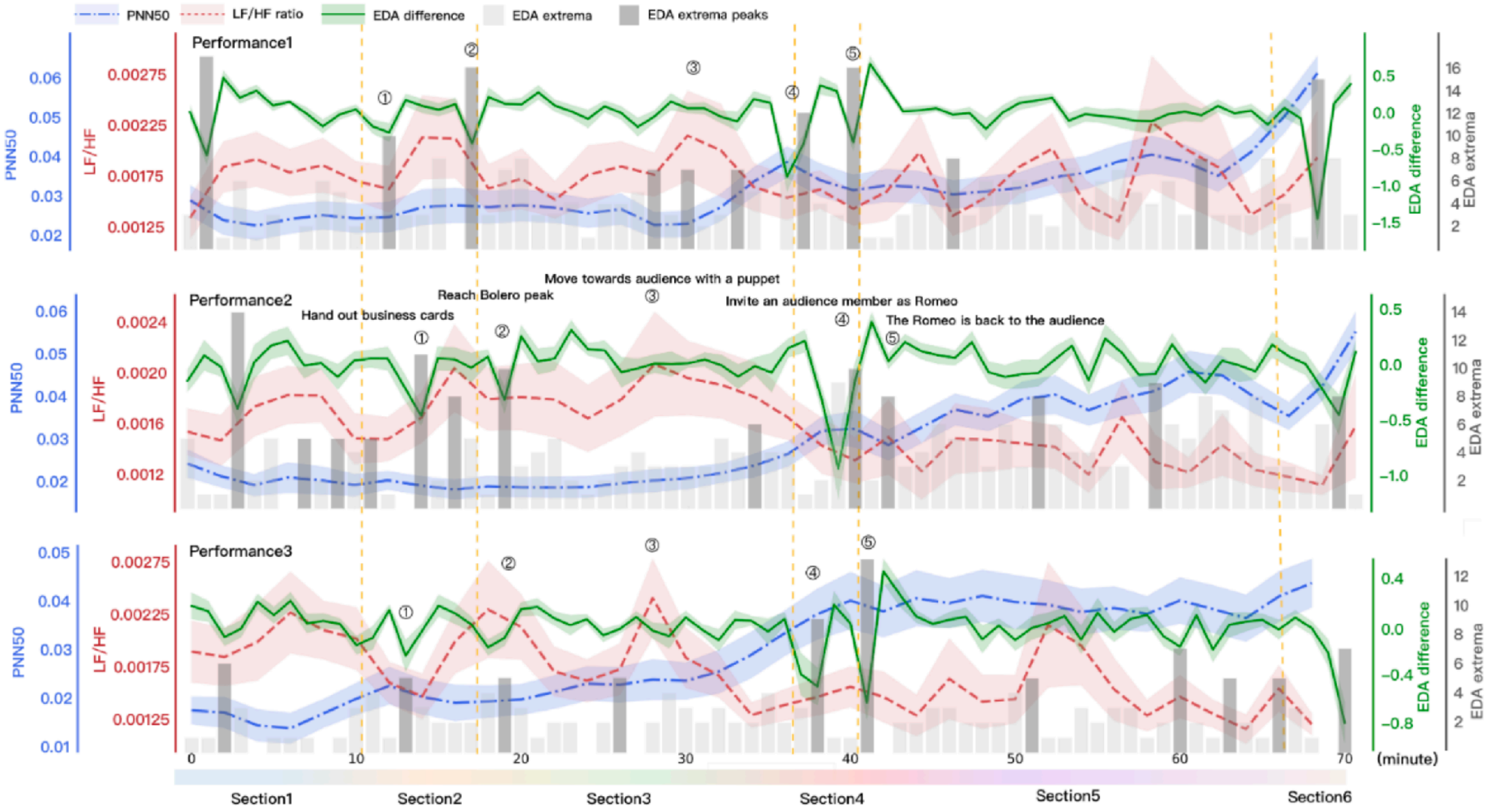
## Why we chose the setup



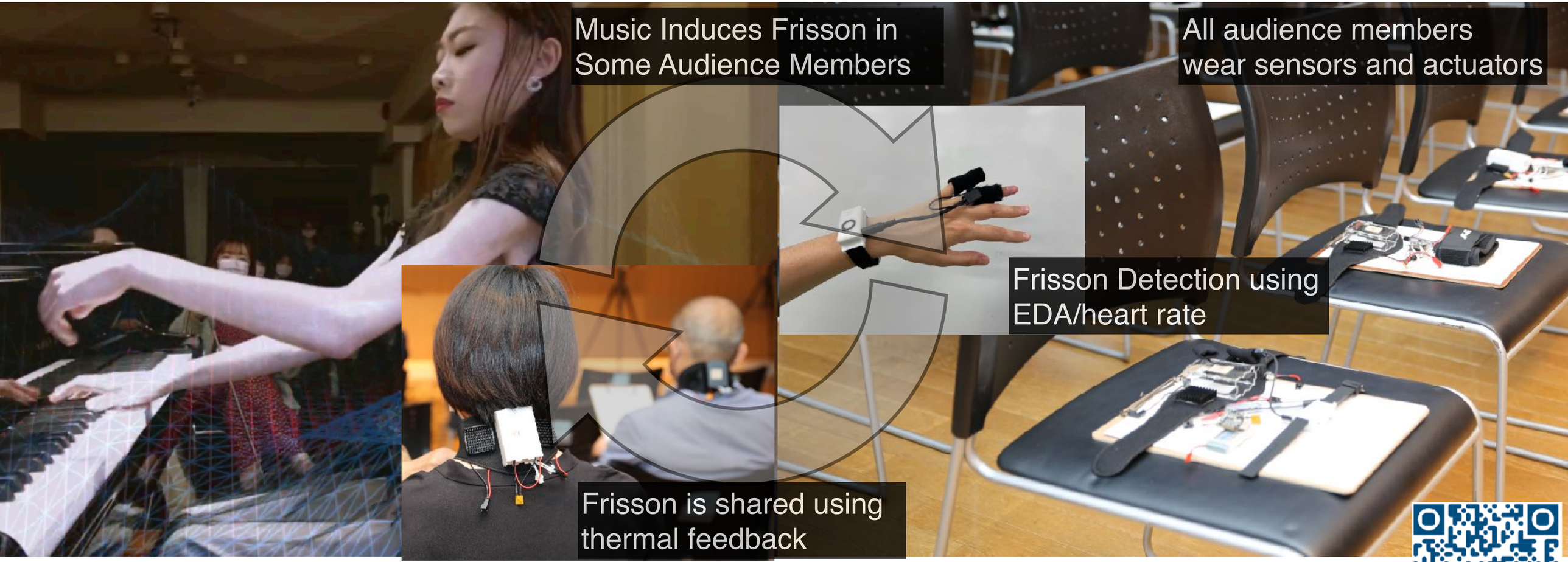



Special thanks to: Dingding Zheng, George Chenyshov, Danny Hynds,

Linking Audience Physiology to Choreography.
TOCHI Journal 2023.
https://dl.acm.org/doi/10.1145/3557887


PNN50
LF/HF ratio
EDA difference
EDA extrema
EDA extrema peaks
Performance1
Performance2
Hand out business cards
Reach Bolero peak
Move towards audience with a puppet
Invite an audience member as Romeo
The Romeo is back to the audience
Performance3
PNN50
LF/HF
EDA difference
EDA extrema
(minute)
Section1
Section2
Section3
Section4
Section5
Section6

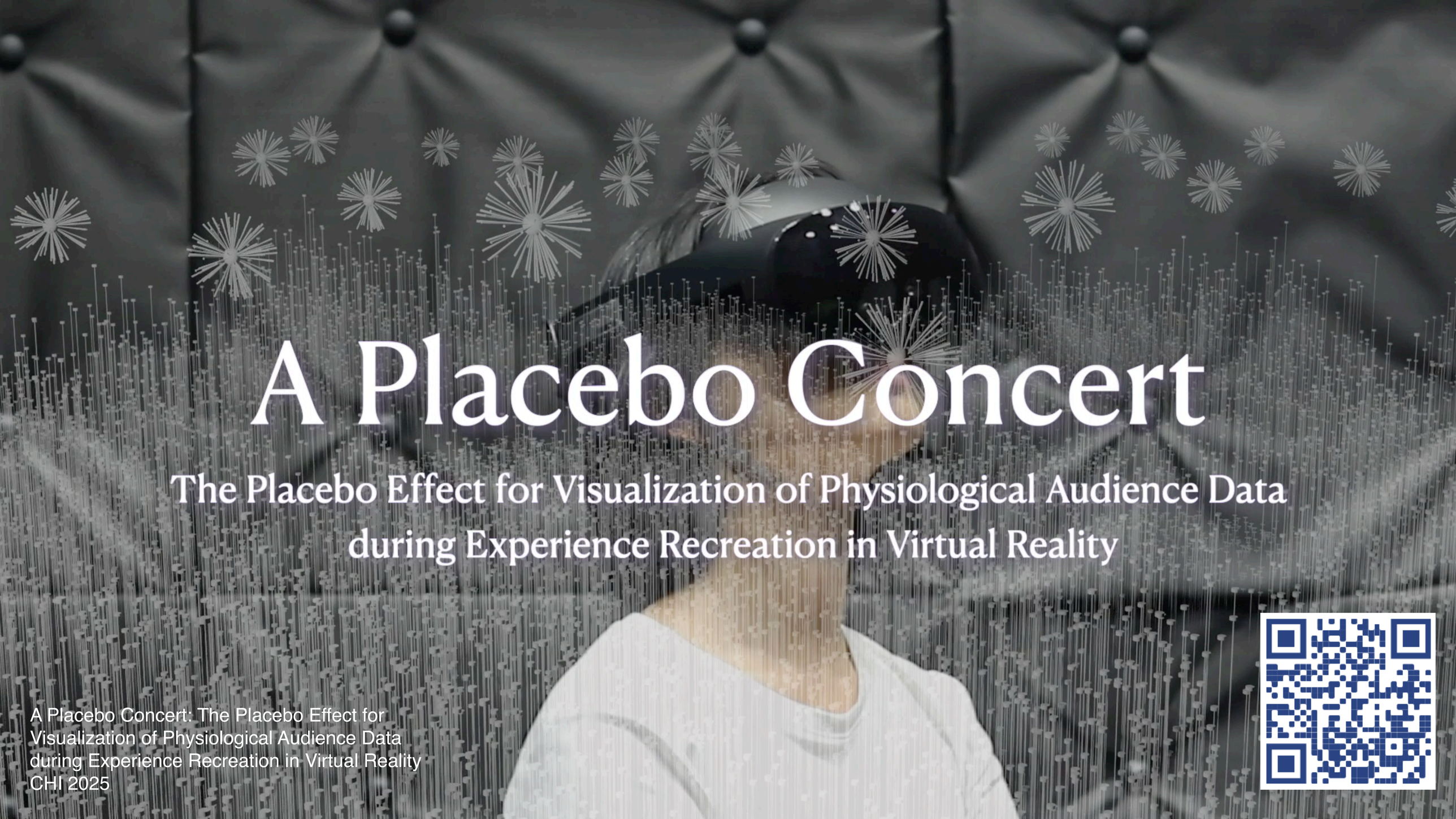
# Recording the Physiology in Classical Concerts




Yan He, George Chernyshov, Jiawen Han, Dingding Zheng, Ragnar Thomsen, Danny Hynds, Muyu Liu, Yuehui Yang, Yulan Ju, Yun Suen Pai, Kouta Minamizawa, Kai Kunze, and Jamie A. Ward. 2022. Frisson Waves: Exploring Automatic Detection, Triggering and Sharing of Aesthetic Chills in Music Performances. Proc. ACM Interact. Mob. Wearable Ubiquitous Technol. 6, 3, Article 118 (September 2022), 23 pages. https://doi.org/10.1145/3550324

# Physiological measurements to recreate collective experiences in VR

A Placebo Concert: The Placebo Effect for Visualization of Physiological Audience Data during Experience Recreation in Virtual Reality
CHI 2025




A Placebo Concert: The Placebo Effect for Visualization of Physiological Audience Data during Experience Recreation in Virtual Reality
CHI 2025

# Questions,Remarks, Violent Dissent?


http://augmented-humans.org/

Full/Short Paper/ Submission Deadline

November 18th, 2025

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