

Reimagining Human Augmentation through Disability-Led Performance

Giulia Barbareschi
University of Duisburg Essen,
Research Center Trustworthy Data
Science and Security
Duisburg, Germany
giulia.barbareschi@uni-due.de

Ximing Shen
Keio University, Graduate School of
Media Design
Yokohama, Japan
ximing.shen@kmd.keio.ac.jp

Ryoichi Ando
Keio University, Graduate School of
Media Design
Yokohama, Japan
andoryoichi@kmd.keio.ac.jp

Mark Armstrong
Keio University, Graduate School of
Media Design
Yokohama, Japan
mark@keio.jp

Mauricio Sousa
Keio University, Graduate School of
Media Design
Yokohama, Japan
mauricio@kmd.keio.ac.jp

Kouta Minamizawa
Keio University, Graduate School of
Media Design
Yokohama, Japan
kouta@kmd.keio.ac.jp

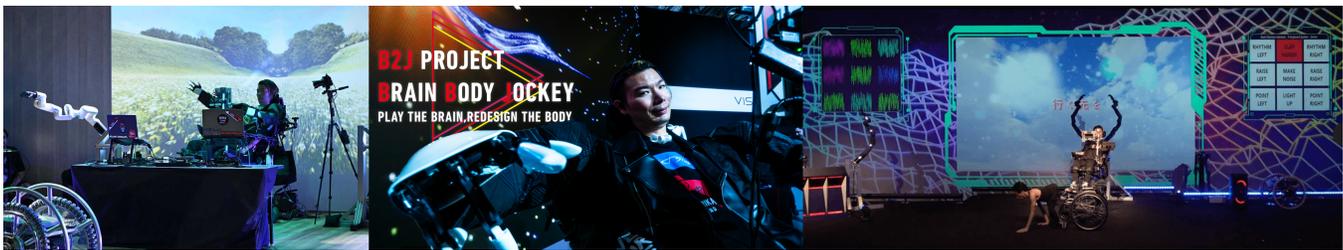


Figure 1: Highlight images from the Brain Body Jockey (B2J) Project

Abstract

This workshop aims to engage participants in collectively imagining future Inclusive Augmented Performances inspired by the examples of the Brain Body Jockey project which features the collaboration of a DJ with ALS and a group of researchers leveraging human augmentation technologies to deliver radically different live music performances. The goal is for the workshop to function as a discussion and ideation platform that integrates technical, artistic, and social perspectives on the challenges and opportunities of inclusive human augmentation in the context of art and creative expression.

CCS Concepts

• **Human-centered computing** → **Accessibility**.

Keywords

human augmentation, accessibility, human-centred computing, participatory design

ACM Reference Format:

Giulia Barbareschi, Ximing Shen, Ryoichi Ando, Mark Armstrong, Mauricio Sousa, and Kouta Minamizawa. 2026. Reimagining Human Augmentation

through Disability-Led Performance. In *The Augmented Humans International Conference 2026 (AHs 2026)*, March 16–19, 2026, Okinawa, Japan. ACM, New York, NY, USA, 4 pages. <https://doi.org/10.1145/3795011.3797160>

1 Background and Motivation

Over the last two decades, a series of technological advances have progressively expanded the boundaries of how people live, work, and relate to technology. These span from the widespread adoption of everyday personal devices such as smartphones and wearable devices, the emergence of physical robots, and the permeation of AI systems in the digital landscape [7]. Despite their differences in purpose and application, these technologies collectively aim to augment human physical and cognitive capabilities, supporting social engagement and self-realisation [4, 6, 8, 14, 15]. For people with disabilities, such augmentation technologies have become increasingly pervasive, extending from assistive devices embedded in everyday environments [12] to systems deeply coupled with the human identity and physical body [2, 5].

Artistic performances offer a unique setting in which to explore the opportunities and implications of human augmentation in the context disability and non-normative bodies. The focus on creative expression, rather than sole functionality, enables the exploration of diversity as opportunity that we can capitalise on using technology as augmentation, instead of a problem that technological augmentations should attempt to address [1]. The Brain Body Jockey Project, also known by the shorthand B2J, is an ambitious project funded via the Japan Science Technology Moonshot R&D Program Cybernetic Being Project, which brings this idea into practice. The

goal of the project is to explore the transformational opportunity of advanced technologies such as brain computer interfaces and cybernetic avatars and robotic augmentations to enhance opportunities in daily life for persons affected by amyotrophic lateral sclerosis (ALS). The project is spearheaded by the collaborative effort between the research and development teams at the Cybernetic Being Lab and NOUPATHY, and the DJ Masatane Muto, known as EYE VDJ Masa, who lives with advanced ALS. The tight collaboration between the performer who has lived experience of disability and the research teams ensures that every development is driven by the realization of a creative vision as well as empowerment in daily life interactions. Since its start in 2023, the project has resulted in the hosting of eighteen public live music performances (including an international one at the Osaka EXPO in September 2025), academic publications [3, 16], and extensive media coverage. A special performance as part of the B2J project will be hosted at the 2026 Augmented Humans Conference, in occasion of the Moonshot-ASPIRE joint symposium on Enhancing Humanity on the 18th of March.

With this backdrop, we propose the delivery of our workshop to leverage this unique opportunity to engage global experts attending the AHs 2026 conference in exploring novel paradigms of inclusive human augmentation by focusing on disability-led performance. Potential participants will first be asked to individually generate speculations for future performances ahead of the workshop, and engage in group-based activities during the workshop to merge, challenge and improve each other's ideas and produce concept proposals for Disability-led augmented performances for different artistic fields.

2 Theme of the Workshop

Building on prior workshops in human-computer interaction and relevant venues that have explored inclusive approaches to human augmentation, e.g., metaverse [10], physicalization [11], robotics [9], and artificial intelligence [13], this workshop aims to bring together researchers, practitioners, and artists attending the 2026 AHs conference to propose, discuss, and collaboratively imagine future forms of human augmentation performance led by disabled artists. Framed through the lenses of inclusivity and equity, the workshop invites participants to submit speculative and practice-based ideas for future performances, and to engage in brainstorming activities around how augmentation technologies might be designed and experienced in the inclusive artistic performance contexts. To this end, the workshop will function as a discussion and ideation platform that integrates technical, artistic, and social perspectives on the challenges and opportunities of inclusive human augmentation.

3 Pre-workshop Plans

3.1 Target Audience and Recruitment

This workshop aims to bring together a multidisciplinary group of researchers, practitioners, and artists interested in human augmentation and inclusive performance, who share a commitment to exploring how augmentation technologies might contribute to more inclusive future societies, while potentially holding diverse viewpoints on how such futures should be shaped. The workshop will be advertised through multiple channels, including the Augmented

Humans conference's mailing lists, the workshop website, social media platforms of the organisers and their affiliated institutions, as well as professional social networks and word-of-mouth. The organizers will create an explanatory video of the B2J project, featuring highlights of different performances, technical development, and real life applications, which will be shared in advance as common reference points for discussion. Rather than relying on standard paper submissions, potential participants will be invited to submit an expression of interest, expressing their own views for the future of Inclusive Augmented Performances. From these expressions of interest collected, we will curate a list of 20 participants who will be invited to join the in person workshop at the Augmented Humans Conference. We aim to include researchers from different fields, lived experiences, and at different career stage, to support in-depth discussion, collective brainstorming, and community-building around inclusive human augmentation and performance.

3.2 Content submission and selection procedure

Rather than standard paper submissions, participation in this workshop will be based on an expression-of-interest submission. Interested participants will be asked to submit a short statement outlining their background, interest in inclusive human augmentation and performance, and how they envision contributing to the collective discussions and design activities of the workshop. Submissions may include reflections on the organisers' shared performance videos, proposed ideas for future performances, critical perspectives on human augmentation technologies and art performances, or relevant artistic, technical, or theoretical practices.

Submissions will be collected and managed through the EasyChair platform. All submissions will be reviewed by at least two members of the organising committee. Reviews will assess the relevance of the submission to the workshop themes and the potential contribution of the participant to collaborative discussion and ideation.

Authors of accepted submissions will be invited to participate in the workshop, with at least one contributor from each submission expected to attend in person. Accepted participants may also be invited to provide a graphic summary or short video (up to 2 minutes) to support shared reflection and dissemination of the workshop.

4 Content of the Workshop

4.1 Workshop Format

The workshop will be conducted fully in person to support situated and collective engagement among participants. As part of the workshop format, participants will be expected to attend the B2J human augmentation performance taking place during the Enhancing Humanity Symposium at the Augmented Humans 2026 conference on March 18th 2026, the day prior to the workshop, which will serve as a shared experiential anchor for subsequent discussions and collaborative activities. Insights from this performance will be carried into the workshop through structured reflection sessions, group discussions, and co-creation activities, enabling participants to ground speculative and design-oriented conversations in lived, performative experience. Following the workshop, a summary of key themes and outcomes will be documented and shared through the workshop website.

4.2 Workshop structure and activities

The workshop will be held as a half-day, fully in-person event on March 19th 2026. The format will combine facilitated discussions and interactive activities with short participant presentations. Contributors will be asked to prepare a single-slide presentation to briefly introduce their perspectives or proposed ideas, which will serve as a starting point for collective reflection and discussion. All sessions, including presentations and group activities, will take place on-site.

An initial welcome session (20 minutes) will be used to introduce the overall aims of the workshop and reiterate the framing of inclusive augmented performance as a space where equity, accessibility, and disabled leadership are central. A quick presentation by the organizers will highlight the key features of the B2J Project, explaining how the team idea of what inclusive augmentation meant in artistic contexts evolved over the years, including questions of agency, aesthetics, authorship, and experience.

A lightning introduction session, (30 minutes) will follow with participants being invited to provide a 1-minute overview of their background and the idea of Inclusive Augmented Performance they proposed in their statement of interest.

Following this, a small-group brain storming activity will take place for approximately one hour. Individual teams (4 teams with 5 people per team), will collaboratively create a unified concept of a future augmented performance mapping key points on a structured canvas that combines technical, artistic, and social considerations. Groups will discuss dimensions such as the performance setting and audience relationship, the role of augmentation technology, and how control, agency, and accessibility are distributed across performers and systems.

Following the activity each of the 4 groups will be asked to present their idea for a maximum of 7 minutes, followed by three minutes discussions with the other participants (40 minutes total). In the final 20 minutes the organizers will outline next steps and present their ideas for a joint publication.

5 Goal and Expected Outcomes

With participants' consent, materials emerging from the workshop, including documented discussions, shared reflections, and selected artefacts such as slides or visual documentation, will be made available on the workshop website. A consolidated synthesis of key themes and insights arising from the disabled-led performance and subsequent workshop activities will be documented to support ongoing reflection and collaboration. As a primary outcome, the organisers intend to develop the collective workshop outputs into a full research paper articulating a cohesive vision for inclusive human augmentation and performance, informed by the perspectives and contributions of workshop participants. Workshop participants will be invited to contribute to such article with the goal of proposing an innovative and comprehensive vision.

6 Organizers

GIULIA BARBARESCHI (<https://giulia-barbareschi.com>) is a professor at the University of Duisburg Essen and leads the Inclusive Technology and Collective Engagement group. She works with marginalised individuals to explore how to leverage technologies

to improve meaningful inclusion in societies. Her previous work has focused on artistic performance and creative exploration as a site where technology can help subvert perceptions of disability.

RYOICHI ANDO (<https://superhuman-sports.org/>) Ph.D. in Media Design, Keio University (2022) Executive Director, Superhuman Sports Project President and Chief Executive Officer, AXERIAL Inc. Researcher, Graduate School of Media Design, Keio University Visiting Professor, iU (Professional University of Information and Management for Innovation) He specializes in the field of human augmentation, with a focus on the integration of technology, culture, and the human body. Through pioneering research and the development of superhuman sports, he is dedicated to creating inclusive environments in which individuals of all backgrounds and abilities can fully participate and find enjoyment.

MARK ARMSTRONG (<https://linktr.ee/butchbangher/>) is a creative engineer and PhD Candidate at Keio University Graduate School of Media Design (KMD). His research explores the unconventional ratios of M-human to N-avatar interactions and how they can affect both embodiment and schema development as well as the social connectedness between people. In his spare time, he creates interactive and immersive installations, and generative audiovisual media art using computer vision, machine learning models, robotics, and high speed sensing technologies.

XIMING SHEN is a Project Assistant Professor at the Keio University Graduate School of Media Design. Her research expertise includes user-centred design, human-computer interaction (HCI), social computing and haptics. She applies qualitative research methods to explore the design and applications of emerging technology in healthcare and art.

MAURICIO SOUSA (<https://mauriciosousa.github.io>) is a Project Senior Assistant Professor at the Keio University Graduate School of Media Design (KMD). His research in HCI and spatial computing focuses on designing intelligent systems that enhance human perception and collaboration. Previously, he was a Research Scientist at Meta Reality Labs, where he developed AI-sensing wearables and neural interfaces. His work explores how multimodal sensing and AI can be embedded into wearable systems to support real-time telepresence and remote communication.

KOUTA MINAMIZAWA (<https://www.embodiedmedia.org/>) is a professor at Keio University Graduate School of Media Design (KMD) and directs KMD Embodied Media Project. where conducts research and social deployment of embodied media that transfer, enhance, and create human experiences with digital technologies. His research expertise includes Haptics, Embodied Interaction, Virtual Reality, and Telexistence. He also promotes activities on Haptic design and Superhuman sports, also serves as a project manager of the Cybernetic being project under the Japan government's Moonshot R&D program.

Acknowledgments

This work was supported by JST Moonshot R&D Program "Cybernetic being" Project (Grant number JPMJMS2013) and JST ASPIRE program (Grant Number JPMJAP2504). Any opinions, findings, conclusions, or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of any funding agencies.

References

- [1] Giulia Barbareschi and Masa Inakage. 2022. Assistive or artistic technologies? Exploring the connections between art, disability and wheelchair use. In *Proceedings of the 24th International ACM SIGACCESS Conference on Computers and Accessibility*. 1–14.
- [2] Giulia Barbareschi, Midori Kawaguchi, Hiroaki Kato, Masato Nagahiro, Kazuaki Takeuchi, Yoshifumi Shiiba, Shunichi Kasahara, Kai Kunze, and Kouta Minamizawa. 2023. “I am both here and there” Parallel Control of Multiple Robotic Avatars by Disabled Workers in a Café. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems* (Hamburg, Germany) (*CHI '23*). Association for Computing Machinery, New York, NY, USA, Article 75, 17 pages. <https://doi.org/10.1145/3544548.3581124>
- [3] Giulia Barbareschi, Songchen Zhou, Ando Ryoichi, Midori Kawaguchi, Mark Armstrong, Mikito Ogino, Shunsuke Aoiki, Eisaku Ohta, Harunobu Taguchi, Youichi Kamiyama, et al. 2024. Brain Body Jockey project: Transcending Bodily Limitations in Live Performance via Human Augmentation. In *Proceedings of the 26th International ACM SIGACCESS Conference on Computers and Accessibility*. 1–14.
- [4] Jonas Frich, Michael Mose Biskjaer, and Peter Dalsgaard. 2018. Twenty years of creativity research in human-computer interaction: Current state and future directions. In *Proceedings of the 2018 Designing Interactive Systems Conference*. 1235–1257.
- [5] Yuji Hatada, Giulia Barbareschi, Kazuaki Takeuchi, Hiroaki Kato, Kentaro Yoshifuji, Kouta Minamizawa, and Takuji Narumi. 2024. People with Disabilities Redefining Identity through Robotic and Virtual Avatars: A Case Study in Avatar Robot Cafe. In *Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) (*CHI '24*). Association for Computing Machinery, New York, NY, USA, Article 61, 13 pages. <https://doi.org/10.1145/3613904.3642189>
- [6] Sarah Homewood, Marika Hedemyr, Maja Fagerberg Ranten, and Susan Kozel. 2021. Tracing conceptions of the body in HCI: From user to more-than-human. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. 1–12.
- [7] Dimitris Mourtzis, John Angelopoulos, and Nikos Panopoulos. 2022. A Literature Review of the Challenges and Opportunities of the Transition from Industry 4.0 to Society 5.0. *Energies* 15, 17 (2022), 6276.
- [8] Florian Floyd Mueller, Pedro Lopes, Paul Strohmeier, Wendy Ju, Caitlyn Seim, Martin Weigel, Suranga Nanayakkara, Marianna Obrist, Zhuying Li, Joseph Delfa, Jun Nishida, Elizabeth M. Gerber, Dag Svanaes, Jonathan Grudin, Stefan Greuter, Kai Kunze, Thomas Erickson, Steven Greenspan, Masahiko Inami, Joe Marshall, Harald Reiterer, Katrin Wolf, Jochen Meyer, Thecla Schiphorst, Dakuo Wang, and Pattie Maes. 2020. Next Steps for Human-Computer Integration. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) (*CHI '20*). Association for Computing Machinery, New York, NY, USA, 1–15. <https://doi.org/10.1145/3313831.3376242>
- [9] Emilyann Nault, Carl J Bettosi, Lynne Baillie, Ronnie Smith, Maja Mataric, Vivek Nallur, Manfred Tscheligi, Andreas Sackl, Fabio Paternò, Scott A Macleod, and Sara Cooper. 2023. Socially Assistive Robots as Decision Makers: Transparency, Motivations, and Intentions. In *Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems* (Hamburg, Germany) (*CHI EA '23*). Association for Computing Machinery, New York, NY, USA, Article 363, 5 pages. <https://doi.org/10.1145/3544549.3573822>
- [10] Callum Parker, Soojeong Yoo, Joel Fredericks, Tram Thi Minh Tran, Mark Colley, Youngho Lee, Khanh-Duy Le, Simon Stannus, Woontack Woo, and Mark Billinghurst. 2025. The Third Workshop on Building an Inclusive and Accessible Metaverse for All. In *Proceedings of the Extended Abstracts of the CHI Conference on Human Factors in Computing Systems* (*CHI EA '25*). Association for Computing Machinery, New York, NY, USA, Article 803, 6 pages. <https://doi.org/10.1145/3706599.3706730>
- [11] Patricia Piedade, Peter A Hayton, Cynthia L Bennett, Anna R. L. Carter, Clara Crivellaro, Alan Dix, Jess McGowan, Katta Spiel, Miriam Sturdee, Garreth W. Tigwell, and Hugo Nicolau. 2025. Access InContext: Futuring Accessible Prototyping Tools and Methods. In *Proceedings of the Extended Abstracts of the CHI Conference on Human Factors in Computing Systems* (*CHI EA '25*). Association for Computing Machinery, New York, NY, USA, Article 766, 7 pages. <https://doi.org/10.1145/3706599.3706716>
- [12] Gisela Reyes-Cruz, Joel E. Fischer, and Stuart Reeves. 2020. Reframing Disability as Competency: Unpacking Everyday Technology Practices of People with Visual Impairments. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) (*CHI '20*). Association for Computing Machinery, New York, NY, USA, 1–13. <https://doi.org/10.1145/3313831.3376767>
- [13] Dakuo Wang, Elizabeth Churchill, Pattie Maes, Xiangmin Fan, Ben Shneiderman, Yuanchun Shi, and Qianying Wang. 2020. From Human-Human Collaboration to Human-AI Collaboration: Designing AI Systems That Can Work Together with People. In *Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) (*CHI EA '20*). Association for Computing Machinery, New York, NY, USA, 1–6. <https://doi.org/10.1145/3334480.3381069>
- [14] Mingyang Xu, Jiayi Shao, Yulan Ju, Ximing Shen, Qingyuan Gao, Weijen Chen, Qing Zhang, Yun Suen Pai, Giulia Barbareschi, Matthias Hoppe, Kouta Minamizawa, and Kai Kunze. 2025. Cuddle-Fish: Exploring a Soft Floating Robot with Flapping Wings for Physical Interactions. In *Proceedings of the Augmented Humans International Conference 2025* (*AHs '25*). Association for Computing Machinery, New York, NY, USA, 160–173. <https://doi.org/10.1145/3745900.3746080>
- [15] Anna Xyngkou, Chee Siang Ang, Panote Siriaryaya, Jonasz Piotr Kopecki, Alexandra Covaci, Eiman Kanjo, and Wan-Jou She. 2024. MindTalker: Navigating the Complexities of AI-Enhanced Social Engagement for People with Early-Stage Dementia. In *Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) (*CHI '24*). Association for Computing Machinery, New York, NY, USA, Article 96, 15 pages. <https://doi.org/10.1145/3613904.3642538>
- [16] Songchen Zhou, Mark Armstrong, Giulia Barbareschi, Toshihiro Ajioka, Zheng Hu, Masatane Muto, Ando Ryoichi, Kentaro Yoshifuji, and Kouta Minamizawa. 2025. Augmented Body Communicator: Enhancing daily body expression for people with upper limb limitations through LLM and a robotic arm. In *Proceedings of the Augmented Humans International Conference 2025*. 174–186.