

Building Trust in Neurotechnology: Ethical and Societal Considerations in Brain-Machine Interface Development

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Abstract:

As part of the Moonshot Project (Internet of Brains) supported by the Japan Science and Technology Agency (JST), our project is primarily focusing on the development of both invasive and non-invasive Brain-Machine Interface (BMI) technologies. The aim of our work is to make these technologies practically viable for real-world applications using the current advancements of AI and material sciences. However, the successful deployment of BMI in society depends on public trust, as these innovations often raise concerns related to mental privacy and other sanctity of the brain important for human dignity. To address such ethical concerns, we include dedicated efforts to foster societal acceptance by enhancing transparency and understanding of the current state of neurotechnology. To this end, our project initiated the creation of two key resources aimed at addressing these challenges: the Neurotech Guidebook, in two volumes, and an Evidence Book. Guidebook Volume 1 is written for general consumers interested in neurotech products, while Volume 2 is directed at developers and researchers. The Evidence Book evaluates scientific validity of claims made by neurotech products based on systematic reviews of published papers. We will also discuss UNESCO's recent efforts to develop a recommendation on the ethics of neurotechnology, which I was involved as a member of their Ad Hoc Expert Group (AHEG). These initiatives form the foundation for responsible research and innovation in neuroscience and are essential to building the public trust needed for widespread acceptance of neurotechnology.

Biographical information:

After graduating from the Faculty of Science at Kyoto University in 2000, he received his PhD (Cum Laude) in 2005 from Utrecht University in the Netherlands, where he studied human visual information processing mechanisms. After working as a researcher at California Institute of Technology in the U.S. and University College London in the U.K., and as a JST PRESTO researcher and Associate Professor (Reader) of Cognitive Neuroscience at the University of Sussex in the U.K., he founded Araya, Inc. and worked full time since 2015. He

is engaged in research on the principles of consciousness in the brain and machines through the fusion of neuroscience and AI technologies. He has been also working on the translation of AI and neuroscience into industrial applications as the primary business of Araya. He has received many awards, including the Young Scientist Award from the Ministry of Education, Culture, Sports, Science and Technology, the JEITA Venture Award (2020), the ET (Embedded technology)/IoT Technology Award (2019) among others. Since 2020, he has been working on the development of next-generation AI-assisted brain-machine interfaces (BMI) as a Project Manager of the Moonshot Project in the Cabinet Office. Since 2023, he has been contributing to the field by serving as a speaker at UNESCO's international conferences.