Moonshot Goal 1

MOONSHOT
RESEARCH & DEVELOPMENT PROGRAM

Liberation from Biological Limitations via Physical, Cognitive and Perceptual Augmentation

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Societal Issues to be solves

MOONSHOT
RESEARCH & DEVELOPMENT PROGRAM

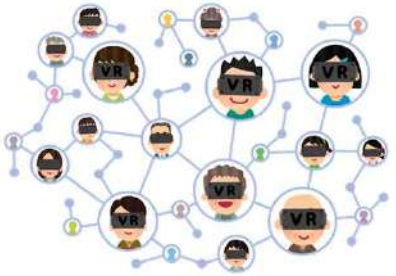
Limitations of body and brain

Mitigation of negative conditions

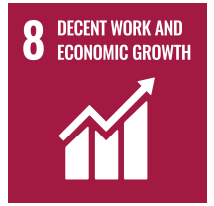
- Loss of muscle control (e.g. ALS)。
- Fatigue from stress and work
- Suffering from past trauma

Positive augmentation

- Learn new skills efficiently
- Execute many tasks simultaneously
- Improve the speed of comunication

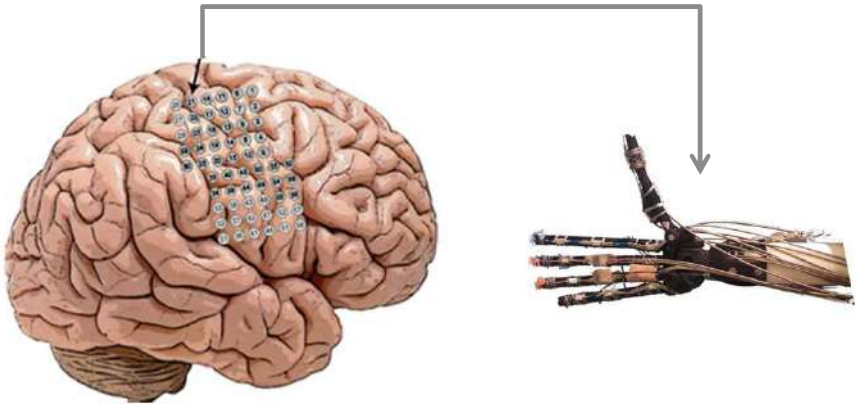


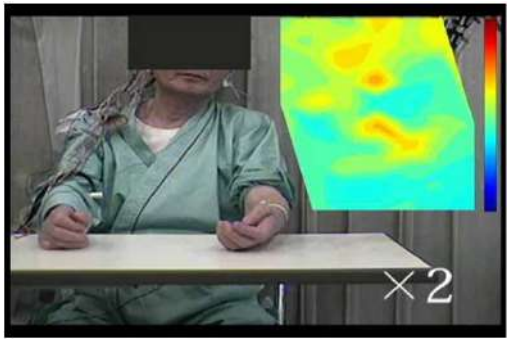
Relevant SDGs



AI-assisted BMI–Cybernetic Avatars

Decoding neural signals to control avatars

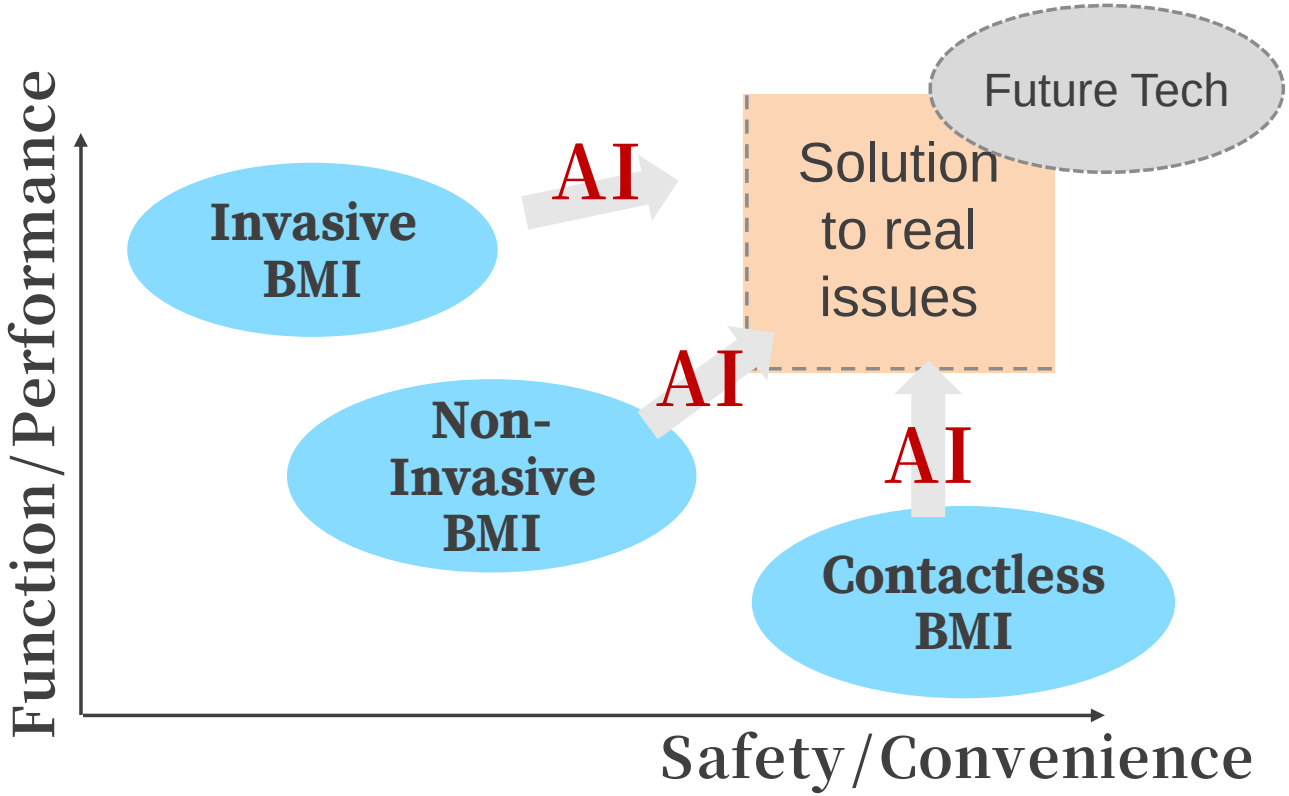




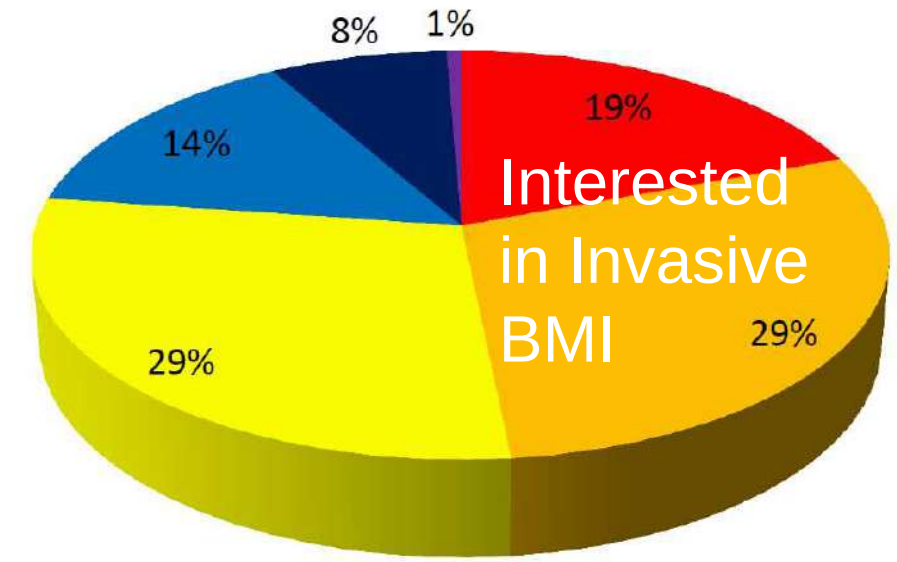
T. Yanagisawa et al., Ann. Neurol., 2012

Three types of BMI-CA

- We prioritize the benefit of the user and employ multiple levels of invasiveness.
- AI will be fully utilized to maximize the potential of existing BMI technologies.

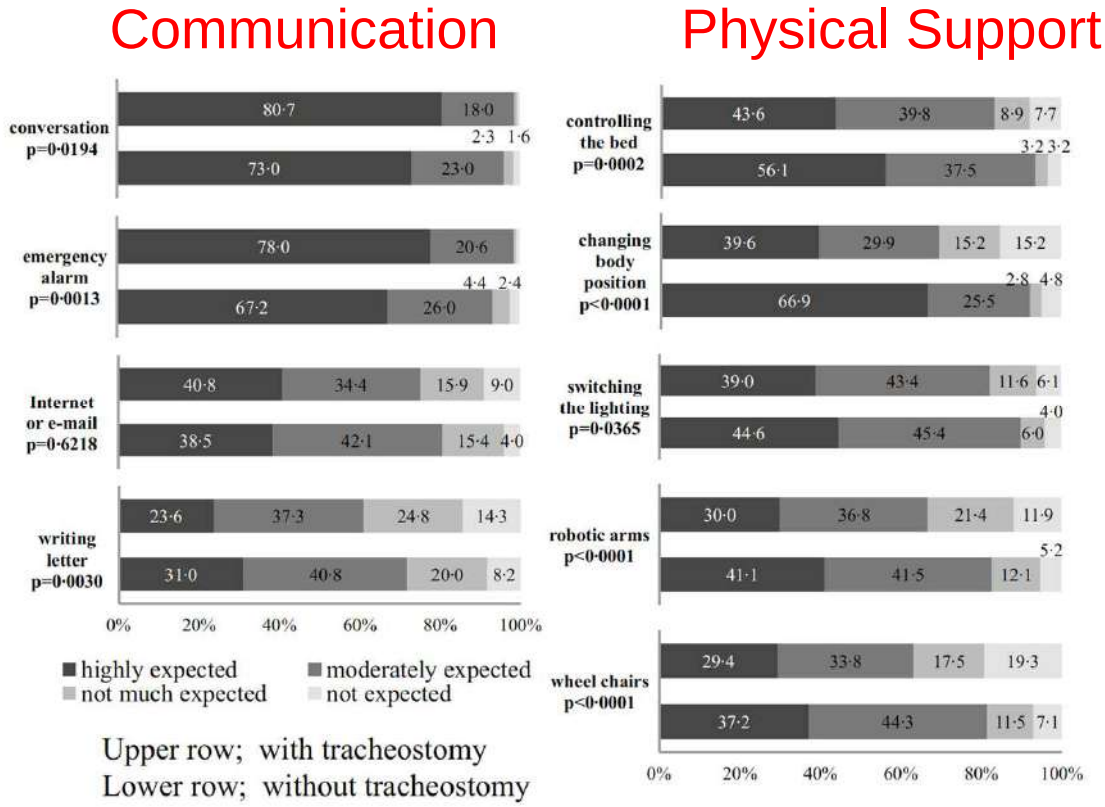


Interest in invasive BMI among ALS patients



ALS 1918
Resp Rate 40.7%
M:F 461:319
Source：Japan ALS Association

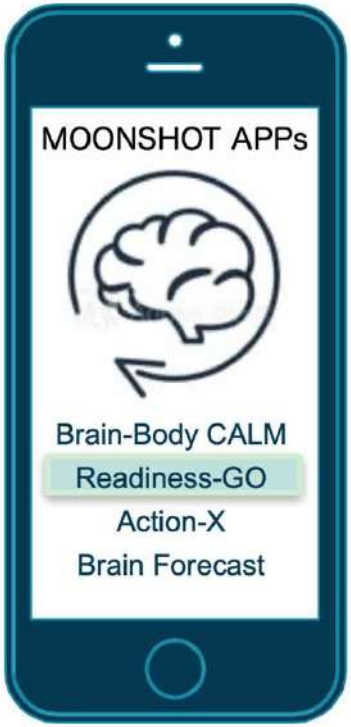
Expected functions



Kageyama et al., J. Neurology, 2020

Quantifying psychological states

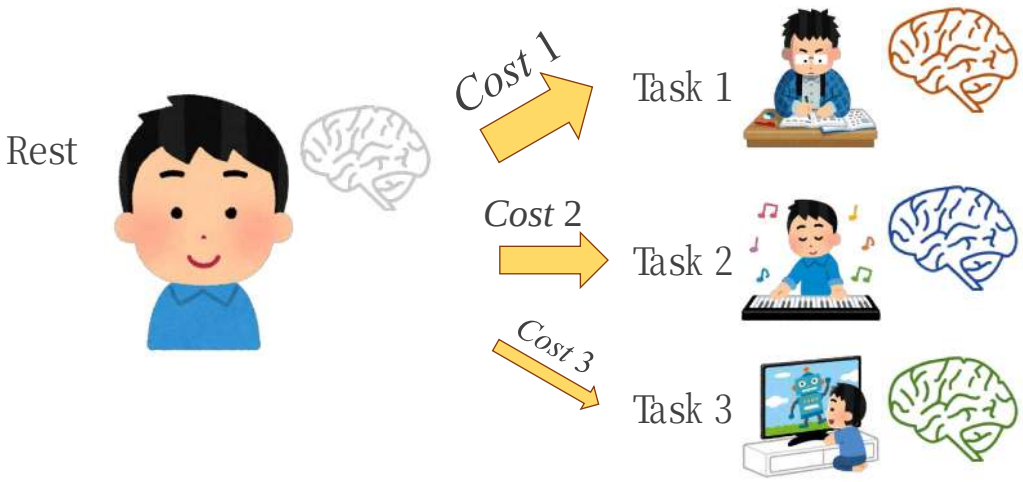
Estimating mental state from external behavior and EEG signals.



(e.g. Project of Ushiba Team at Keio University)

Quantifying psychological states

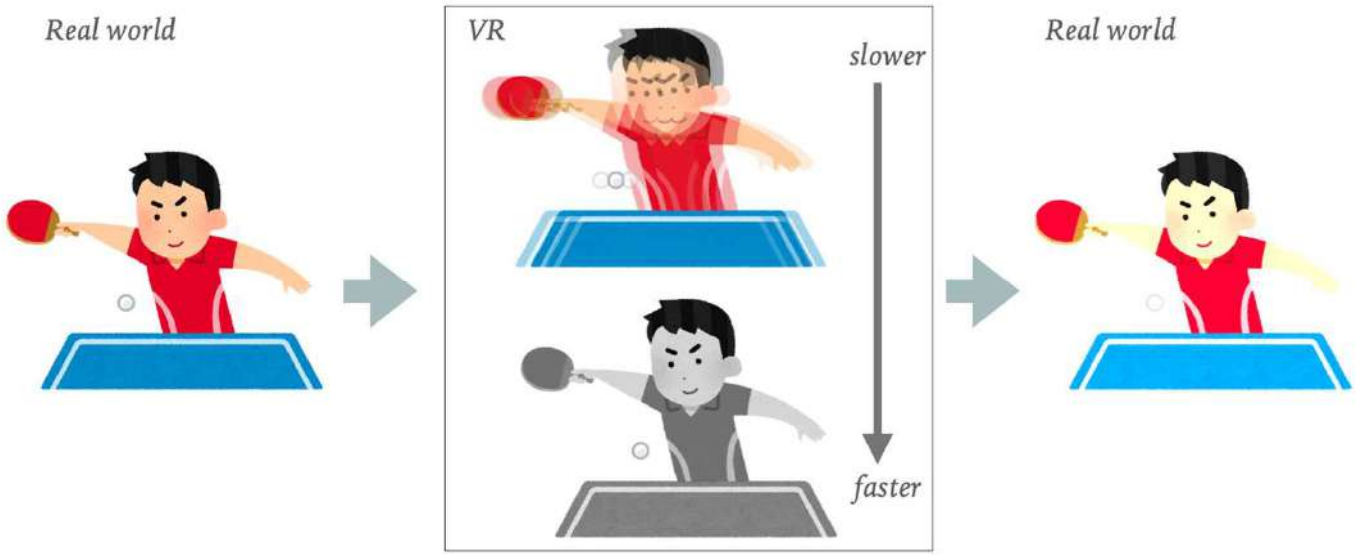
Quantification of “effort” needed to perform a given task.



Proposal of a new method to quantify effort

Improving bodily control in VR space

Changing the speed of flow of time in VR allows otherwise impossible conditions for training.



We aim to improve efficiency in sport training.

(e.g. Project of Koike's Team)

Liberation from memory

We aim to mitigate trauma by modifying the past in VR.

(e.g. Project of Koizumi's Team)

Motivation self-control

Activations of Nacc are lowered among depressed individuals. We explore the possibility of improving the condition by direct stimulation.

(e.g. Project of Nishimura‘s Team)

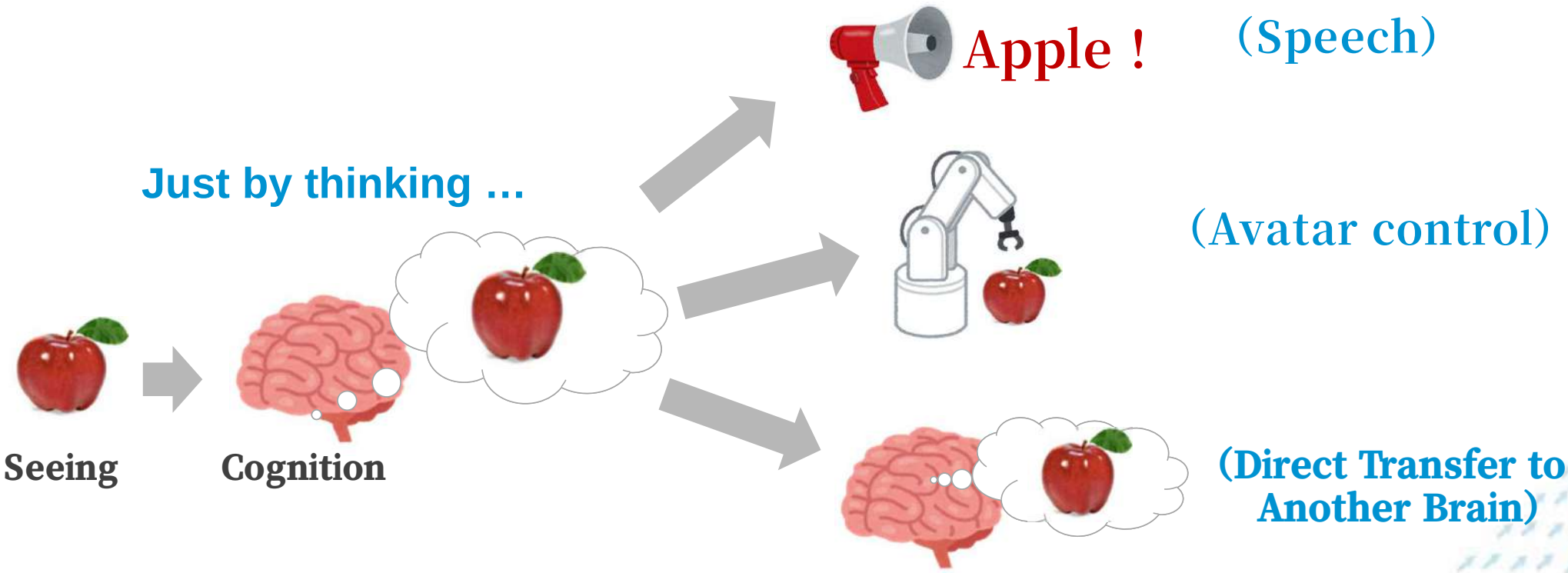
Trustable Neurotech

We will establish guidelines for neurotech applications that consumers can trust.

Promoting evidence-based consumer Apps

Brain-to-AI, Brain-to-Brain Communication

Converting brain signals to various outputs



Our Team


PD/PM
Hagita/Kanai

Non-Invasive Contactless BMI-CA

Non Inv.


Keio U
Ushiba


Sony CSL
Furuya

Contact less


Waseda
Watanabe


U Tokyo
Nakazaw


Sony CSL
Koizumi

AI for Neurotech

IoA BMI


U Tokyo
Rekimoto


Tokyo Tech
Koike

AI


Araya
Sasai


AIST
Hayashi


U Tokyo
Oizumi

RL


Araya
Arulkumaran

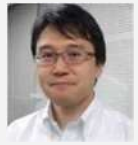
Invasive BMI-CA

BMI


RIKEN
Komatsu

BMI


TMiMS
Nishimura


Osaka U
Yanagisa
aw

Platform

Guideline

Explore


Araya
Kanai