

Reliability-ensuring Cybernetic Avatar Infrastructure Allowing Interactive Teleoperation

Project manager

(selected in 2022)

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R&D institutions

NICT, ATR, Tokyo University of
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Summary of the project

Moonshot Goal 1 aims to establish a cybernetic avatar (CA) platform that allows anyone to participate in a variety of social activities and spread CA life based on socially-accepted ideas. Currently, R&D projects are being conducted from the three perspectives of "Freedom from Body Limitations", "Freedom from Brain Limitations", and "Freedom from Space Limitations and Time Limitations". At present, R&D is underway for a fundamental technology in which one operator can directly operate one or more CAs. It will be extended to technologies and infrastructure that allow one person to operate more than 10 avatars at the same speed and accuracy as one avatar case by 2030. Also, it will be further extended to technologies and infrastructure to carry out large-scale complex tasks combining large numbers of CAs teleoperated by multiple persons by 2050. Besides, it is assumed that CA's activity area will be expanded to in the air, under the sea, and on the moon. This project aims to establish a communication platform that realizes stable operation and control of CA services even when communication is degraded by unstable network conditions, CA density, environmental changes, etc.

Milestone by year 2030

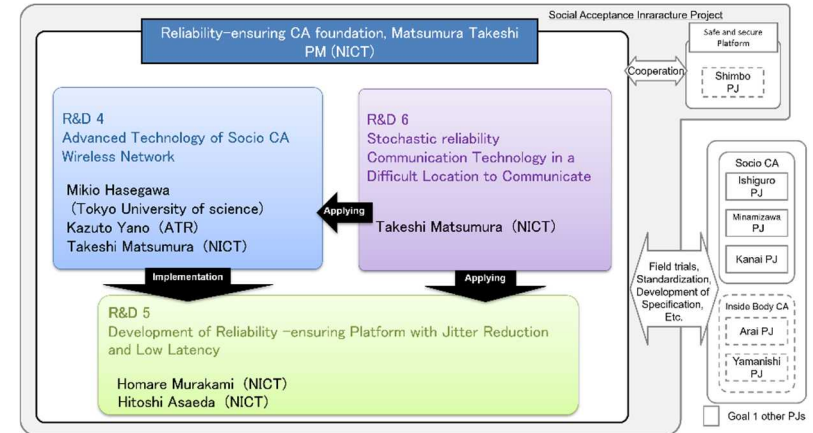
Toward the goal that one teleoperator can operate 10 or more CAs simultaneously by 2030, and M teleoperators cooperatively control N CAs ($M \times N$ control) by 2050, this project tries to develop the reliability-ensuring CA infrastructure.

Milestone by year 2025

This project will develop and demonstrate the fundamental technology that allows one operator to remotely control 2 - 5 CAs in different locations at the same time according to the teleoperator's will, aiming to realize $1 \times N$ CA teleoperation. Also, we will develop and demonstrate the fundamental technology that allows 2 - 5 teleoperators to remotely control one CA cooperatively, aiming to realize $M \times 1$ CA teleoperation.

Project structure

R&D item structure was reconstructed as below.



R&D 4 is developing a technology to establish a flexible and reliable wireless communication environment according to the CA operation, density, and surrounding environment in the CA operation area and a technology to optimize the network configuration for CA teleoperation. R&D 5 is developing a reliability-ensuring platform that reduces delay and jitter in communications between CAs and teleoperators for highly reliable teleoperation. Also, we develop extended information-centric networking (ICNx) technology that does not increase data amount and delay, even when many CAs are teleoperated. Furthermore, in R&D 6, we study how to ensure reliability for teleoperation of millions of in-cellular CAs in difficult communication environments such as inside the body and develop reliability-ensuring communication technology for such applications. We also comprehensively investigate the communication requirements of each CA in other Moonshot Goal 1, aiming to establish a CA infrastructure that ensures the reliability of communication in teleoperation of CA and increases social acceptance.