Big-data and AI-enabled Cyberspace Technologies

Building a new intellectual social infrastructure to realize Society 5.0

A system mutually linking cyberspace and physical space is needed to realize Society 5.0; however, various elements for development and other issues still remain. Among cyberspace platform technologies, this project particularly establishes highly-sophisticated “Human-interaction platform technology”, “Inter-domain data exchange platform technology”, and “AI-based automatic negotiation platform technology” which contribute to human-AI collaboration and conducts social implementation of a cyber-physical system utilizing big data and AI.

ANZAI Yuichiro, Program Director(PD), is responsible for formulating and promoting research and development plans. The PD chairs the committee and the Cabinet Office serves as its secretariat. The committee consists of relevant ministries and agencies, experts and intellectuals. The New Energy and Industrial Technology Development Organization (NEDO), a national research and development corporation, will be utilized to promote research and development by a research director selected from among applications. Four sub-PDs, MOCHIMARU Masaaki, KOSHIZUKA Noboru, WASHIO Takashi and KANEMURA Atsunori were appointed. KAWAKAMI Takayoshi will serve as a strategic coordinator (Strategic C) for innovation, and this way, R&D will be promoted to achieve the goal through collaboration of PD, sub-PDs, and Strategic C.

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**Research and Development Topics**

(1) Human-interaction platform technology
- Development of advanced interaction technology to collect and structure non-verbal data related to human behavior and cognition and to support situation judgment and communication for individuals.
- Development of advanced dialogue processing technology that enables multimodal memory, integration, recognition, and judgment for human-AI collaboration
- Prototyping and verification in each area (nursing care, education, customer service, etc.)

(2) Inter-domain data exchange platform technology
Development of distributed/federated data exchange technologies and platforms for inter-domain data sharing and utilization

(3) AI-based automatic negotiation platform technology
- Development of communication protocols, vocabulary, algorithms, etc., for automatic negotiation and collaboration (E.G., automatic adjustment of transaction conditions among multiple companies) by multiple AI
- Prototyping and verification in areas where automated collaboration between AI is effective

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**Implementation Structure**

**Profile**
ANZAI Yuichiro is known for his pioneering work on learning by doing and human-robot interaction in the fields of cognitive and computer sciences, having published around 300 reviewed academic articles and books in those fields. He served as the president of Keio University (2001-2006), the president of Japan Society for the Promotion of Science (2001-2006), the chair of the Asia-Pacific rim Universities, and others. Currently he is the chair of the Council for Artificial Intelligence Strategy under the Cabinet Office, as well as the program director for the program “Big-data and AI-enabled cyberspace technologies” in SIP and also the program director for the innovative cyberspace technology program in PRISM, both at the Cabinet Office. ANZAI was honored to be a Person of Cultural Merit, and also received the Medal with Purple Ribbon from the Japanese government, as well as Commander de l’Ordre Palmes Académiques from France, and honorary doctoral degree from Ecole Centrale de Nantes and Yamaz University.

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Cross-ministerial Strategic Innovation Promotion Program (SIP)
Past Milestones and Anticipated Outcomes

Past Milestones

- As “Human-interaction platform technology,” development of inter-domain/intra-domain technologies and implementation of them into multiple applications.
- As “Inter-domain data exchange platform technology,” development of technology for connectors compatible with open data and release of OSS.
- Commencement of standardization of “AI-based automatic negotiation platform technology” by UN/CEFACT and completion of transition to the private sector.

Anticipated Outcomes

By establishing “Big-data and AI-enabled cyber space technologies” and creating more than 20 practical applications that improve productivity (work hours, learning speed, error rate, etc.) by more than 10% through social implementation of cyber physical systems utilizing big data and AI, “Society 5.0” will be realized through human-AI collaboration.

i. Develop the “Human-interaction platform technology” which supports human interaction, and create examples of effectiveness verification and practical applications through demonstration experiments in areas where collaboration between human and AI is considered to be effective (for example, nursing care, education, customer service).

ii. Develop the “Inter-domain data exchange platform technology” that easily provides interoperability and federates data held separately by industry, government and academia, respectively, and supplies it as big data that can be used by AI within three years, put it into full-scale operation within five years, and present actual practical examples.

iii. Develop the “AI-based automatic negotiation platform technology” which automatically adjusts win-win conditions through multiple AI collaborations, and verify the effectiveness through demonstration experiments and put it to practical applications.