About CiNet

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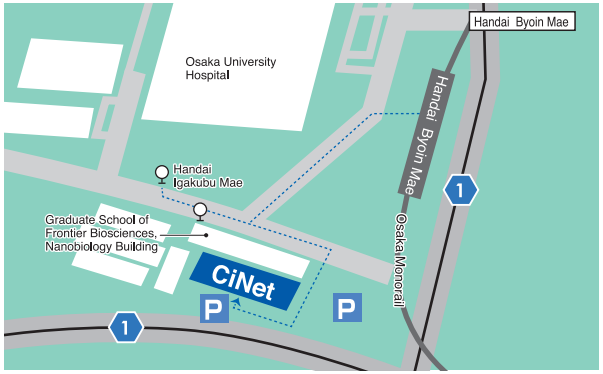
About CiNet

The Center for Information and Neural Networks (CiNet) is an interdisciplinary neuroscience technology research institute based in Osaka, Japan. CiNet is Japan's flagship initiative to develop intelligent technologies founded on the rapid advancement in our understanding of the brain. The central research building opened in 2013 and houses state-of-the-art facilities for research into basic systems neuroscience and applications in the following key inter-related areas:

- Information and Communications Technology
- Brain-Machine Interfaces
- Neuroimaging Technology
- Robotics

CiNet's research is led by a team of over 30 of the most innovative and pioneering scientists from Japan and abroad, together with over 100 researchers, engineers and technologists. They make CiNet a uniquely creative and collaborative institute dedicated to discovering fundamentally new ways to improve human health, wellbeing and experience.

Access



Access from the nearest station

- By Monorail
  5 min. walk from Handai Byoin Mae Station on the Osaka Monorail.
- By Bus
  By Hankyu Bus: Get on the bus bound for "Handai Honbu Mae"or "Ibaraki Mihogaoka" from Senri-Chuo Station. Get off at Handai Igakubu Mae, walk 1 min. from the bus stops.

  By Kintetsu Bus: Get on the bus bound for "Handai Honbu Mae" from Hankyu Ibarakishi Station (via JR Ibaraki Station) Get off at Handai Igakubu Mae, walk 1 min. from the bus stops.

CiNet

Center for Information and Neural Networks

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NICT ATR

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Future of Information and Telecommunications Inspired by Collaborative Work between Neuroscience and ICT

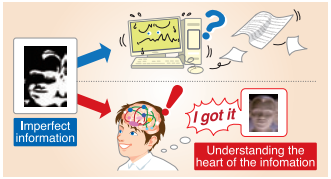
Center for Information and Neural Networks

CiNet

Research

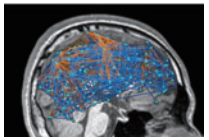
Systems neuroscience.

CiNet has a strong research focus on vision and motor control, but other areas include pain, multi-sensory integration, higher cognition, decision making, language, and social neuroscience.



Information and communications technology (ICT).

A key vision of CiNet is to explore the application of neuroscience to ICT research.
Can neuroscience help us create fundamentally new designs for computing and controlling information networks? Can the science of complex networks help us neuronal information processing? Can an understanding of human communication and brain processing lead to new brain-based communications technology?

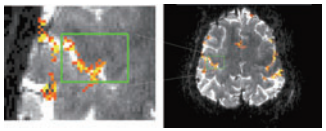

A brain network topology based on fMRI data

Brain-machine interfaces(BMI).

Invasive BMI research involves collaboration with the neurosurgical team at the Osaka University Hospital and work on brain stimulation and neuroprosthetic control of robotic devices. Non-invasive BMI program include developing control and feedback systems for non-clinical applications ranging from domestic appliances to support systems for aviation.

Neuroimaging technology.

Basic research includes research into high-field fMRI, integrated PET-fMRI, magnetic resonance spectroscopy (MRS) and high density near infra-red spectrospcopy. We aim to establish and develop next generation imaging technologies including phase-contrast cerebral blood flow imaging, temperature function imaging, nerve fiber function imaging, brainstem nucleus function imaging.


Sufficient spatial resolution to visualize cortical columns

Robotics.

Goals: first, development of robotic systems for human support; second, core research into improving robotic motor control, especially using bio-mimetic algorithms inspired by neuroscience; third, research into humanoid, ultra-realistic, and tele-existence robots to study human-robot interactions, communication and embodiment, and to help us understand how humans and robots can best co-exist in the future.

Facilities

Magnetic Resonance Imaging

CiNet houses two 3T magnets and one 7T magnet for human structural, functional and spectroscopic MRI, and an additional 3T magnet at our Kobe facility.
There are state-of-the-art experimental stimulation and physiological monitoring systems, real-time analysis and online neurofeedback, and a team of engineers to help design and implement new systems and technologies.

Magnetoencephalography.

Magnetoencephalography.
We have an augmented 360 high-density MEG system. This can be used in sitting or lying position, and with full set-up for cognitive tasks. We have an additional 148 channel system at our Kobe facility.

Information and Network technology

ICT researchers use a range of high performance computing and super-computing facilities, allowing large scale network simulations. Several CiNet researchers use the K Supercomputer at RIKEN Kobe, and the NICT's Japan-wide Orchestrated Smart ICT Testbed.

Electroencephalograhy and Near-Infrared Spectroscopy.

We have, and develop, EEG systems for standard uses, ambulant mobile wireless recording, and high density recording. In addition to conventional fNIRS, high-density and wireless fNIRS systems are used at ATR.

Transcranial Magnetic, Transcranial Direct Current, and Transcortical Anodal Current Stimulation.

We have several systems for TMS and tDCS for humans and animals. This includes combined EEG-TMS systems, portable tDCS, and systems used in clinical therapeutics.

Visual displays and sensory stimulation.

We have a range of immersive visual systems, including large scale 3D projection systems, virtual reality, wide-view MRI projection, integrated 3D vision and sound systems, and a motion platform / full flight simulator. We also have several contact heat stimulators for pain and temperature experiments, and state-of-the-art sound delivery systems.

CiNet has many other state-of-the-art facilities adding to the above.

Collaboration

International collaboration.

CiNet researchers collaborate widely with researchers from across the globe. We have agreements with several partner institutes designed to facilitate specific programs of close collaboration:

- Computational and Biological Learning Laboratory, Department of Engineering, University of Cambridge, UK (neural information engineering)
- Institute of Cognitive Neuroscience, UCL, London, UK (perceptual and cognitive neuroscience)
- Swartz Center for Computational Neuroscience, University of California San Diego, USA (computational neuroscience)
- National Higher French Institute of Aeronautics and Space (ISAE-SUPAERO), France (human computer / machine interaction)
- Caesarea Rothschild Institute for Interdisciplinary Applications of Computer Science, University of Haifa, Israel (modeling and machine learning on brain structures)
- Faculty of Computer Science, Namur University, Belgium (stochastic modelling of brain networks and communication networks)
- Laboratory of Psychological Perception, Faculty of Biomedical Sciences, Paris Descartes University, France (information and communications technology in particular with respect to human science and brain science)


Industry collaboration

Osaka and the broader Kansai region (incorporating Kobe, Kyoto and Nara) has been the powerhouse of Japanese innovation, technology and industry since the early 20th century. Although often associated with technology giants such as Panasonic, Sharp, and Nintendo, in fact the vast majority of industry is made up of small to medium sized firms, especially in the high-tech electronics, materials, and biotech industries. This means that the Kansai region offers a concentration, diversity and magnitude of technological research and development that is probably unparalleled worldwide.

CiNet is committed to the development of strategic industry partnerships to engage in ambitious collaborative research programs and facilitate technology transfer.