FY 2025 Annual Report

Unit Name

Cognitive Neurorobotics Research Unit

Professor Jun Tani

Collaborations

Yuichi Yamashita, National Center of Neurology and Psychiatry, Japan, Section Chief

Kenji Doya, OIST, Japan, Professor

Jeffrey White, NOVA-LINCS, Portugal, Collaborator

Research Personnel

Jeffrey Queisser, Staff Scientist

Takazumi Matsumoto, Staff Scientist

Sergio Verduzco Flores, Postdoctoral Scholar

Henrique Carlos Oyama, Postdoctoral Scholar

Takahito Fujimori, Research Unit Technician

Jinho Chung, Research Unit Technician

Jeffrey Benjamin White, Visiting Researcher

Hok Shing Lau, Research Unit Technician

Raymond Alexander Baranski, PhD Student

Rui Fukushima, PhD Student

Hiroki Sawada, PhD Student

David Pere Tomas Cuesta, PhD Student

Theodore Jerome Tinker, PhD Student

Hinata Nago, Research Intern

Francesco Iori, Research Intern

Scholarly Contributions and Creative Productions (by Faculty)

Journal Article

1. Queißer, J. F.; Tani, J.
   Working Memory and Self-Directed Inner Speech Enhance Multitask Generalization in Active Inference. Neural Computation 2025, 38, 28–70.
2. Idei, H.; Tani, J.; Ogata, T.; Yamashita, Y.
   Future Shapes Present: Autonomous Goal-Directed and Sensory-Focused Mode Switching in a Bayesian Allostatic Network Model. NPJ Complexity 2025, 2.
3. Vijayaraghavan, P.; Queisser, J. F.; Flores, S. V.; Tani, J.
   Development of Compositionality through Interactive Learning of Language and Action of Robots. Science Robotics 2025, 10, eadp0751.
4. Takahashi, Y.; Idei, H.; Komatsu, M.; Tani, J.; Tomita, H.; Yamashita, Y.

Digital Twin Brain Simulator for Real-Time Consciousness Monitoring and Virtual Intervention Using Primate Electrocorticogram Data. NPJ digital medicine 2025, 8, 80.

5. Tani, J.

   The Epistemic Uncertainty Gradient in Spaces of Random Projections. Entropy 2025, 27.

6. Ohata, W.; Tani, J.

   Characterizing the Sense of Agency in Human–robot Interaction Based on the Free Energy Principle.. NPJ Complexity 2025, 2.

7. Oyama, H.; Tani, J.; Matsumoto, T.

   Modeling Autonomous Shifts between Focus State and Mind-Wandering Using a Predictive-Coding-Inspired Variational Recurrent Neural Network.. Frontiers in Computational Neuroscience 2025, 19.

8. Queißer, J. F.; Oyama, H.; Tani, J.

   How Deep Will You Go? Hierarchy in Predictive Coding and Transformers. Cognitive Neuroscience 2025, 1.

9. Matsumoto, T.; Fujii, K.; Murata, S.; Tani, J.

   Active Inference with Dynamic Planning and Information Gain in Continuous Space by Inferring Low-Dimensional Latent States . Entropy 2025, 27(8).

Presentation at Conference

1. Tani, J.

   Human-in-the-Loop Learning under the Free Energy Principle: A Developmental Robotics Perspective. The Augmented Humans (AHs) International Conference 2026. Keynote speech. 2026.

2. Tani, J.

   Exploring robotic minds by extending the idea of predictive coding and active inference. International Symposium on the Unified Theory of Prediction and Action 2026. Invited talk. 2026.

3. Tani, J.

   Cognitive Neurorobotics Studies Extending the Free Energy Principle. 6th International Workshop on Active Inference (IWAI2025). Keynote speech. 2025.

4. Tani, J.

   Development of Higher Cognitive Mechanisms Through Iterative Sensorimotor Interactions With the World: Insights From Neurorobotics. 32nd International Conference on Neural Information Processing (ICONIP2025). Keynote speech. 2025.

5. Tani, J.

   How Can Higher Cognitive Mechanisms Develop through Iterative Sensorimotor interactions with the World? Insights From Neurorobotics. 2025 Asia-Pacific Computational and Cognitive Neuroscience Conference (AP-CCN2025). Invited talk. 2025.

Seminars

1. Tani, J.

   Development of Compositionality through Interactive Learning of Language and Action of Robots Using Free Energy Principle. 2025.

2. Tani, J.

   Development of Compositionality through Interactive Learning of Language and Action of Robots Using Free Energy Principle. 2025.

Scholarly Contributions (by Unit Members)

Name of Unit Member	Type	Title	Outlet	Publisher	Year Pub
Henrique Oyama	Journal Article	Response of Dynamic Processes with Control Implemented on a Noisy Quantum Computer	American Control Conference	IEEE	2025
Henrique Oyama	Poster Presentation at Conference	Computational Framework for Focus-Mind Wandering Modes of Operation under the Free Energy Principle	The 3rd RIKEN CBS Co-Creation International Conference		2025
Henrique Oyama	Poster Presentation at Conference	Modeling Autonomous Transitions Between Focus and Mind-Wandering States under the Free Energy Principle	OIST TSVP Symposium: Computational and Physical Understanding of Biological Information Processing		2025
Henrique Oyama	Poster Presentation at Conference	Lyapunov-Based Economic Model Predictive Control for Online and Safe Process Model Discrimination	16th HOPE Meeting		2025
Alex Baranski	Poster Presentation at Conference	Generating Adaptive Behavior By A Self-Mutating Search Process	The 3rd RIKEN CBS Co-Creation International Conference		2025
Theodore Jerome Tinker	Poster Presentation at Conference	Curiosity-Driven Development of Action and Language in Robots Through Self-Exploration	IWAI2025	IWAI	2025
Henrique Oyama	Poster Presentation at Conference	Online and Safe Model Discrimination under Lyapunov-Based Economic Model Predictive Control	2025 OIST Researcher Appreciation Month		2025
Henrique Oyama	Poster Presentation at Conference	Modeling Focus-Mind-Wandering Transitions using a Predictive-Coding-Inspired Variational RNN Model under the Free Energy Principle	OIST Neuroscience Online Seminars (ONOS)		2025
Henrique Oyama	Poster Presentation at Conference	Computational Framework for Autonomous Transitions Between Focus State and Mind-Wandering under the Free Energy Principle	OIST Neuroscience Symposium 2025		2025
Henrique Oyama	Poster Presentation at Conference	Predictive-Coding-Inspired Variational RNN Model of Focus-Mind-Wandering Transitions under the Free Energy Principle	Alife 2025		2025
Henrique Oyama	Poster Presentation at Conference	Computational Framework for Autonomous Shifts Between Focus State and Mind-Wandering using a Predictive-Coding-Inspired Variational RNN Model	28th Annual Meeting of the ASSC	28th Annual Meeting of the ASSC	2025
Henrique Oyama	Presentation at Conference	Modeling Autonomous Transitions Between Focus and Mind-Wandering States under the Free Energy Principle	OIST TSVP Symposium: Computational and Physical Understanding of Biological Information Processing		2025

Name of Unit Member	Type	Title	Outlet	Publisher	Year Pub
Theodore Jerome Tinker	Seminars	Curiosity-Driven Development of Action and Language in Robots Through Self-Exploration	OIST Internal Seminar Series		2026

Honors, Awards & Fellowships [By Unit Members Only]

Term 2 2026 - Term 2 2026	Henrique Oyama, FENS Forum 2026 Travel Award, n/a, 2026, FENS Forum 2026, Japan Neuroscience Society, n/a [Fiscal Year: 2026-02-01]

External Service

Term 1 2023 - 2024	大学コンソーシアム沖縄創立１０周年記念事業企画・運営委員会委員 [Fiscal Year: 2024]

Other Institutional Service

Term 1 2019 - Ongoing	Scientific Computing Committee
Term 1 2022 - Ongoing	OIST's Visiting Program (TSVP) Committee
Term 1 2024 - Ongoing	Yomitan Library Project, (University) [Fiscal Year: 2024]

Outreach Activities [For Unit Members Only]

Term 1 2025	Henrique Oyama, “Light a Candle” and “R U OK day” , OIST Ganjuu’s Peer Supporters Program [Fiscal Year: 2025-09-11]
Term 1 2025	Henrique Oyama, OIST Neuroscience Symposium 2025 , OIST [Fiscal Year: 2025-12-04]
Term 1 2025	Jeffrey Queisser, Remote Island Science Caravan, OIST Outreach Section [Fiscal Year: 2025-12-22]
Term 1 2025	Henrique Oyama, Researcher Appreciation Month (RAM) , OIST [Fiscal Year: 2025-10-02]
Term 3 2025	Henrique Oyama, Japanese Immigration to Brazil and Liberdade: A Place of Diasporas, Ancestries, and Coexistence, OIST Cultural Event Series [Fiscal Year: 2025-06-21]
Term 3 2025	Jeffrey Queisser, Unna Jr High School Work Experience Program, OIST Outreach Section [Fiscal Year: 2025-06-05]
Term 2 2025	Takazumi Matsumoto, OIST Science Festival, OIST [Fiscal Year: 2025-02-01]
Term 2 2025	Jeffrey Queisser, OIST Science Festival, OIST [Fiscal Year: 2025-02-01]
Term 2 2025	Jeffrey Queisser, OIST Beach Robot Hackathon, OIST [Fiscal Year: 2025-03-29]
Term 2 2025	Jeffrey Queisser, OIST Beach Robot Remote Islang School Visit, OIST [Fiscal Year: 2025-03-15]
Term 2 2025	Henrique Oyama, Unna Jr High School Work Experience Program , OIST Outreach Section [Fiscal Year: 2025-06-05]
Term 2 2025	Henrique Oyama, OIST Science Festival, OIST [Fiscal Year: 2025-02-01]

Workshops and Seminars [Organized and Hosted by Faculty/Units]

Speaker Name(s)	Title	Location	Date
Prof. Koh Hosoda, Kyoto University	Project RAISE, Real-World Adaptive Intelligence Generated through Soft Embodiment	L5D23, Lab5	2026-03-30
Takashi Ikegami, Shingo Murata, Tetsuya Ogata, Hiro Iizuka	Workshop on Cognitive Neurorobotics Date	L5D23, Lab5	2026-03-05
Dongqi Han, Microsoft Research Asia	Synergizing habitual and goal-directed behaviors for advancing decision-making AI	C700, Lab 3	2025-07-16
Yansen Wang, Microsoft Research Asia	Towards Extending the Boundary of Non-invasive Brain-Computer Interfaces	C700, Lab 3	2025-07-16