

Takashi IKEGAMI

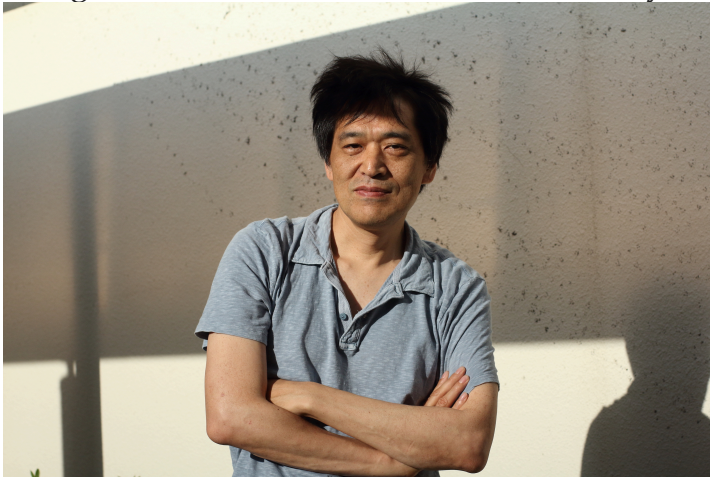
AFFILIATION: Professor at Department of General Systems, The Graduate School of Arts and Sciences

University of Tokyo, Japan **POSITION:** Professor

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Research

I have been working on the field of artificial life for more than 20 years. Open-ended evolution in artificial life models, self-moving droplet experiments are the main targets of my research. Recently, I am interested in constructing artificial life in the real world. To fruition the concepts such as "autonomy", "enaction", "sustainability", and "evolvability", I have started several experimental and conceptual works, using an android (called Alter3), a large scale Boids model and a new theory of collective intelligence.



Educational Background

Research and Professional Experience

Degree Year :BA 1984 Ph.D. 1989 from the university of Tokyo

Field of study :Statistical Physics /complex systems/artificial life

Work History

1989-1990 postdoc the Research institute of Fundamental Physics, Kyoto University (+ LosAlamos National Lab.)

1990-1994 assistant professor at the Graduate school of Natural Sciences, Kobe University

1994-2008 associated professor at the Graduate school of Arts and Sci, the University of Tokyo

2008-Present Professor at the university of Tokyo

Awards

2022 ISAL (international Society for Artificial Life) *BEST paper* in 2007-2017: Martin M. Hanczyc, Taro Toyota, Takashi Ikegami, Norman Packard and Tadashi Sugawara: **Chemistry at the oil-water interface: Self-propelled oil droplets.** *J. Am. Chem. Soc.* 129(30): 9386 - 9391, 2007

2021 ISAL Award for *Lifetime Achievement* Takashi Ikegami

2022 文化庁メディア芸術祭・優秀賞 傀儡神楽 *ALTER the Android KAGURA*
『傀儡神楽』制作チーム（代表：池上 高志）

2018 Priz Ars Electronica *Award of Distinction: "Alter"*
Takashi Ikegami, Hiroshi Ishiguro, Kohei Ogawa, Itsuki Doi,

Grant-in-Aids (2022-2023):

2021-2023 *Analysis of Emerging Super-Organisms by Large-scale Tracking Experiments and Developing a New Theory of Collective Intelligence*
Project/Area Number 21H04885 (KAKENHI kiban-A) ¥42,250,000

2021-22: Implementation and Analysis of Subjective Time Flow in an Artificial Machine Project Area *Chronogenesis: how the mind generates*

time Project/Area Number 21H00300 Scientific Research on Innovative Areas (KAKENHI Research in a proposed research area) ¥5,200,000

2021-2022: *Emerging in Large Groups of Living/Non-living Agents* Google University Relations Grant: US\$ 30,000

2021-2023: *Large-scale analysis of Swarm Dynamics and Collective Vitality*, Big Data-Driven Approaches with AI in Life Sciences, the Uehara Memorial Foundation grant of Life Sciences. ¥9,000,000

Some Recent Publications (2014-)

Refereed contributions

Books (+ co-authored) :

- Mizuki, O., Ikegami, T., Chen, D., Ryuta, A., Norihiro M. "Building and Running Alife - An Introduction to Artificial Life Models through Implementation", O'Reilly Japan, Inc. (2018)
- Ikegami, T. and Ishiguro, H. "Between human and machine", Kodansha Ltd., Publishers (2016)

Book Chapters (2014-):

- Ikegami, T. forward in *Artificial Intelligence, Intellectual Property, Cyber Risk and Robotics A New Digital Age* (eds. Ruth Tapiin, 2022).
- Ikegami, T. "Bohemian Rhapsody", In *Style of The University of Tokyo Komaba*, Graduate School of Arts and Sciences (2019)
- Ikegami, T. "The Future of Life", In *The future of education: 11 lessons of knowledge for surviving in a rapidly changing world* (2019)

Refereed Journals (2014-):

- Hiroki Kojima, Takashi Ikegami. **Organization of a Latent Space structure in VAE/GAN trained by navigation data** *Neural Networks*, Volume 152, August 2022, Pages 234-243
- Hiroki Kojima, Dominique Chen, Mizuki Oka and Takashi Ikegami. Analysis and Design of Social Presence in a Computer-Mediated Communication System *Frontiers in Psychology, Human-Media Interaction*, *Front. Psychol.*, 24 May 2021 [Offloaded Agency]
- Hiroki Kojima, Yuzuru Mitsui and Takashi Ikegami. Spatial and Temporal Taylor's Law in 1-Dim Chaotic Maps *Chaos: An Interdisciplinary Journal of Nonlinear*

Science, Chaos 31, 033111, 2021

-Masumori, A., Sinapayen, L., Maruyama, N., Mita, T., Bakkum, D., Frey, U., ... & Ikegami, T. Neural Autopoiesis: Organizing Self-Boundaries by Stimulus Avoidance in Biological and Artificial Neural Networks. *Artificial life*, 26(1), 130-151, 2020

-Brumley, J., Taylor, C., Suzuki, R., Ikegami, T., Vesna, V., & Iwata, H. Bird Song Diamond in Deep Space 8k. *AI & SOCIETY*, 35(1), pp.87-101. 2020

-Sinapayen, L., Masumori, A., Ikegami, T. Reactive, Proactive, and Inductive Agents: An Evolutionary Path for Biological and Artificial Spiking Networks. *Frontiers in Computational Neuroscience*, 13(88), 2019

-Ikegami, T., Hashimoto, Y., Oka, M. Open-Ended Evolution and a Mechanism of Novelties in Web Services. *Artificial Life*, pp.168-177, 2019.

-Maruyama, N., Saito, D., Hashimoto, Y., Ikegami, T. Dynamic organization of flocking behaviors in a large-scale boids model. *Journal of Computational Social Science*, 1-8, 2019.

-Rössler, O. E., Vial, L. R., Kuske, F., Nitschke, A., Ikegami, T., Ujica, A. Brain Equation and Personogenesis. *Clinics in Pediatrics*, vol.2, 1-11, 2019.

-Witkowski, O., Ikegami, T. How to make swarms open-ended? Evolving collective intelligence through a constricted exploration of adjacent possibles. *Artificial life*, 25(2), 178-197, 2019.

-Ikegami, T., Mototake, M., Kobori, S., Oka, M., Hashimoto, Y. Life as an emergent phenomenon: studies from a large-scale boid simulation and web data, *Phil.Roy.Soc.*, 375, pp.1-15, 2017

-Kojima, H., Froese, T., Oka, M., Iizuka, H., & Ikegami, T. A Sensorimotor Signature of the Transition to Conscious Social Perception: Co-regulation of Active and Passive Touch. *Frontiers in psychology*, 8, 1778, 2017.

-Witkowski, O., Ikegami, T. Emergence of Swarming Behavior: Foraging Agents Evolve Collective Motion Based on Signaling, *PLoS ONE*, 11(4): e0152756, 2016.

-Taylor, T., Bedau, M., Channon, A., Ackley, D., Banzhaf, W., Beslon, G., Dolson, E., Froese, T., Hickinbotham, S., Ikegami, T., McMullin, B., Packard, N., Rasmussen, S., Virgo, N., Agmon, E., Clark, E., McGregor, S., Ofria, C., Ropella, G., Spector, L., ... Wiser, M. Open-Ended Evolution: Perspectives from the OEE Workshop in York. *Artificial life*, 22(3), 408-423. 2016

-Drozd, A., Witkowski, O., Matsuoka, S., & Ikegami, T. Critical mass in the emergence of collective intelligence: a parallelized simulation of swarms in noisy environments. *Artificial Life and Robotics*, 21(3), 317-323. 2016

-Ikegami, T., Horibe, N., & Hanczyc, M. M. Potential Memory Effects in Self-Moving Oil Droplets. *International Journal of Unconventional Computing*, 11. 2015.

-Oka, M., Abe, H., & Ikegami, T. Dynamic homeostasis in packet switching networks. *Adaptive Behavior*, 23(1), 50-63. 2015

-Oka, M., Hashimoto, Y., & Ikegami, T. Self-organization on social media: Endo-exo bursts and baseline fluctuations. *PLoS One*, 9(10), e109293. 2014

- Froese, T., Iizuka, H., & Ikegami, T. Using minimal human-computer interfaces for studying the interactive development of social awareness. *Frontiers in psychology*, 5, 1061. 2014
- Matsuda, E., Hubert, J., & Ikegami, T. A robotic approach to understanding the role and the mechanism of vicarious trial-and-error in a t-maze task. *PloS one*, 9(7), e102708. 2014

International Conferences (Keynote, Invited Lectures 2019-)

keynote:

1. Takashi Ikegami: " Architectural Body In Metaverse"
Arakawa+Gins Int'l workshop (kyoto) 2022/3/11-13
2. Takashi Ikegami: Offloaded Mind: Experiments in Dyadic
Humanoid/Human Interaction, 2021 International Workshop on
Embodied Intelligence. (UK, online) 2021/3/25
3. Takashi Ikegami: Life as a Collective Emergence Phenomenon,
SWARM 2019: The 3rd International Symposium on Swarm
Behavior and Bio-Inspired Robotics, ,(Okinawa, OIST) 2019/11/
20-22

Invited:

4. Takashi Ikegami: In Between Man and Machine Daiwa Foundation
Seminar (London, online) 2021/12/02
5. Takashi Ikegami: Off-loaded Mind and Communication Musicality,
Gateway event Edinburgh Centre for Robotics (Edinburgh, online)
2021/11/30
6. Takashi Ikegami: "How can an android become human?"
International Conference on Embodied Cognitive Science (OIST, JP)
2022/11/7-11

7. Takashi Ikegami: "Self-Organization and Developments of Super-Individuals in Large Scale Systems: HoneyBees, Tetrahymena, Web data, Boids ,,,," Conference for Complex Systems 2020/12/4-11 (Barcelona Online)

8. Takashi Ikegami: "Offloaded Agency", SIGEF 2019/9/18-19 (Tokyo)

9. Takashi Ikegami: ""Machine Learning and Consciousness"" Mini Symposium at the Barbican center London 2019/5/20 (London, UK)

10. Takashi Ikegami: "Fro AI to ALIFE" : AI/SUM 2019/4/22-24 (Tokyo)

Invited as a mentor

/organizer

11. Takashi Ikegami: "Bringing Chemistry, Physics and Computing to Life" workshop (Prague, CZ) 2022/6/19-24

Domestic Conferences (Keynote)

12. Takashi Ikegami: "Evolution of Individuality and Collectivity", Molecular Robotics (Sendai, JP) 2022/11/12-13