# Lana SINAPAYEN – Curriculum Vitae

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## Current Affiliations

- Associate Researcher, Sony Computer Science Laboratories Kyoto (Founding Member)

- Associate Professor, National Institute for Basic Biology

- Board of Directors, International Society for Artificial Life

- Diversity, Equity and Inclusion Committee, International Society for Artificial Life

- Early Career Advisory Group, eLife Journal

## Employment History

**Apr 2020 - Present**  Sony Computer Science Laboratories, inc., Japan – Kyoto Lab
***Founding Member*** - *Associate Researcher*

Predictive coding, Artificial Perception, Astrobiology

**Apr 2022 - Apr 2023**  Hokkaido University Center for Human Nature, Artificial Intelligence, and Neuroscience – Japan - Hokkaido
*Visiting Researcher*

Artificial Perception, Artificial Life

**Sep 2018 - Apr 2020**  Sony Computer Science Laboratories, inc., Japan - Tokyo
*Associate Researcher*

Neural Networks, Predictive Coding, Measures of complexity

**Apr 2019 - Jan 2020**  Earth-Life Science Institute, Tokyo Institute of Technology, Japan
*Researcher*

Predictive Systems, Origins of Life

## Awards

- 2022 **Exceptional Service Award**, International Society for Artificial Life

- 2022 **Distinguished Early-Career Investigator Award**, International Society for Artificial Life

- 2020 **Education and Outreach Award**, International Society for Artificial Life

- 2018 **University of Tokyo Ichiko Memorial Award**, for my PhD thesis "Exploring new neural architectures for adaptation to complex worlds"

# Research Community Service

**2020 - 2022** Associate Editor, *Journal of Artificial Life*
**2017 - 2021** Co-organizer, Hybrid Life Special Session, *International Conference on Artificial Life*
**2020 - Now** Co-organizer, Artificial Perception Special Session, *International Conference on Artificial Life*
**2021 - Now** Co-organizer, Virtual Creatures Competition

Reviewing activities, organizing workshops, judging scientific competitions, giving keynotes and invited talks.

# Education

**2015-2018**   Ph.D. in Artificial Life and Artificial Intelligence
Tokyo University, Japan, Ikegami Laboratory

Topic                          New neural architectures for Predictive Coding
Tokyo University **Ichiko Memorial Award** laureate; Leading Graduate Schools Scholarship recipient.

**2013-2015**   Master of Science in Computer and Mathematical Sciences
Tohoku University, Japan, Kinoshita Laboratory

Topic                          Swarm Intelligence with sound processing quadcopters
Joint research with Honda Research Institute; Lead to **two patents**.

**2007-2015**   Master of Science in Engineering
INSA engineering school, Lyon, France

Major                          **Information Technologies**

# Programming Languages / Frameworks

Everyday user       Python, Java, C++, R, SQL
Experienced         C, Objective C, Swift, PHP, JavaScript, React, Docker

# Natural Languages

French              Native
English             Fluent, TOEIC 970 (2010)
Japanese            Fluent, JLPT N2 (2011)

Spanish: 5 years, Chinese: 4 years.

# Peer-reviewed journal papers

[1]   Stuart Bartlett, Jiazheng Li, Lixiang Gu, Lana Sinapayen, Siteng Fan, Vijay Natraj, Jonathan H Jiang, David Crisp, and Yuk L Yung. "Assessing planetary complexity and potential agnostic biosignatures using epsilon machines". In: *Nature Astronomy* 6.3 (2022), pp. 387–392.

[2]   Atsushi Masumori, Lana Sinapayen, Norihiro Maruyama, Takeshi Mita, Douglas Bakkum, Urs Frey, Hirokazu Takahashi, and Takashi Ikegami. "Neural autopoiesis: Organizing self-boundaries by stimulus avoidance in biological and artificial neural networks". In: *Artificial Life* 26.1 (2020), pp. 130–151.

[3]   Lana Sinapayen, Atsushi Masumori, and Takashi Ikegami. "Reactive, Proactive, and Inductive Agents: An evolutionary path for biological and artificial spiking networks". In: *Frontiers in Computational Neuroscience* 13 (2019).

[4]   Lana Sinapayen and Takashi Ikegami. "Learning by stimulation avoidance: A principle to control spiking neural networks dynamics". In: *PloS one* 12.2 (2017), e0170388.

[5]   Lana Sinapayen, Keisuke Nakamura, Kazuhiro Nakadai, Hiroki Takahashi, and Tetsuo Kinoshita. "Swarm of micro-quadrocopters for consensus-based sound source localization". In: *Advanced Robotics* 31.12 (2017), pp. 624–633.

[6]   Caleb Scharf, Nathaniel Virgo, H James Cleaves, Masashi Aono, Nathanael Aubert-Kato, Arsev Aydinoglu, Ana Barahona, Laura M Barge, Steven A Benner, Martin Biehl, Ramon Brasser, Christopher J. Butch, Kuhan Chandru, Leroy Cronin, Sebastian Danielache, Jakob Fischer, John Hernlund, Piet Hut, Takashi Ikegami, Jun Kimura, Kensei Kobayashi, Carlos Mariscal, McGlynn Shawn, Brice Menard, Norman Packard, Robert Pascal, Juli Pereto, Sudha Rajamani, Lana Sinapayen, Eric Smith, Christopher Switzer, Ken Takai, Feng Tian, Yuichiro Ueno, Mary Voytek, Olaf Witkowski, and Hikaru Yabuta. "A strategy for origins of life research". In: Journal of Astrobiology. 2015, pp. 1031–1042.

## Peer-reviewed conference papers

[7]   Lana Sinapayen. "The Mimosa Manifesto: a Web Platform for Open Collaboration in Science". In: *Beyond static papers: Rethinking how we share scientific understanding in ML-ICLR 2021 workshop*. 2021.

[8]   Lana Sinapayen and Eiji Watanabe. "Evolutionary Generation of Visual Motion Illusions". In: *Proceedings Of The Joint Symposium Of The Twenty-seventh International Symposium On Artificial Life And Robotics (Arob 27th 2022) And The Seventh International Symposium On Biocomplexity (Isbc 7th 2022) And The Fifth International Symposium On Swarm Behavior And Bio-inspired Robotics (Swarm 5th 2022)* (2021).

[9]   Atsushi Masumori, Takashi Ikegami, and Lana Sinapayen. "Predictive coding as stimulus avoidance in spiking neural networks". In: *2019 IEEE Symposium Series on Computational Intelligence (SSCI)*. IEEE. 2019, pp. 271–277.

[10]  Lana Sinapayen and Atsushi Noda. "DNN Architecture for High Performance Prediction on Natural Videos Loses Submodule's Ability to Learn Discrete-World Dataset". In: *arXiv preprint arXiv:1904.07969* (2019).

[11]  Atsushi Masumori, Lana Sinapayen, Norihiro Maruyama, Takeshi Mita, Douglas Bakkum, Urs Frey, Hirokazu Takahashi, and Takashi Ikegami. "Autonomous regulation of self and non-self by stimulation avoidance in embodied neural networks". In: *ALIFE 2018: The 2018 Conference on Artificial Life*. MIT Press. 2018, pp. 163–170.

[12]  Atsushi Masumori, Lana Sinapayen, and Takashi Ikegami. "Learning by Stimulation Avoidance Scales to Large Neural Networks". In: *14th European Conference on Artificial Life (ECAL 2017)* (2017).

[13]  Atsushi Masumori, Lana Sinapayen, and Takashi Ikegami. "Learning by stimulation avoidance scales to large neural networks". In: *ECAL 2017, the Fourteenth European Conference on Artificial Life*. MIT Press. 2017, pp. 275–282.

[14]  Lana Sinapayen and Takashi Ikegami. "Online fitting of computational cost to environmental complexity: predictive coding with the $\varepsilon$-network". In: *ECAL 2017, the Fourteenth European Conference on Artificial Life*. MIT Press. 2017, pp. 380–387.

[15]  Lana Sinapayen, Atsushi Masumori, Nathaniel Virgo, and Takashi Ikegami. "Online Fitting of Computational Cost to Environmental Complexity: Predictive Coding with the epsilon-network". In: *14th European Conference on Artificial Life (ECAL 2017)* (2017).

[16]  Hiroki Kojima, Itsuki Doi, Lana Sinapayen, and Takashi Ikegami. "DCGAN を用いた記憶と表象のモデル (A Memory and Representation Model Using DCGAN)". In: Proceedings of the conference of Japanese Society for Artificial Intelligence. 2016, pp. 2747–2747.

[17]  S Lana, KNKNH Takahashi, and T Kinoshita. "Consensus-based sound source localization using a swarm of micro-quadrocopters". In: *Proc. Robot. Soc. Japan, Tokyo, Japan* (2015), pp. 1–4.

[18] Atsushi Masumori, Norihiro Maruyama, Lana Sinapayen, Takeshi Mita, Urs Frey, Douglas Bakkum, Hirokazu Takahashi, and Takashi Ikegami. "Emergence of sense-making behavior by the Stimulus Avoidance Principle: Experiments on a robot behavior controlled by cultured neuronal cells". In: *13th European Conference on Artificial Life (ECAL 2015)* (2015), pp. 373–380.

[19] Keisuke Nakamura, Lana Sinapayen, and Kazuhiro Nakadai. "Interactive sound source localization using robot audition for tablet devices". In: *2015 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE. 2015, pp. 6137–6142.

[20] Lana Sinapayen, Atsushi Masumori, Nathaniel Virgo, and Takashi Ikegami. "Learning by Stimulation Avoidance as a primary principle of spiking neural networks dynamics." In: *13th European Conference on Artificial Life (ECAL 2015)* (2015), pp. 175–182.

## Peer-reviewed posters

[21] Asahi Adachi, Lana Sinapayen, and Jun Rekimoto. "Generation of Traditional Japanese Patterns From Natural Patterns With StyleGAN". In: *Special Interest Group on Computer Graphics and Interactive Techniques (SIGGRAPH) 2022*. 2022.

[22] Stuart Bartlett, Jiazheng Li, Lixiang Gu, Lana Sinapayen, Siteng Fan, Vijay Natraj, Jonathan H Jiang, David Crisp, and Yuk L Yung. "Quantifying Planetary Complexity and Potential Agnostic Biosignatures using Epsilon Machines". In: *2022 Astrobiology Science Conference*. AGU. 2022.

## Preprints

[23] Lana Sinapayen. *Perspective: Purposeful Failure in Artificial Life and Artificial Intelligence*. 2021. arXiv: 2102.12076 [cs.AI].

## Patents

[24] Keisuke Nakamura, Kazuhiro Nakadai, H Takahashi, and Lana Sinapayen. *Acoustic processing device and acoustic processing method*. US Patent 9720068.

[25] Kazuhiro Nakadai, Keisuke Nakamura, Lana Sinapayen, and Michita Imai. *Sound processing device, sound processing method, and sound processing program*. US Patent 9,664,772. May 2017.

*Miscellaneous*

- Keynotes / Invited talks: `https://youtube.com/playlist?list=PLYuu1RcSnrYRS5HJNivMQDvaQQq0E7J5G`

- Open source code `https://github.com/LanaSina`

- Website `https://lanasina.github.io/`

- New publishing platform for collaborative science, open source: `https://docs.google.com/presentation/d/1V_K8hghgnvGfEtW7TdwtowTveZyy4Qs8rMemNyHx_Dg/edit?usp=sharing`