Jumpei Saito

Keio University | 2nd-year Undergraduate | Faculty of Environment and Information Studies
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Research Interests

Digital Fabrication, Multi-Robot Systems, Embedded & Wireless Systems, Human-Computer Interaction

Education

Bachelor (Expected), Faculty of Environment and Information Studies (SFC) *Apr 2024 – Mar 2028 (expected)*
Keio University
- Major: Computer Science
- GPA: 3.68 / 4.00

Publications & Research Outputs

1 **Jumpei Saito**, and Koya Narumi. 2024. An Interactive Method for Displaying Images Larger than a Screen Using a Mobile Actuated Display. Poster presentation at the 86th National Convention of IPSJ.

2 **Jumpei Saito**, Ryuki Tsuji, and Tomohiko Iida. 2025. Challenge and Future of Interface Development for Representing Virtual Worlds, following the Overall Championship at RoboCup 2024 OnStage League. Invited talk at the WIDE Camp, March 2025.

3 Rin Ishiguro, **Jumpei Saito**, Takumi Yamamoto, Mayuka Kuwana, and Koya Narumi. 2026. Implementing Deployable and Freeform Balloon Structures with a Single-Stroke Pouch Motor. The 216th IPSJ SIGHCI Technical Report, vol. 2026-HCI-216, no. 29, 7 pages. https://ipsj.ixsq.nii.ac.jp/record/2006471/files/IPSJ-HCI26216029.pdf

4 Hiroto Horie, Daniel Campos Zamora, Liang He, **Jumpei Saito**, and Koya Narumi. 2026. Implementing a Mobile 3D Printer that can Localize a Printing Position via Natural Language Instruction. The 88th National Convention of IPSJ, 2 pages, to appear in 2026.

5 Kaito Kikuchi, **Jumpei Saito**, Takeo Igarashi, and Koya Narumi. 2026. A Method to Synthesize Worn-Out Fabric Texture with a Physical Image Dataset. The 88th National Convention of IPSJ, 2 pages, to appear in 2026.

Research Experience

Undergraduate Researcher *Oct 2025 – Present*
Auto-ID Laboratory, Keio University — Advisor: Jin Mitsugi
Research on backscatter communication and signal processing.
- Designed and implemented QPSK signal processing for backscatter communication.
- Implemented modulation/demodulation and evaluated communication performance using MATLAB.

Technical Staff *Mar 2025 – Present*
Programmable Products Lab, Keio University — Advisor: Koya Narumi
Technical support and system implementation for digital fabrication research.
- Implemented hardware, electronics, and control software for a pouch-actuator-based fabrication machine.
- Developed G-code-driven control software for fabrication workflows.
- Built research-grade prototypes and data-collection apparatus for digital fabrication studies.

Research Mentee *Apr 2023 – Mar 2024*

Experts in Information Science Program, National Institute of Informatics (NII)
— Advisor: Koya Narumi

Research on interactive display systems using autonomous mobile robots.

- Selected as one of 40 high school students nationwide for a highly competitive informatics research program at NII.
- Investigated methods for presenting images larger than physical screens through autonomous moving displays.
- Presented research outcomes through poster and oral sessions; awarded Best Presentation / Poster Award.

Projects

RoboCup OnStage Team "Tomoshibi Technology" *Apr 2023 – Present*

Team Leader & Founder

Development of interactive multi-robot systems integrating mobility, actuation, and visual expression.

- Founded and led a robotics team from scratch, mentoring members with no prior robotics experience.
- Designed and implemented interactive robotic systems, including mobile robotic displays and illuminated actuated mechanisms.
- Led full-stack system integration spanning mechanical design (CAD), digital fabrication, circuit design (KiCad), embedded software, and FPGA-based control.
- Built and deployed a coordinated system of up to 15 robots; won championship titles at national and international RoboCup OnStage competitions.

Swarm Robots as a Medium for Ecosystem Dynamics *Sep 2025 – Present*

Exploratory Project

Exploring swarm robots as an interactive medium for representing ecosystem dynamics.

- Implemented a swarm robot coordination system for 20 Sony toio robots with collision avoidance.
- Demonstrated the system in collaboration with researchers in audio signal processing and biological systems.

Technical Skills

Software

- C/C++, Python, Verilog, MATLAB, Linux, Git
- Embedded software (motor control, timing-critical control, inter-MCU communication)
- HAL-based MCU programming (STM32, ESP32, ATmega)
- FPGA-based communication and rendering pipelines (Gowin Tang series)

Hardware

- 3D printing (Ender-3, Guider 2S, Bambu Lab printers)
- CNC machining (KitMill CL200), laser cutting
- Mechanical design using Autodesk Fusion
- Schematic and PCB design using KiCad

Awards

- *2024* — RoboCup Eindhoven 2024 OnStage League: **Individual Team 1st Place**
  International performance-robotics competition; won 1st place among 24 invited teams from around the world.
- *2024* — RoboCupJunior Japan Open 2024 OnStage League: **Champion & Presentation Award**
  Won the championship after six consecutive years of participation; qualified for the world championship.
- *2024* — Experts in Information Science Program (NII): **Best Poster Presentation Award**
  Received the program's top award among 40 selected high school students in NII's research mentorship program.
- *2025* — Keio University Shonan Fujisawa Campus (SFC): **SFC STUDENT AWARD**

Faculty-wide award; first-year undergraduate recipient in 9-years.

Fellowships & Grants

- *2022 – Present* — Masason Foundation Fellow: **Full Scholarship**
  One of 30 global fellows selected by Masayoshi Son (SoftBank Group) received cumulative funding exceeding JPY 10,000,000 for education and independent research.
- *2023* — MITOU Junior Program: **Selected Creator**
  One of 20 under-18 participants nationwide; awarded a JPY 500,000 scholarship to develop a custom 3D-printed motor with mentorship.
- *2024* — External Project Funding (Crowdfunding):
  Secured JPY 3,055,000 from 168 supporters to support international competition participation (RoboCup Eindhoven 2024).