HISASHI ISHIDA

+1 667-910-2558 ⋄ hishida3@jhu.edu ⋄ www.linkedin.com/in/hisashi-ishida95

⋄ https://youtube.com/playlist?list=PLgAkMcuvrL6i8IJakd$_I$2R$_A$4B1KCt3tW

EDUCATION

Johns Hopkins University, Baltimore, MD, USA   August 2021 - Present
Ph.D. student in Computer Science advised by Dr. Peter Kazanzides and Dr. Russell H. Taylor

The University of Tokyo, Tokyo, Japan   April 2021 - August 2021
Ph.D. student in Mechanical Engineering advised by Dr. Harada Kanako

The University of Tokyo, Tokyo, Japan   April 2019 - March 2021
Master of Science in Mechanical Engineering advised by Dr. Mamoru Mitsuishi

Massachusetts Institute of Technology, Massachusetts, U.S.A.   February 2017 - May 2017
Special Student Program, Mechanical Engineering

The University of Tokyo, Tokyo, Japan   April 2015 - March 2019
Bachelor of Science in Mechanical Engineering advised by Dr. Mamoru Mitsuishi

EXPERIENCE

Engineer Intern   November 2020 - April 2021
SENSYN ROBOTICS   *Tokyo, JAPAN*

- Developed digital twin pipeline for remote control for power shovel to optimize human resources while enhancing construction site safety.
- Implemented the visual interface to monitor surrounding environment of power shovel and assist the operator by providing information of the target.
- Skills: C++, Robot Operation System (ROS), RViz, Gazebo, Unified Robot Description Format (URDF)

PROJECTS

Digital Twin based assistance for improving situational awareness for skull-base Surgery.
Johns Hopkins University, January 2023 - Present

- Developed digital twin pipeline, which accurately represents the real-world robot motion and the preoperatively CT in the simulation within the millimeter accuracy.
- Implemented SDF-based haptic feedback to avoid collision with critical structures.
- Initial experiments using dental stone phantoms and cadaveric temporal bones demonstrate the system's feasibility and effectiveness.

SDF-based Guidance Modalities for Mastoidectomy Procedures.
Johns Hopkins University, January 2022 - May 2023

- Developed a multimodal navigation system for a mastoidectomy VR simulation to identify the effect of different modalities (visual, audio, and haptic) on performance and mental demands.
- Implemented visual, audio, and haptic feedback using Signed Distance Field (SDF).
- Evaluated system with expert otolaryngology surgeons and shown that the system improved procedural safety without no additional time or workload.

Semi-autonomous Assistance for Telesurgery under Communication Loss.
Johns Hopkins University, November 2021 - March 2023

- Proposed a telesurgery simulation framework that models an environment incorporating local and remote sites which can be applicable to provide high-quality surgery to medically underserved areas.

- Analyzed human behavior when there is a communication loss using the developed simulation and modeled the behavior using Kalman Filter.
- Provided different forms of assistance both under communication failure and when communication is restored.

Combined Segmentation Method for Harmonic scalpel using ResUnet and Classifier.
Japan Society of Computer Aided Surgery AI Challenge, September 2020 - November 2020

- Implemented semantic segmentation architecture (ResUnet) for the active blade of the harmonic scalpel and classification method for identifying the model of the scalpel.
- Adopted data augmentation methods to prevent over-fitting to dataset and improved accuracy to 90.6%.

Virtual Fixture Assistance for Suturing in Robot-Aided Pediatric Endoscopic Surgery.
Master Thesis, the University of Tokyo, March 2021.

- Propose guidance virtual fixtures to enhance the performance and the safety of suturing while generating the required task constraints using constrained optimization and Cartesian force feedback.
- Tested in simulations (CoppeliaSim) and experiments with a physical robot (DENSO VS050).
- Accepted to R-AL and presented at ICRA2020.

PUBLICATION

- **Hisashi Ishida***, Deepa Galaiya, Nimesh Nagururu, Francis Creighton, Peter Kazanzides, Russell Taylor, Manish Sahu*. "Beyond the Manual Touch: Situational-aware Force Control for Increased Safety in Robot-assisted Skullbase Surgery" Submitted to the 15th International Conference on Information Processing in Computer-Assisted Interventions (IPCAI). Under Review (*equal contributions)

- **Hisashi Ishida***, Manish Sahu*, Adnan Munawar, Nimesh Nagururu, Deepa Galaiya, Peter Kazanzides, Francis X. Creighton, and Russell H. Taylor. "Haptic-Assisted Collaborative Robot Framework for Improved Situational Awareness in Skull Base Surgery" Submitted to 2024 IEEE International Conference on Robotics and Automation (ICRA). Under Review (*equal contributions)

- **Hisashi Ishida***, Juan Antonio Barragan* *et al.* "Improving Surgical Situational Awareness with Signed Distance Field: A Pilot Study in Virtual Reality" 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).(*equal contributions)

- **Hisashi Ishida**, Adnan Munawar, Russell H. Taylor, Peter Kazanzides. "Semi-autonomous Assistance for Telesurgery under Communication Loss." 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

- **Hisashi Ishida**, Murilo M. Marinho, Kanako Harada, Mamoru Mitsuishi. "Preliminary Study on Looping Trajectory Classification for Robot-assisted Suturing in Pediatric Endoscopic Surgery." 16th Asian Conference on Computer Aided Surgery (ACCAS), Tokyo, Japan, November 2020. Excellent Paper Award.

- Risa Oikawa, Murilo M. Marinho, **Hisashi Ishida**, Kanako Harada, Mamoru Mitsuishi. "Towards the Semi-Automation of Looping in Robot Assisted Pediatric Endoscopic Surgery." 16th Asian Conference on Computer Aided Surgery (ACCAS), Tokyo, Japan, November 2020.

- Murilo M. Marinho*, **Hisashi Ishida***, Kanako Harada, Kyoichi Deie, and Mamoru Mitsuishi. "Virtual Fixture Assistance for Suturing in Robot-Aided Pediatric Endoscopic Surgery." IEEE Robotics and Automation Letters (RA-L), 5(2): 524–531, April 2020. Also presented at 2020 IEEE International Conference on Robotics and Automation (ICRA). (*equal contributions)

- **Hisashi Ishida**, Murilo M. Marinho, Kanako Harada, Jian Gao, Mamoru Mitsuishi. "Virtual-Fixtures for Robotic-Assisted Bi-Manual Cutting Using Vector-Field Inequalities." Proceedings of the 2020 IEEE/SICE International Symposium on System Integration (SII): 395-400, January 2020.

- **Hisashi Ishida**, Murilo M. Marinho, Kanako Harada, Mamoru Mitsuishi. "Virtual Fixtures for Suturing in Robot-Aided Pediatric Endoscopic Surgery." Proceedings of the 14th Asian Conference on Computer Aided Surgery (ACCAS): 50-51, November 2018.

AWARDS AND HONORS

- **Honorable Mention**   April 2022
  EN601.682 Machine Learning: Deep Learning course project Title: "Surgical Gesture Recognition in Videos and Kinematic Data." Johns Hopkins University

- **Dean's Award, The University of Tokyo**   March 2021
  Awarded as the top graduate from Mechanical Engineering department.

- **Excellent Paper Award**   November 2020
  16th Asian Conference on Computer Aided Surgery

- **Silver Award, Japan Society of Computer Aided Surgery AI Challenge**   November 2020
  Surgical tool segmentation competition.

- **Silver Award and Audience Award**   March 2019
  Sony-University of Tokyo Startup Idea Competition

- **Best Design Award** (Mechanical Engineering Practice Modules 2 Course),   March 2018
  Department of Mechanical Engineering, The University of Tokyo

SKILLS

Programming skills: C++, C, Python, OpenGL, OpenMP, MATLAB
Hardware: Arudino, Raspberry Pi
Robot system design: ROS, URDF
Simulation: AMBF, Rviz, CoppeliaSim, Gazebo
Deep learning framework: PyTorch

FELLOWSHIPS

- **ITO Foundation fellowship**   2021 - 2023
  Awarded 2-year fellowship ($50,000/year) for Ph.D. study in the US.

- **JSPS DC1 fellowship**   2021
  Research fellowship($8,000 for research grant and $2,000 for stipends) for young doctoral students from Japan Society for the Promotion of Science (JSPS).

- **Global Leader Program for Social Design and Management**   2019 - 2021
  Awarded monthly fellowship ($2,000 for stipends) for graduate study, The University of Tokyo.

- **World-leading Innovative Graduate Study Program Co-Designing Future Society**   2019 - 2021
  Awarded monthly fellowship ($2,000 for stipends) for graduate study, The University of Tokyo.

OTHERS

- Japanese: Native speaker

- English: Fluent speaker (TOEFL iBT 107).