Sicheng Lu

M.S.E. in Robotics, Johns Hopkins University, Baltimore, MD
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Research Interests

Embodied AI and humanoid robot learning, with the operating room as a driving application: vision-language navigation, visuomotor policies, sim-to-real transfer, and perception from surgical video to embodied agents.

Education

Johns Hopkins University Baltimore, MD
M.S.E. in Robotics; GPA: 3.7/4.0 Aug. 2025 – May 2027 (expected)

- Coursework: Foundations of Reinforcement Learning; Learning-Based Vision; Algorithms for Sensor-Based Robotics

Zhejiang University Haining, China
B.Eng. in Mechanical Engineering; GPA: 3.80/4.00 Sep. 2021 – Jun. 2025

University of Illinois Urbana-Champaign Urbana, IL
B.S. in Mechanical Engineering, Minor in ECE; GPA: 3.80/4.00; dual degree Aug. 2021 – May 2025

Publications (*equal contribution)

[1] H. Zhang*, **Sicheng Lu***, A. Santari, J. K. Jopling, M. Ishii, M. Unberath. "ActOR: Ambient AI-Based Agentic Orchestration for Humanoid Autonomy in Operating Rooms." Under review, *International Conference on Information Processing in Computer-Assisted Interventions (IPCAI)*, 2027.

[2] **Sicheng Lu***, Z. Xiao*, J. Wei*, D. Sun, Q. Lu, K. Hu, Y. Feng, J. Wu, Z. Yang, Z. Liu. "Scaling Video Pretraining for Surgical Foundation Models." *arXiv preprint* arXiv:2603.29966, 2026. [Code] [Weights]

[3] **Sicheng Lu**, C. Xu, Q. Lin, Y. Gao, Z. He. "RustGAN: A Method to Generate Rusty Screw with Physico-chemical Constraints." *International Conference on Advanced Mechatronic Systems (ICAMechS)*, pp. 7–12, 2024. doi:10.1109/ICAMechS63130.2024.10818721

Research Experience

Johns Hopkins University, Laboratory for Computational Sensing and Robotics (LCSR) Baltimore, MD
Graduate Researcher, ARCADE Lab (Advisor: Prof. Mathias Unberath) Jan. 2026 – Present

- **ActOR: ambient AI for humanoid autonomy in the operating room.** Co-first author [1].
  - **System:** built the framework, in which an LLM agent plans locomotion and manipulation skills over a digital twin fused from ambient and head cameras and replans from execution feedback.
  - **Deployment:** ran it on a Unitree G1 in a physical mock OR.
  - **Simulation (solely responsible):** ablations in ORs reconstructed from real rooms show that ambient perception reduces exploration and closed-loop feedback improves multi-step success.
- **End-to-end vision-language navigation (ongoing).** Train a G1 visuomotor policy from egocentric RGB and language with large-scale demonstrations from a privileged teacher in a reconstructed OR, targeting sim-to-real.

Zhejiang University, ZJU-UIUC Institute Haining, China
Research Assistant (Advisor: Prof. Zuozhu Liu) Apr. 2025 – Mar. 2026 (remote after Aug. 2025)

- **SurgRec: a medical-domain video foundation model.** Co-first author [2]. Curated 10,535 surgical videos (214.5M frames); led pretraining with balanced sampling, benchmark construction, evaluation, and manuscript.
- On a 16-dataset benchmark across four clinical domains (cataract, robotic, endoscopy, laparoscopy), SurgRec-MAE gains +3.18 points over VideoMAE on average (+5.43 in macro accuracy) and SurgRec-JEPA +2.61 over V-JEPA.

Undergraduate Research 2024

- RustGAN (Prof. Yicong Gao, ZJU): physics-constrained GAN for scarce defect data in disassembly vision [3].

Teaching Experience

Course Assistant, Computer Integrated Surgery I (Prof. Russell H. Taylor), Johns Hopkins University — Fall 2026
Teaching Assistant, Introductory Solid Mechanics (Prof. Jiahuan Cui), ZJU-UIUC Institute — Spring 2024

Technical Skills

Programming	Python, C++, PyTorch, ROS 2, Docker
Tools	Isaac Sim / Isaac Lab, MuJoCo, Pinocchio, Nav2, cuVSLAM, LiDAR SLAM, SAM2, GroundingDINO, AnyGrasp, Fast-FoundationStereo, DUSt3R, vLLM, SolidWorks, Fusion 360
Robots & Hardware	Unitree G1 with Dex1-1 grippers (Unitree SDK, CycloneDDS), ZED cameras, Jetson Orin