# Ji Woong (Brian) Kim

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## Education

- **Johns Hopkins University** — *Sept 2018 - Nov 2023*
  Ph.D in Mechanical Engineering, Robotics Concentration — Baltimore, USA
  ◦ Advisor: Marin Kobilarov

- **Johns Hopkins University** — *Sept 2013 - May 2018*
  B.S. in Mechnical Engineering — Baltimore, USA

## Work Experience

- **Stanford University** — *Jan 2025 - Current*
  Postdoctoral Researcher, Advised by Chelsea Finn — Stanford, USA
  ◦ Building foundation models for generalist robots

- **Johns Hopkins University** — *Nov 2023 - Dec 2024*
  Postdoctoral Researcher, Advised by Axel Krieger — Baltimore, USA
  ◦ Building dexterous and long-horizon policies for surgical robots

- **Zoox Inc.** — *May 2022 – Sep 2022*
  Motion Planning and Controls Intern — Foster City, USA
  ◦ Developed planner-centric metrics for optimal planner model selection

- **Johns Hopkins University** — *August 2015 – May 2017*
  Research intern — Baltimore, USA
  ◦ Studied how mechanical forces impact cellular behavior

- **Automated Processes Incorporated (API)** — *May 2014 – August 2014*
  Intern — Jessup, USA
  ◦ Assembled various sound mixing boards used in music studios

## Journal Papers

**[J.9]** **J. W. Kim**, J. T. Chen, P. Hansen, L. X. Shi, A. Goldenberg, S. Schmidgall, et al. **SRT-H: A hierarchical framework for autonomous surgery via language-conditioned imitation learning**. *Science Robotics* (2025), 10(104).
**2nd highest Altmetric score among all Science Robotics papers**

**[J.8]** S. Schmidgall, J. D. Opfermann, **J. W. Kim**, A. Krieger. **Will your next surgeon be a robot? Autonomy and AI in robotic surgery**. *Science Robotics* (2025), 10(104).

**[J.7]** M. Esfandiari, **J. W. Kim**, P. Zhang, J. S. Heng, P. Gehlbach, R. H. Taylor, I. Iordachita. **Bimanual Robotic Eye Manipulation Using Adaptive Sclera Force Control: Towards Safe Retinal Vein Cannulation**. *IEEE Transactions on Medical Robotics and Bionics* (2025).

**[J.6]** S. Schmidgall, **J. W. Kim**, A. Kuntz, A. E. Ghazi, A. Krieger. **General-purpose foundation models for increased autonomy in robot-assisted surgery**. *Nature Machine Intelligence* (2024), 6, 1275–1283.

**[J.5]** S. Schmidgall, C. Harris, I. Essien, ... **J. W. Kim**, et al. **Evaluation and mitigation of cognitive biases in medical language models**. *npj Digital Medicine* (2024), 7(1), 295.

**[J.4]** S. Schmidgall, **J. W. Kim**, A. Krieger. **Robots learning to imitate surgeons—challenges and possibilities**. *Nature Reviews Urology* (2024), 21(8).

**[J.3]** P. Zhang, **J. W. Kim**, P. Gehlbach, I. Iordachita, M. Kobilarov. **Autonomous needle navigation in subretinal injections via iOCT**. *IEEE Robotics and Automation Letters (RA-L)* (2024), 9(5).

**[J.2]** **J. W. Kim**, S. Wei, P. Zhang, P. Gehlbach, J. U. Kang, I. Iordachita, M. Kobilarov. **Towards autonomous retinal microsurgery using RGB-D Images**. *IEEE Robotics and Automation Letters (RA-L)* (2024), 9(4).
**Best poster award at IROS 2023 (Data vs Model in Medical Robotics workshop)**

**[J.1]** M. G. Urias, N. Patel, C. He, A. Ebrahimi, **J. W. Kim**, I. Iordachita, P. L. Gehlbach. **Artificial intelligence, robotics and eye surgery: are we overfitted?**. *International Journal of Retina and Vitreous* (2019), 5(1).

## Conference Papers

**[C.13]** **J. W. Kim**, K. Wang, S. Liu, Z. Fu, C. Gao, J. Lai, C. Finn. **Ego-Pi: VLA Fine-Tuning for Ego-Centric Human and Robot Data**. *Under review* (2025).

**[C.12]** L. Zbinden, N. Nelson, J. T. Chen, X. Chen, **J. W. Kim**, M. Azizian, A. Krieger, S. Huver. **Cosmos-Surg-dVRK: World Foundation Model-based Automated Online Evaluation of Surgical Robot Policy Learning**. *Under review* (2025).

**[C.11]** N. Barnes, **J. W. Kim**, L. Di, H. Qu, A. Bhattacharjee, et al. **Autonomous Soft Robotic Guidewire Navigation via Imitation Learning**. *Under review* (2025).

**[C.10]** J. Haworth, J. T. Chen, N. Nelson, **J. W. Kim**, M. Moghani, C. Finn, A. Krieger. **SutureBot: A Precision Framework & Benchmark For Autonomous End-to-End Suturing**. *NeurIPS* (2025).

**[C.9]** J. T. Chen, X. Chen, **J. W. Kim**, P. M. Scheikl, R. J. Cha, A. Krieger. **SurgiPose: Estimating Surgical Tool Kinematics from Monocular Video for Surgical Robot Learning**. *IROS* (2025).

**[C.8]** **J. W. Kim**, T. Z. Zhao, S. Schmidgall, A. Deguet, M. Kobilarov, C. Finn, A. Krieger. **Surgical Robot Transformer (SRT): Imitation Learning for Surgical Tasks**. *Conference on Robot Learning (CoRL)* (2024).
**Oral presentation (4.5%)**

**[C.7]** M. Esfandiari, **J. W. Kim**, B. Zhao, G. Amirkhani, M. Hadi, P. Gehlbach, I. Iordachita. **Cooperative vs. teleoperation control of the steady hand eye robot with adaptive sclera force control: A comparative study**. *IEEE International Conference on Robotics and Automation (ICRA)* (2024).

**[C.6]** P. Zhang, **J. W. Kim**, P. Gehlbach, I. Iordachita, M. Kobilarov. **Autonomous needle navigation in retinal microsurgery: Evaluation in ex vivo porcine eyes**. *IEEE International Conference on Robotics and Automation (ICRA)* (2023).

**[C.5]** K. Mach, S. Wei, **J. W. Kim**, A. Martin-Gomez, P. Zhang, J. U. Kang, et al. **OCT-guided robotic subretinal needle injections: A deep learning-based registration approach**. *IEEE International Conference on Bioinformatics and Biomedicine (BIBM)* (2022).

**[C.4]** S. Wei, **J. W. Kim**, A. Martin-Gomez, P. Zhang, I. Iordachita, J. U. Kang. **Region targeted robotic needle guidance using a camera-integrated optical coherence tomography**. *Optical Coherence Tomography* (2022).

**[C.3]** P. Zhang, **J. W. Kim**, M. Kobilarov. **Towards safer retinal surgery through chance constraint optimization and real-time geometry estimation**. *IEEE Conference on Decision and Control (CDC)* (2021).

**[C.2]** **J. W. Kim**, P. Zhang, P. Gehlbach, I. Iordachita, M. Kobilarov. **Towards autonomous eye surgery by combining deep imitation learning with optimal control**. *Conference on Robot Learning (CoRL)* (2021).

**[C.1]** **J. W. Kim**, C. He, M. Urias, P. Gehlbach, G. D. Hager, I. Iordachita, M. Kobilarov. **Autonomously navigating a surgical tool inside the eye by learning from demonstration**. *IEEE International Conference on Robotics and Automation (ICRA)* (2020).

## Technical Reports

**[T.3]** S. Schmidgall, **J. W. Kim**, J. Jopling, A. Krieger. (2024). **General surgery vision transformer: A video pre-trained foundation model for general surgery**. *arXiv preprint arXiv:2403.05949*.

**[T.2]** H. Ding, Y. Zhang, H. Shu, X. Lian, **J. W. Kim**, A. Krieger, M. Unberath. (2024). **Towards robust algorithms for surgical phase recognition via digital twin-based scene representation**. *arXiv preprint arXiv:2410.20026*.

**[T.1]** **J. W. Kim**, P. Zhang, P. Gehlbach, I. Iordachita, M. Kobilarov. **Micromanipulation in Surgery: Autonomous Needle Insertion Inside the Eye for Targeted Drug Delivery**. *Robotics: Science and Systems (RSS) Workshop* (2023).

## Invited Talks

**Building Robot Models That Can Perform Any Surgeries**

- Neural Information Processing Systems (NeurIPS), *Invited talk at GenAI4Health workshop* *Dec 2025*
- CRSA 16th Worldwide Congress, *Invited talk* *Nov 2025*
- Conference on Robot Learning (CoRL), *Invited talk at Automating Robotic Surgery workshop* *Sept 2025*
- China GI Surgical Forum, *Invited talk* *Sept 2025*
- Korean Society of Endo-Laparoscopic & Robotic Surgery (KSERS), *Invited talk* *April 2025*

**SRT-H: A Hierarchical Framework for Autonomous Surgery via Language-Conditioned Imitation Learning**

- Livsmed, *Invited talk* *Sept 2025*

**Surgical Robot Transformer (SRT): Imitation Learning for Surgical Tasks**

- Johns Hopkins University, *invited talk at Malone Center* *April 2024*

**Towards Autonomous Retinal Microsurgery Using RGB-D Images**

- Johns Hopkins University, *Invited talk in Iulian Iordachita's lab* *April 2021*

**Autonomous Needle Insertion in Microsurgery: a First Demonstration on ex-vivo Pig Retinal Veins**

- Johns Hopkins University, *Invited talk at graduate seminar* *April 2022*

**Towards Autonomous Eye Surgery by Combining Deep Imitation Learning and Optimal Control**

- Johns Hopkins University, *Invited talk at graduate seminar* *April 2021*

**Upcoming invited talks**

- Seoul National University, *Dec 2025*
- BrainX, *Dec 2025*
- GRASP seminar at UPenn, *Spring 2026*
- Global Breast Cancer Conference (GBCC), *April 2026*
- Robotcs Summit, *May 2026*

## Honors and Awards

- **Malone Center Best Presentation Award** 2024
- **Best poster award at IROS (Data vs Model in Medical Robotics workshop)** 2023
- **Provost's Undergraduate Research Award** 2016

## TEACHING

- Teaching Assistant, Johns Hopkins University — Fall 2022
  Applied Optimal Control (Marin Kobilarov)
- Teaching Assistant, Johns Hopkins University — Spring 2022
  Nonlinear Control and Planning in Robotics (Marin Kobilarov)

## STUDENT MENTORING

**Ph.D. Students**

- Juo-Tung Chen (JHU → Ph.D at JHU) — Science Robotics & NeurIPS 2025, in-progress
- Noah Barnes (JHU) — in-progress
- Xinhao Chen(JHU) — in-progress
- Sam Schmidgall (JHU → Google) — CoRL & Nature Machine Intelligence 2024
- Jesse Haworth (JHU) — NeulIPS 2025
- Mojtaba Esfandiari (JHU) — ICRA 2024

**Master's Students**

- Ke Wang (Stanford) — in-progress
- Pascal Hansen (JHU) — Science Robotics 2025
- Kristina Mach (JHU) — BIBM 2022
- Peiyao Zhang (JHU → Ph.D at JHU) — CoRL 2020

**Undergraduate Students**

- Javier Nieto (Stanford) — in-progress
- Antony Goldenberg (JHU) — Science Robotics 2025

## SERVICES

**Peer Review**

- **CoRL, RSS, RA-L, T-RO, TBME, ICRA, IROS, MICCAI, IPCAI**

## SELECTED PRESS COVERAGE

**[P.43]** Robots learn surgical tasks by watching videos, *The Washington Post*, Dec 22, 2024.

**[P.42]** Robot surgery on humans could be trialled within decade after success on pig organs, *The Guardian*, July 9, 2025.

**[P.41]** Experimental surgical robot performs gallbladder procedure autonomously, *Reuters*, July 2025.

**[P.40]** Surgical robots take step towards fully autonomous operations, *New Scientist*, July 2025.

**[P.39]** Robot listens to spoken instructions and performs surgery just like a human, *The Independent*, July 2025.

**[P.38]** A robot shows that machines may one day replace human surgeons, *El Pais*, July 9, 2025.

**[P.37]** Robot performs realistic gallbladder surgery with 100% accuracy, *Sky News*, July 2025.

**[P.36]** Robot Gallbladder Surgery, *Science Friday*, July 2025.

**[P.35]** Autonomous robot performs first realistic surgery without human help, *CTV News*, July 9, 2025.

**[P.34]** AI-trained robots surgery success on PIGS, *Daily Mail*, July 2025.

**[P.33]** AI-trained robot completes groundbreaking gall bladder operation with 100% success, *NY Post*, July 12, 2025.

**[P.32]** Robot performs surgery for first time, *The Mirror (UK)*, July 2025.

**[P.31]** Robotic surgery: Autonomous gallbladder removal, *UPI*, July 9, 2025.

[**P.30**] AI-guided robot performs complex gallbladder surgery autonomously, *South China Morning Post*, July 2025.

[**P.29**] In a first, a robot listened to spoken instructions and performed surgery, *IFL Science*, July 2025.

[**P.28**] AI-Controlled Robot Gallbladder Removal 100 Percent Accuracy, *Futurism*, July 2025.

[**P.27**] Worlds first robot surgery, *New Atlas*, July 2025.

[**P.26**] An autonomous gallbladder robot: realistic surgery, *Tech Xplore*, July 2025.

[**P.25**] Robot successfully removes gallbladder with 100% accuracy, *Cybernews*, July 2025.

[**P.24**] Johns Hopkins teaches robot to perform a gallbladder removal on a realistic patient, *The Robot Report*, July 2025.

[**P.23**] AI surgical robot removes gallbladder, *Interesting Engineering*, July 2025.

[**P.22**] Robot at Johns Hopkins performs first autonomous surgery, *Courthouse News*, July 2025.

[**P.21**] From Imitation to Action: Johns Hopkins Robot Autonomously Performs Key Step, *MedTech Insight*, July 2025.

[**P.20**] Johns Hopkins AI-powered, voice-controlled robot performs autonomous surgery, *Fierce Biotech*, July 2025.

[**P.19**] Robot performs surgery without a human controlling its hands for the first time ever, *Earth.com*, July 2025.

[**P.18**] Robot surgeon flawlessly perform surgery, *Study Finds*, July 2025.

[**P.17**] Da Vinci Code: First Autonomous Robot Surgery Achieved in Pig Cadavers, *Inside Precision Medicine*, July 2025.

[**P.16**] Robot performs surgery with '100% accuracy', *Fox News*, July 2025.

[**P.15**] Robotic surgery hits 'milestone' with autonomous gallbladder removal, *Miami Herald*, July 10, 2025.

[**P.14**] Robot surgeon executes key phase of surgery without human assistance, *HPCwire*, July 9, 2025.

[**P.13**] Doctors at Stanford and Johns Hopkins operate on animal organs without human intervention, *DeepLearning.AI*, July 2025.

[**P.12**] Robot performs realistic surgery 'with 100% accuracy', *The National*, July 9, 2025.

[**P.11**] Robot performs surgery with 100% accuracy on its own, *The Herald (Scotland)*, July 9, 2025.

[**P.10**] 100% Success Rate: AI Surgeon Does What Humans Can't Guarantee, *Sify*, July 25, 2025.

[**P.9**] Robot performs realistic surgery 'with 100% accuracy', *Border Telegraph*, July 9, 2025.

[**P.8**] AI-guided robot performs surgery alone and shocks doctors, *Click News*, July 12, 2025.

[**P.7**] AI-Powered Robot Performs First Autonomous Surgery on Patient Model, *OECD.AI*, July 9, 2025.

[**P.6**] AI surgical robot performs gallbladder op autonomously, *MedicalBrief*, July 16, 2025.

[**P.5**] Robot Performs Realistic Surgery Without Human Help, *OR Today*, September 1, 2025.

[**P.4**] Robotic surgery hits 'milestone' with autonomous gallbladder removal, *UCL News*, July 10, 2025.

[**P.3**] Automation in Construction: AI-powered surgical robot SRT-H, *Automation in Construction*, August 2, 2025.

[**P.2**] Robot performs first realistic surgery without human help, *The Hub (JHU)*, July 9, 2025.

[**P.1**] Robot injects drugs into back of eyeball more accurately than surgeons, *New Scientist*, 2023.