SARVESH SAINI

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Nationality: Indian

Current Address: South Miami, Florida-33143, USA.

Area of Specialization

Robotics, Design, Dynamics, Mechatronics, Control Systems, Intelligent Control, Surgical Robotics, Medical Devices, Haptics, and Agricultural Robots.

Experience

- **Postdoctoral Associate:** Robocans Lab, Dept. of Computer Science, University of Miami, Florida (Aug 2024–Present).
  Advisors: Prof. Ubbo Visser and Dr. Jonathan Katz. Working on the development of an **autonomous robotic ureteroscopy system (ARA-URS)** integrating a **Digital Twin (NVIDIA Isaac Sim)**. *Completed: Graduate Teaching Academy (GTA) course, University of Miami (2024–2025).*
- **Postdoctoral Researcher:** Robotics and Medical System Lab, Mechanical Engineering Department, UC Riverside, California (May 2023–July 2024).
  Developed a **steerable neurosurgical continuum robot** and a **macroscale cable-driven follow-the-leader continuum robot**.
- **Assistant Professor:** Mechanical Engineering Department, UPES, Dehradun (July 2022–April 2023). Taught courses: Robotics and Control, Introduction to Automation and Robotics, Biomedical Mechatronics, and Industrial, Service, and Medical Robots.
- **Junior Research Fellow:** Biomedical Division, CSIR–Central Scientific Instruments Organisation (CSIR–CSIO), India (June 2016–July 2017).

Academic Qualifications

- **Ph.D. (Robotics and Control):** Indian Institute of Technology Roorkee (IITR), India (July 2017–Nov 2022). Thesis: *"Modeling, development, and control of a Bilateral master-slave robotic system aiming natural orifice transluminal endoscopic surgery".*
- **M.Tech. (CAD, CAM, and Robotics):** IITR, India (July 2014–June 2016). Thesis: *"Experimental and Simulation Studies of Medical Robots".*
- **B.Tech. (Mechanical Engineering):** Maharishi Dayanand University, India (July 2009–June 2013).

Publications

Journal Articles

- R. Deuling, A. Akbari, **S. Saini**, L. Tian, B. Qi, M. S. Asif, and J. Sheng, "Design and Development of a Macroscale Cable-Driven Follow-the-Leader Continuum Robot," *IEEE Transac-*

tions on Mechatronics (Early Access), Nov 2025. **IF: 7.1**. DOI: 10.1109/TMECH.2025.3625485.

- **S. Saini**, S. Rezaeian, A. Akbari, B. Badie and J. Sheng, "Towards a Steerable Neurosurgical Robot for Debulking of Brain Mass Lesions," *IEEE Robotics and Automation Letters*, vol. 10, no. 5, pp. 4690-4697, May 2025. **IF: 4.6**. DOI: 10.1109/LRA.2025.3548352.
- **S. Saini**, M. F. Orlando, and P. M. Pathak, "Adaptive control of a master-slave teleoperated robotic surgical system with haptic feedback," *IEEE Transactions on Automation Science and Engineering*, vol. 20, no. 2, pp. 1125-38, 2022. **IF: 6.6**. DOI: 10.1109/TASE.2022.3183179.
- **S. Saini**, M. F. Orlando, and P. M. Pathak, "Intelligent Control of a Master-Slave based Robotic Surgical System," *Journal of Intelligent and Robotic Systems*, vol. 105, no. 94, pp. 1-20, 2022. **IF: 3.1**. DOI: 10.1007/s10846-022-01684-3.
- **S. Saini**, M. F. Orlando, and P. M. Pathak, "Development and Optimal Control of a Master-Follower Redundant Robot for NOTES," *IEEE Robotics and Automation Letters (RA-L)*, **IF: 5.2** (Under Revision).
- J. V. Ospina, A. Gordon, J. Ojalvo, **S. Saini**, et al., "Patient Positioning Influences Stone Migration in Ureteroscopy: A Simulation Study," *Simulation in Healthcare*, (Under Review).

Book Chapter

- **S. Saini**, M. F. Orlando, and P. M. Pathak, "Development of Intelligent Control Systems for Assistive Robots," in *Assistive Robotics: Modeling, Computation, and Realization*, vol. 2, D. Roy and S. Chakraverty, Eds., pp. 164–191. Boca Raton, FL, USA: CRC Press, Taylor & Francis Group, 2026. doi: 10.1201/9781003434436-10.

Conference Papers

- **S. Saini**, K. Halder, M. F. Orlando, and P. M. Pathak, "Neuro-Adaptive Control of a Master-Slave Robotic System," *Eighth Indian Control Conference (ICC)*, Chennai, India, 2022. DOI: 10.1109/ICC56513.2022.10093256.
- **S. Saini**, P. M. Pathak, and M. F. Orlando, "Bondgraph Modelling for the Master-Slave Robotic Teleoperation System," *28th IEEE RO-MAN 2019*, New Delhi, India. DOI: 10.1109/RO-MAN46459.2019.8956409.
- **S. Saini**, and P. M. Pathak, "Experimental and Simulation Study of Haptically Enabled Robotic Teleoperation for NOTES," *Proceedings of 4th International and 19th iNaCoMM 2019*. DOI: 10.1007/978-981-16-0550-5_106.
- **S. Saini**, J. Ojalvo, U. Visser, and J. Katz, "Robotic-Assisted Ureteroscopy (RA-URS) and its Digital Twin (DT): Design, Trials, and Validation," *IROS 2025 Workshop on Embodied Intelligence for Medical Robotics (EIMR-IROS2025)*, Hangzhou, China, Oct. 2025 (Accepted).
- **S. Saini**, J. Ojalvo, U. Visser, and J. Katz, "Autonomous Robot-Assisted Ureteroscopy (ARA-URS) for the Treatment of Kidney Stones," *IEEE International Conference on Robotics and Automation (ICRA)*, 2026 (Submitted).
- **S. Saini**, J. Ojalvo, U. Visser, and J. Katz, "A Novel Robotic System with Digital Twin for Ureteroscopy in Kidney Stone Surgery," *IEEE International Conference on Robotics and Automation (ICRA)*, 2026 (Submitted).

Patents

- **Robotic Ureteroscope System with Digital Twin** – Patent filed (UMIP-102241779.04020), 2025.
- **Steerable Robot for Brain Tumor Evacuation** – Patent filed, 2025.

Invited Talks

- **Computer Science Seminar Series**, Mar-2025, University of Miami, FL, USA.
  Topic: *Robotics in Surgery: Teleoperation and Automation.*
- **Graduate and Postdoctoral Research Symposium**, Mar-2025, University of Miami, FL, USA.
  Topic: *Development of Novel Digital Twin for Ureteroscopy with Laser Lithotripsy for Kidney Stone Surgery.*
- **Early Career Symposium, Riverside Postdoc Association**, May-2024, University of California, Riverside.
  Topic: *Macroscale Continuum Robot for Manipulation in Confined Agricultural Environment.*

Research Grants / Funding

- **Principal Investigator (PI):** *Semi-Automatic Solid Waste Segregation System* – SHODH-2023 Seed Grant, UPES-R&D, India. **Funding: INR 46,000**. Duration: 2023–2024.

Student Supervision / Mentoring

- **M.Tech Thesis (Main Supervisor):** "Design and Fabrication of Two-Wheeled Self-Balancing Autonomous Robot for Service Industry" — Student: Alok Singh, UPES, 2023.

Scholarly Achievements, Pedagogical Training & Professional Development

- **Graduate Teaching Academy (GTA), University of Miami, FL, USA (2025)**
  Completed pedagogical training in higher education emphasizing reflective *Teaching Philosophy*, **Fink's Taxonomy of Significant Learning**, active learning, assessment for learning, technology integration, and inclusive classroom practices.
- **Lab Development:** Established the **GLiDAR** project lab at the University of Miami, FL, USA.
- **Surgery Observership:** Kidney stone ureteroscopy surgery observership at UHealth, University of Miami, FL, USA.
- **Post-Doctoral Mentor:** Graduate Student Mentorship Program, University of California Riverside.
- **Faculty Mentor:** IEEE Chapter, School of Advanced Engineering, UPES, Dehradun.
- **Lab Coordinator:** Theory of Machine Lab, SOAE, UPES Dehradun (Jan–Apr 2023).
- **Best Indian Robotics Student Award:** 28th IEEE RO-MAN Conference, New Delhi (2019).

- **Recipient of LR Mudra Memorial Fellowship (Jan 2021):** Awarded for outstanding research contributions during Ph.D. **Grant: INR 3,00,000**.
- **Member:** IEEE and Society of Robotic Surgery.
- **DAAD Postdoc-NeT-AI Fellow:** Selected for the 2023–2024 program.