

AABHA TAMHANKAR

[Google Scholar](#) | [GitHub](#) | [LinkedIn](#) | [Website](#)

EDUCATION

PhD in Robotics Engineering, Worcester Polytechnic Institute Expected 2028
Thesis: Autonomous Control & Navigation for Neuroendovascular Procedures GPA: 4.00

Master's in Robotics Engineering, Worcester Polytechnic Institute May 2024
Thesis: Image Guidance and Safe Insertion Region Localization for Lumbar Puncture GPA: 3.88

RESEARCH EXPERIENCE

Autonomous Neuroendovascular Procedures Aug 2024 – Present
PhD Student — FuTURE Lab [Project Link](#)

- Architecting autonomous solutions for neurovascular interventions to reduce procedure time and radiation exposure.
- Collaborating with neurosurgeons at UMass Medical and Boston Children's Hospital to develop navigation algorithms.
- Engineering contact-aware models to simulate tool-vascular interactions, achieving a **20.68% increase in tip prediction accuracy** over current state-of-the-art methods.
- Achieved a **100% success rate** in navigation across 300 trials on three aortic arch variants (covering 94% of patient population) with a maximum runtime of **22.8s**.
- Developed algorithms to identify optimal patient-specific wire properties and select tools from commercial catalogues.
- Designed a closed-loop wire-tip shaping robot to customize tool geometry for patient-specific vascular anatomies.

Image Guidance for Lumbar Puncture Aug 2023 – May 2024
Master's Thesis Research [Thesis Link](#)

- Built an **MRI-ultrasound registration framework** enhancing intraoperative visualization for lumbar puncture.
- Implemented **intensity-based segmentation + 3D reconstruction** pipelines for real-time ultrasound integration.
- Established **real-time 3D probe localization in MRI**, enabling **intraoperative safe insertion region mapping**.
- Improved registration accuracy by **13.2% IoU** across 44 dynamic test cases using a custom local optimization.

WORK EXPERIENCE

Engineering Development Group Intern, MathWorks Natick, MA May 2023 - Aug 2023

- Enhanced **3D mapping and obstacle localization** by improving the Truncated Signed Distance Field (TSDF) representation through **voxel-level quadratic curve fitting**.
- Achieved a **15% improvement in localization accuracy** and a **12% reduction in runtime** compared to baseline TSDF with trilinear interpolation, validated in `drivingScenario` simulations in MATLAB.

PUBLICATIONS

- Cole Welcher, **A. Tamhankar**, L. Fichera, G. Pittiglio, "Contact-Aware Kinematics for Non-Coaxial Nested Continuum Robots with Arbitrary Play and Cross-Section," in **IEEE Transactions on Robotics (TRO)**, Under Review.
- **A. Tamhankar**, J. Patil, G. Pittiglio, "An Anatomy-specific Guidewire Shaping Robot for Improved Vascular Navigation," in *Proc. IEEE International Symposium on Medical Robotics (ISMR)*, 2026.
- **A. Tamhankar**, R. Alterovitz, A. Puri, G. Pittiglio, "Contact-aware Path Planning for Autonomous Neuroendovascular Navigation," in **IEEE Robotics & Automation Letters (RA-L)**, 2025.
- **A. Tamhankar**, G. Pittiglio, "Towards Autonomous Navigation of Neuroendovascular Tools for Timely Stroke Treatment via Contact-Aware Path Planning," in *Proc. IEEE International Symposium on Medical Robotics (ISMR)*, 2025. [2nd Place Best Student Paper Award]

ACHIEVEMENTS & SERVICE

- 2nd Place, Best Student Paper Award at IEEE Intl. Symposium on Medical Robotics (ISMR), 2025.
- Winner, People's Choice Award at Graduate Research Innovation Exchange (GRIE) WPI, 2024.
- Invited Speaker at WPI Robotics Colloquium: "Towards Autonomous Neuroendovascular Interventions".
- Graduate Lecturer on **Optical Flow** and **Motion Segmentation** for RBE 549 for a cohort of ≈ 60 students.
- Serving as a research mentor technical guidance to 10+ graduate students at the FuTURE Lab.