

RAVI PRAKASH

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EDUCATION

Duke University

Doctor of Philosophy in Mechanical Engineering and Materials Science

2022 - Present

Master of Science in Mechanical Engineering and Materials Science

2020 - 2021

National Institute of Technology Warangal

Bachelor of Technology in Mechanical Engineering

2015 - 2019

PUBLICATION

Prakash, R., Yang, W., Codd, P. J., Lin, S. *Continuous Optical Coherence Tomography Tissue Representation for Robotic Surgical Systems* (In Preparation)

Ma, G.*, **Prakash, R.***, Schleupner, B., Everitt, JI., Mishra, A., Chen, J., Mann, B., Chen, B., Bridgeman, L., Zhong, P., Draeos, M., Eward, Codd, P. J. *TumorMap: A Laser-based Surgical Platform for 3D Tumor Mapping and Fully-automated Tumor Resection* (In Preparation)

Prakash, R., Wang, V. Y., Chen, Z., Bridgeman, L., & Codd, P. J. *Portable Dual Sensor Large Area Visualization System for Robotic Laser Surgery*. (International Symposium on Medical Robotics, 2025, accepted)

Wang, V. Y., **Prakash, R.**, Oca, S. R., LoCicero, E. J., Codd, P. J., & Bridgeman, L. J. (2024). *Sampling-Based Model Predictive Control for Volumetric Ablation in Robotic Laser Surgery*. arXiv preprint arXiv:2410.03152. (International Conference on Robotics and Automation, 2025, accepted)

Chen, D., **Prakash, R.**, Chen, Z., Dias, S., Wang, V., Bridgeman, L., & Oca, S. (2024). *Design and Evaluation of a Compliant Quasi Direct Drive End-effector for Safe Robotic Ultrasound Imaging*. arXiv preprint arXiv:2410.03086.

Prakash, R., Dupre, M. E., Østbye, T., & Xu, H. (2024). *Extracting Critical Information from Unstructured Clinicians' Notes Data to Identify Dementia Severity Using a Rule-Based Approach: Feasibility Study*. JMIR aging, 7(1), e57926.

Sperber, J., Zachem, T.J., **Prakash, R.**, Owolo, E., Yamamoto, K., Nguyen, AD., Hockenberry, H., Ross, WA., Herndon, JE., Codd, P.J., Goodwin, CR (2024). *A Blinded Study Using Laser Induced Endogenous Fluorescence Spectroscopy to Differentiate Exvivo Spine Tumor, Healthy Muscle, and Healthy Bone*. Scientific Reports, 14(1), 1921.

Prakash, R., Dupre, M.E., Ostbye, T. and Xu, H., 2023. *A Rule-Based Framework to Identify Severity of Dementia from Unstructured Electronic Health Record Data*. Alzheimer's & Dementia, 19, p.e075325.

Zachem, T.J., Chen, S.F., Venkatraman, V., Sykes, D.A., **Prakash, R.**, Spellicy, S., Suarez, A.D., Ross, W. and Codd, P.J. (2023). *Computer Vision for Increased Operative Efficiency via Identification of Instruments in the Neurosurgical Operating Room: A Proof-of-Concept Study*. arXiv preprint arXiv:2312.03001.

Ross, W., **Prakash, R.**, Ma, G., Eward, W., Mann, B., Codd, P. (2023). *Optimization of Laser Photoablation for Robotic Soft-Tissue Surgery*. Workshop on Data vs Model in Medical Robotics (DMMR), 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems, Detroit, Michigan, United States.

Ma, G., **Prakash, R.**, Mann, B., Ross, W., Codd, P. (2023). *3D Laser-and-tissue Agnostic Data-driven Method for Robotic Laser Surgical Planning*. 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems, Detroit, Michigan, United States.

Prakash, R., Yamamoto, KK., Oca, SR., Ross, W., Codd, P.J. (2023, April 19-21). *Brain-Mimicking Phantom for Photoablation and Visualization*. International Symposium on Medical Robotics, Atlanta, Georgia, United States.

Chatterjee, A., Valaparla, R. K., **Prakash, R.**, Balasubramanian, K. (2019). *Comparative study of fluid flow and heat transfer in microchannels with uniformly varying cross-section*. In Proceedings of Emerging Trends in Mechanical Engineering (pp. 25–30). Warangal, Telangana.

WORKSHOP

Lin, S., **Prakash, R.**, Fichera, L., Mattos, L., Su, H., Yip, M.C., Codd, P., Webster III, R.J. (2025, May 19-23). *The Evolving Landscape of Surgical Robotics: Towards AI-Powered Unconventional Instruments and Technologies in the Operating Theatre*. International Conference on Robotics and Automation, Atlanta, Georgia, United States.

PATENT

Fudim, Marat, Eric Richardson, James Butch, Valerie Cross, Bidisha Nandi, Richard Lyon, **Ravi Prakash** et al. "Device for treating orthostatic syncope and methods thereof." U.S. Patent Application 18/618,762, filed October 3, 2024.

PRESENTATIONS RECENT 5

Chen,Z.* , Cahilig, A.C.* , Dias, S.,Kolar, P.,**Prakash, R.**, Codd, P. *Where is the Boundary: Multimodal Sensor Fusion Test Bench for Tissue Boundary Delineation* [Poster Presentation.] 2025 First Workshop on The Evolving Landscape of Surgical Robotics, IEEE International Conference on Robotics and Automation (ICRA)

Prakash, R., Ma, Guangshen., Wang, V., Schleupner, B., Mishra, A., Everitt, J., Mann, B., Zhong, P., Bridgeman, L., Draelos, M., Chen, B., Eward, W., Codd, P., (2024, October 25). *Towards Multimodal System For Non-contact Robotic Surgery* [Poster Presentation.] Duke Medical Robotics Symposium, Durham, United States.

Prakash, R., Dupre, M. E., Ostbye, T., Xu, H., (2023, July 16–20). *A Rule-Based Framework to Identify Severity of Dementia from Unstructured Electronic Health Record Data* [Poster Presentation]. Alzheimer’s Association International Conference, Amsterdam, Netherlands.

Sperber J, Zachem TJ, **Prakash R**, Chamberlain G, Cummings T, Ross W, Codd, PJ, Goodwin CR. *Characterization of the TumorID Technology to Differentiate Tumor from Non-Tumor in Frozen Samples* [Oral Presentation]. Global Spine Congress; May 31-June 6, 2023; Prague, Czech Republic.

Ma, G.,**Prakash, R.**, Mann, B., Ross, W., Codd, P. J. (2023, March 13–14). *3D Laser-and-tissue Agnostic Data-driven Method for Cavity Prediction* [Poster Session]. Fitzpatrick Institute for Photonics Symposium, Durham, North Carolina, United States.

Ma, G., **Prakash, R.**, Mann, B., Ross,W., Codd, P. J. (2023, March 13–14). *3D Laser-and-tissue Agnostic Data-driven Method for Cavity Prediction* [Poster Presentation]. Fitzpatrick Institute for Photonics Symposium, Durham, North Carolina, United States.

AWARDS

Rhodes Graduate Fellowship for Interdisciplinary Research, *Rhodes Information Initiative, Duke University*
Dean’s Research Award for Master’s Students, *Duke University*
Mechanical Engineering and Materials Science Graduate Scholarship, *Duke University*
Woo Center for Big Data and Precision Health Fellowship, *Duke University*
Duke Design Health Fellowship, *Duke University*
Laboratory and Curriculum Development Fellowship,*Mechanical Engineering and Materials Science, Duke University*
S.N.Bose Undergraduate Research Fellowship, *IUUSTF, Department of Science and Technology, Govt.of India*
Govt. of India Scholarship for Undergraduate Students, *National Institute of Technology Warangal*

GRANTS

Reimaging Surgery for Rural Needs: Robotics Teleoperation, Bass Connections Grant	01/2025
Bass Connections Collaborative Teaching Grant	06/2024
Duke Colab Student Research Award	03/2024
Bass Connections Research Grant	02/2024
Research Travel Grant, Duke India Initiative	03/2023
Maclin Community Connections Grant, Office of Diversity, Equity, and Inclusion, Duke University	03/2023
DEI Microaward, Graduate and Professional Student Government, Duke University	12/2022

WORK EXPERIENCE

Graduate Researcher <i>Dr.Patrick Codd, Brain-Tool Lab, & Dr.Boyuan Chen, General Robotics Lab,Duke University</i>	<i>01/2022 - Present</i>
- Advancing a closed-loop surgical platform for real-time tumor identification and resection in neurosurgery, leveraging multi-modal algorithms for sensor fusion and precise robotic control in real-world settings.	
Graduate Researcher <i>Dr.Xiao Yue Ni, Ni Lab, Duke University</i>	<i>07/2020 - 12/2021</i>
- Designed and implemented multimodal epidermal flexible device for speech based psychological state identification and neuro-degenerative diseases	
Woo Center Fellow <i>Dr.Hanzhang Xu, Duke University School of Nursing</i>	<i>05/2021 - 12/2021</i>
- Investigating distinct pathways to predict the stage of AD/DRD at the time of diagnosis in underrepresented communities using Duke's EHR data	
Teaching Assistant, Graduate Capstone Lab <i>Prof.George Delagrammatikas,Duke University</i>	<i>01/2021 - 04/2022</i>
- Facilitated setting up of Graduate Capstone lab (Garage Lab) and assisted in curriculum focused on open-source, hands-on experiential learning.Teaching assistant for Graduate Capstone course for Spring 2021,Fall 2021, and Spring 2022	
Acting Co-Lead,India <i>Sustainable Living Lab</i>	<i>05/2019 -08/2020</i>
- Designed and implemented new technology ventures along with Intel's global AI curriculum for non-tech audience.	
- Formulated and led "Futures+", a foresight driven community innovation program with entrepreneurial teams in Bhutan, India, Indonesia, and Singapore.	
Undergraduate Thesis <i>Prof.P.Bangaru Babu, National Institute of Technology Warangal</i>	<i>08/2018 - 05/2019</i>
- Thesis: "Experimental Study of Ledinegg Instability". Designed and fabricated a leakproof low-cost open-loop mini channel test setup to study hydrodynamic instabilities.	
- Enabled experimental heat transfer learning in resource-deprived areas.	
S.N.Bose Fellow <i>Prof.Debjyoti Banerjee ,Multi-Phase Flow and Heat Transfer Lab, Texas A&M University</i>	<i>06/2018 - 07/2018</i>
Summer Research Intern <i>Prof.Poh Seng Lee, Thermal Processing Lab, National University of Singapore</i>	<i>05/2017 - 07/2017</i>
Summer Research Intern <i>Dr.Atul Thakur, Mechatronics lab, IIT Patna</i>	<i>05/2016 - 06/2016</i>

TECHNICAL SKILLS

- **Robotics & Perception:** Sensor Fusion, Multi-modal Deep Learning, Multi-agent Drones, Acoustics, Optical Coherence Tomography, 3D Computer Vision, PCB design, Kinematics, Motion Planning, Robot Simulation (PyBullet)
- **Optics:** Laser-tissue Interaction, Optical System Design, Laser Systems
- **Software Programming:** Python, C++, MATLAB, Embedded Systems Programming, TinyML
- **Simulation Modeling:** CAD Modeling, Ansys (Fluent), Abaqus, FEA
- **Innovation Design:** Open Innovation, Human-Centric Design, Prototyping, Systems Engineering

PROFESSIONAL MEMBERSHIP

American Society of Mechanical Engineers
Institute of Electrical and Electronics Engineers

LEADERSHIP

Lab Manager, Brain Tool Lab	<i>07/2023 - Present</i>
President, Graduate Student Committee, Duke MEMS	<i>01/2022 - 05/2023</i>
Secretariat Member, Graduate and Professional Student Government, Duke	<i>08/2021 - 10/2022</i>
MEMS Representative,Engineering Graduate Student Committee	<i>08/2021 - 05/2022</i>
Founder and Mentor, TEDxNITW	<i>02/2017 - 05/2019</i>
Facilitator + Technical Lead, Innovation Garage (Incubation center cum makerspace)	<i>03/2016 - 05/2019</i>