Ron Alterovitz, Ph.D.

Lawrence Grossberg Distinguished Professor
Department of Computer Science
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Education

University of California, Berkeley
Ph.D., Industrial Engineering and Operations Research, 2006
Thesis: *Planning and Optimization Algorithms for Image-Guided Medical Procedures*
Committee: Ken Goldberg (Chair), James F. O'Brien, Alper Atamtürk, and Jean Pouliot

University of California, Berkeley
M.S., Industrial Engineering and Operations Research, 2003

California Institute of Technology (Caltech)
B.S. with Honors, Engineering and Applied Science (emphasis on Computer Science), 2001

Professional Experience

2024–present *Lawrence Grossberg Distinguished Professor (with Tenure)*, **University of North Carolina at Chapel Hill**, Department of Computer Science

2024–present *Associate Chair for Faculty Affairs*, **University of North Carolina at Chapel Hill**, Department of Computer Science

2023–2024 *Associate Chair for Research*, **University of North Carolina at Chapel Hill**, Department of Computer Science

2018–2024 *Professor (with Tenure)*, **University of North Carolina at Chapel Hill**, Department of Computer Science

2015–2018 *Associate Professor (with Tenure)*, **University of North Carolina at Chapel Hill**, Department of Computer Science

2009–2014 *Assistant Professor*, **University of North Carolina at Chapel Hill**, Department of Computer Science

2007–2008 *NIH Postdoctoral Research Fellow*, **University of California, San Francisco**, UCSF Comprehensive Cancer Center, and **University of California, Berkeley**, Department of Electrical Engineering and Computer Sciences

2006–2007 *Postdoctoral Research Fellow*, **LAAS-CNRS (National Center for Scientific Research)**, Toulouse, France, Robotics and Artificial Intelligence Group

2005 *Graduate Student Instructor*, **University of California, Berkeley**, Department of Electrical Engineering and Computer Sciences

2001–2006 *Graduate Student Researcher*, **University of California, Berkeley**, Berkeley Automation Sciences Laboratory

2000 *Software Developer*, **Oracle Corporation**

1999 *Software Developer*, **Netscape Communications**

1997, 1998 *Research Intern*, **NASA Glenn Research Center**

Honors

2025 IEEE Fellow, a distinction reserved for less than 0.1% of members of the IEEE, the world's largest engineering professional organization

2024 Best Paper Award - 1st Place, International Symposium on Medical Robotics (ISMR)

2023 Program Chair's Award (the Best Paper in which the first author is a student), ACM Conference on Global Computing Education (CompEd)

2023 Best Poster Award (Top 2), Workshop on Medical Robotics, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

2023 Best Poster Award, UNC Data Science Day

2021 Best Paper Award Finalist, Robotics: Science and Systems (RSS) Conference

2020 Best Student Paper Award Finalist, Dynamic Systems and Control Conference (DSCC)

2019 Presidential Early Career Award for Scientists and Engineers (PECASE): the highest honor bestowed by the United States Government on science and engineering professionals in the early stages of their independent research careers

2019 Most Read Paper, Trends in Cognitive Sciences, Apr. 17, 2019

2018 Featured Paper, ACM Transactions on Human-Robot Interaction (one of 4 papers selected by this journal for presentation at the field's flagship conference in 2018)

2017 Best Paper Award, Robotics: Science and Systems (RSS) Conference

2015 Best Paper Award, Medical Image Understanding and Analysis Conference

2015 Best Oral Presentation Award for paper presented by co-author, Hamlyn Symposium on Medical Robotics

2015 Paper from 2007 ranked in top 20 most cited papers from the last 10 years of the Robotics: Science and Systems (RSS) Conference

2012 National Science Foundation (NSF) CAREER Award

2010, 2013 UNC Computer Science Students Association (CSSA) Teaching Award

2009 "Highly Accessed" designation for article in BMC Bioinformatics journal

2009 Finalist for Best Paper Award in Medical Robotics, IEEE International Conference on Robotics and Automation (ICRA)

2007 National Institutes of Health (NIH) Ruth L. Kirschstein National Research Service Award

2006 Department of Defense (DOD) Prostate Cancer Research Fellowship (declined)

2003 Best Paper Award Finalist, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) (one of 7 finalists/1,000+ submissions)

2003–2006 National Science Foundation (NSF) Graduate Research Fellowship

2001–2003 National Defense Science and Engineering Graduate (NDSEG) Fellowship

2000–2001 Caltech Upper Class Merit Award full tuition scholarship

2001 Sigma Xi, The Scientific Research Society

2000 Tau Beta Pi National Engineering Honor Society

Bibliography

Refereed Journal Articles

1. Aabha Tamhankar, Ron Alterovitz, Ajit S. Puri, and Giovanni Pittiglio, "Contact-aware Path Planning for Autonomous Neuroendovascular Navigation," *IEEE Robotics and Automation Letters*, pp. 1–8, Feb. 2026.

2. Ron Alterovitz, Janine Hoelscher, and Alan Kuntz, "Medical needles in the hands of AI: Advancing toward autonomous robotic navigation," *Science Robotics*, vol. 10, no. 104, pp. eadt1874, July 2025.

3. Khoa T. Dang, Carter Hatch, Peter Connor, Stephen Qiu, Tony Qin, Ron Alterovitz, Robert J. Webster III, and Caleb Rucker, "Stiff yet Bendy: Tubular Transmissions for Driving Surgical Robots through Flexible Endoscopes," *Journal of Medical Robotics Research*, vol. 10, no. 01n02, pp. 2450005, June 2025.

4. Janine Hoelscher, Inbar Fried, Spiros Tsalikis, Jason Akulian, Robert J. Webster III, and Ron Alterovitz, "Safe Start Regions for Medical Steerable Needle Automation," *IEEE Transactions on Robotics*, vol. 41, pp. 2424–2440, Mar. 2025.

5. Angelos Angelopoulos, James F. Cahoon, and Ron Alterovitz, "Transforming science labs into automated factories of discovery," *Science Robotics*, vol. 8, no. 82, pp. eadm6991, Oct. 2024.

6. Alan Kuntz, Maxwell Emerson, Tayfun Efe Ertop, Inbar Fried, Mengyu Fu, Janine Hoelscher, Margaret Rox, Jason Akulian, Erin A. Gillaspie, Yueh Z. Lee, Fabien Maldonado, Robert J. Webster III, and Ron Alterovitz, "Autonomous medical needle steering in vivo," *Science Robotics*, vol. 8, no. 82, pp. eadf7614, Sep. 2023.

7. Mengyu Fu, Kiril Solovey, Oren Salzman, and Ron Alterovitz, "Toward Certifiable Optimal Motion Planning for Medical Steerable Needles," *International Journal of Robotics Research (IJRR)*, vol. 42, no. 10, pp. 798–826, Sep. 2023.

8. Mengyu Fu, Alan Kuntz, Oren Salzman, and Ron Alterovitz, "Asymptotically optimal inspection planning via efficient near-optimal search on sampled roadmaps," *International Journal of Robotics Research (IJRR)*, vol. 42, no. 4, pp. 150–175, Apr. 2023.

9. Janine Hoelscher, Mengyu Fu, Inbar Fried, Maxwell Emerson, Tayfun Efe Ertop, Margaret Rox, Alan Kuntz, Jason A. Akulian, Robert J. Webster III, and Ron Alterovitz, "Backward Planning for a Multi-Stage Steerable Needle Lung Robot," *IEEE Robotics and Automation Letters*, vol. 6, no. 2, pp. 3987–3994, Apr. 2021. [selected for presentation at the *IEEE International Conference on Robotics and Automation (ICRA)*, 2021]

10. Joseph D. Greer, Laura H. Blumenschein, Ron Alterovitz, Elliot W. Hawkes, and Allison M. Okamura, "Robust navigation of a soft growing robot by exploiting contact with the environment," *International Journal of Robotics Research (IJRR)*, vol. 39, no. 14, pp. 1724–1738, Dec. 2020.

11. Margaret Rox, Maxwell Emerson, Tayfun Efe Ertop, Mengyu Fu, Inbar Fried, Janine Hoelscher, Alan Kuntz, Josephine Granna, Jason Mitchell, Michael Lester, Fabien Maldonado, Erin Gillaspie, Jason Akulian, Ron Alterovitz, and Robert J. Webster III, "Decoupling Steerability from Diameter: Helical Dovetail Laser Patterning for Steerable Needles," *IEEE Access*, vol. 8, pp. 181411–181419, Oct. 2020.

12. Alan Kuntz, Armaan Sethi, Robert J. Webster III, and Ron Alterovitz, "Learning the Complete Shape of Concentric Tube Robots," *IEEE Transactions on Medical Robotics and Bionics*, vol. 2, no. 2, pp. 140–147, May 2020.

13. Yochanan E. Bigman, Adam Waytz, Ron Alterovitz, and Kurt Gray, "Holding Robots Responsible: The Elements of Machine Morality," *Trends in Cognitive Sciences*, vol. 23, no. 5, pp. 365–368, May 2019.
(**Most Read Paper, Apr. 17, 2019**)

14. Cenk Baykal, Chris Bowen, and Ron Alterovitz, "Asymptotically Optimal Kinematic Design of Robots using Motion Planning," *Autonomous Robots*, vol. 43, no. 2, pp. 345–357, Feb. 2019.

15. Chris Bowen and Ron Alterovitz, "Closed-loop Global Motion Planning for Reactive, Collision-free Execution of Learned Tasks," *ACM Transactions on Human-Robot Interaction (THRI)*, vol. 7, no. 1, pp. 10:1–10:16, May 2018.
(**One of four journal papers selected for oral presentation at the 2018 ACM/IEEE International Conference on Human-Robot Interaction (HRI)**)

16. Philip J. Swaney, Arthur W. Mahoney, Bryan I. Hartley, Andria A. Remirez, Erik Lamers, Richard H. Feins, Ron Alterovitz, and Robert J. Webster III, "Toward Transoral Peripheral Lung Access: Combining Continuum Robots and Steerable Needles," *Journal of Medical Robotics Research*, vol. 2, no. 1, pp. 1–14, 2017.

17. Ron Alterovitz, Sven Koenig, and Max Likhachev, "Robot Planning in the Real World: Research Challenges and Opportunities," *AI Magazine*, vol. 37, no. 2, pp. 76–84, Summer 2016.

18. Chris Bowen and Ron Alterovitz, "Asymptotically Optimal Motion Planning for Tasks Using Learned Virtual Landmarks," *IEEE Robotics and Automation Letters*, vol. 1, no. 2, pp. 1036–1043, July 2016. [selected for presentation at the *IEEE International Conference on Robotics and Automation (ICRA)*, 2016]

19. Momen Abayazid, Claudio Pacchierotti, Pedro Moreira, Ron Alterovitz, Domenico Prattichizzo, and Sarthak Misra, "Experimental Evaluation of Co-manipulated Ultrasound-guided Flexible Needle Steering," *International Journal of Medical Robotics and Computer Assisted Surgery*, vol. 12, no. 2, pp. 219–230, June 2016.

20. Wen Sun, Jur van den Berg, and Ron Alterovitz, "Stochastic Extended LQR for Optimization-based Motion Planning Under Uncertainty," *IEEE Transactions on Automation Science and Engineering*, vol. 13, no. 2, pp. 437–447, Apr. 2016.

21. Raul Wirz, Luis G. Torres, Philip J. Swaney, Hunter Gilbert, Ron Alterovitz, Robert J. Webster III, Kyle D. Weaver, and Paul T. Russell III, "An Experimental Feasibility Study on Robotic Endonasal Telesurgery," *Neurosurgery*, vol. 76, no. 4, pp. 479–484, Apr. 2015.

22. Wen Sun, Sachin Patil, and Ron Alterovitz, "High-Frequency Replanning under Uncertainty using Parallel Sampling-Based Motion Planning," *IEEE Transactions on Robotics*, vol. 31, no. 1, pp. 104–116, Feb. 2015.

23. Ken Goldberg, Siamak Faridani, and Ron Alterovitz, "Two Large Open-Access Datasets for Fitts' Law of Human Motion and a Succinct Derivation of the Square-Root Variant," *IEEE Transactions on Human-Machine Systems*, vol. 45, no. 1, pp. 62–73, Feb. 2015.

24. Chris Bowen, Gu Ye, and Ron Alterovitz, "Asymptotically-Optimal Motion Planning for Learned Tasks Using Time-Dependent Cost Maps," *IEEE Transactions on Automation Science and Engineering*, vol. 12, no. 1, pp. 171–182, Jan. 2015.

25. Momen Abayazid, Pedro Moreira, Navid Shahriari, Sachin Patil, Ron Alterovitz, and Sarthak Misra, "Ultrasound-Guided Three-Dimensional Needle Steering in Biological Tissue with Curved Surfaces," *Medical Engineering & Physics*, vol. 37, pp. 145–150, Jan. 2015.

26. Momen Abayazid, Gustaaf J. Vrooijink, Sachin Patil, Ron Alterovitz, and Sarthak Misra, "Experimental Evaluation of Ultrasound-Guided 3D Needle Steering in Biological Tissue," *International Journal of Computer Assisted Radiology and Surgery*, vol. 9, no. 6, pp. 931–939, Nov. 2014.

27. Jeffrey Ichnowski and Ron Alterovitz, "Scalable Multicore Motion Planning Using Lock-Free Concurrency," *IEEE Transactions on Robotics*, vol. 30, no. 5, pp. 1123–1136, Oct. 2014.

28. Gustaaf J. Vrooijink, Momen Abayazid, Sachin Patil, Ron Alterovitz, and Sarthak Misra, "Needle Path Planning and Steering in a Three-Dimensional Non-Static Environment using Two-Dimensional Ultrasound Images," *International Journal of Robotics Research (IJRR)*, vol. 33, no. 10, pp. 1361–1374, Sep. 2014.

29. Sachin Patil, Jessica Burgner, Robert J. Webster III, and Ron Alterovitz, "Needle Steering in 3-D via Rapid Replanning," *IEEE Transactions on Robotics*, vol. 30, no. 4, pp. 853–864, Aug. 2014.

30. Jur van den Berg, Sachin Patil, and Ron Alterovitz, "Motion Planning Under Uncertainty Using Iterative Local Optimization in Belief Space," *International Journal of Robotics Research (IJRR)*, vol. 31, no. 11, pp. 1263–1278, Sep. 2012.

31. Kyle B. Reed, Ann Majewicz, Vinutha Kallem, Ron Alterovitz, Ken Goldberg, Noah J. Cowan, and Allison M. Okamura, "Robot-Assisted Needle Steering," *IEEE Robotics and Automation Magazine*, vol. 18, pp. 35–46, Dec. 2011.

32. Vincent Duindam, Jijie Xu, Ron Alterovitz, Shankar Sastry, and Ken Goldberg, "Three-dimensional Motion Planning Algorithms for Steerable Needles Using Inverse Kinematics," *International Journal of Robotics Research (IJRR)*, vol. 29, no. 7, pp. 789–800, June 2010.

33. Nuttapong Chentanez, Ron Alterovitz, Daniel Ritchie, Jonha Cho, Kris Hauser, Ken Goldberg, Jonathan R. Shewchuk, and James F. O'Brien, "Interactive Simulation of Surgical Needle Insertion and Steering," *ACM Transactions on Graphics (Proc. SIGGRAPH)*, vol. 28, no. 3, pp. 88:1–88:10, Aug. 2009.
(**Image from article featured on back cover**)

34. Ron Alterovitz, Aaron Arvey, Sriram Sankararaman, Carolina Dallett, Yoav Freund, and Kimmen Sjölander, "ResBoost: Characterizing and Predicting Catalytic Residues in Enzymes," *BMC Bioinformatics*, vol. 10, no. 197, pp. 1–14, June 2009.
(**Designated as "Highly accessed" by BMC Bioinformatics**)

35. Ron Alterovitz, Ken Goldberg, Jean Pouliot, and I-Chow Hsu, "Sensorless Motion Planning for Medical Needle Insertion in Deformable Tissues," *IEEE Transactions on Information Technology in Biomedicine*, vol. 13, no. 2, pp. 217–225, Mar. 2009.

36. Ron Alterovitz, Michael Branicky, and Ken Goldberg, "Motion Planning Under Uncertainty for Image-Guided Medical Needle Steering," *International Journal of Robotics Research (IJRR)*, vol. 27, no. 11–12, pp. 1361–1374, Nov. 2008.

37. Ron Alterovitz, Etienne Lessard, Jean Pouliot, I-Chow Hsu, James F. O'Brien, and Ken Goldberg, "Optimization of HDR Brachytherapy Dose Distributions Using Linear Programming with Penalty Costs," *Medical Physics*, vol. 33, no. 11, pp. 4012–4019, Nov. 2006.

38. Ron Alterovitz, Ken Goldberg, Jean Pouliot, I-Chow Hsu, Yongbok Kim, Susan Moyher Noworolski, and John Kurhanewicz, "Registration of MR Prostate Images with Biomechanical Modeling and Nonlinear Parameter Estimation," *Medical Physics*, vol. 33, no. 2, pp. 446–454, Feb. 2006.

Refereed Conference Articles

1. Angelos Angelopoulos, Cem Baykal, Jade Kandel, Matthew Verber, James F. Cahoon, Ron Alterovitz, "The Experiment Orchestration System (EOS): Comprehensive Foundation for Laboratory Automation," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2025, pp. 15900–15906.

2. Syed W. Ali, Angelos Angelopoulos, Denver Massey, Sarah Haddix, Alexander Georgiev, Joseph Goh, Rohan Wagle, Prakash Sarathy, James H. Anderson, Ron Alterovitz, "On the Necessity of Real-Time Principles in GPU-Driven Autonomous Robots," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2025, pp. 8086–8092.

3. Janine Hoelscher, Inbar Fried, Oren Salzman, Ron Alterovitz, "Resolution Optimal Motion Planning for Medical Needle Steering from Airway Walls in the Lung," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2025, pp. 10659–10666.

4. Peter Connor, Carter Hatch, Khoa Dang, Tony Qin, Ron Alterovitz, Caleb Rucker, Robert J. Webster III, "A System for Endoscopic Submucosal Dissection Featuring Concentric Push-Pull Manipulators," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2025, pp. 3496–3501.

5. Emily McCabe, Margaret Rox, Maxwell Emerson, Tayfun Efe Ertop, Inbar Fried, Mengyu Fu, Janine Hoelscher, Fabien Maldonado, Erin A. Gillaspie, Jason Akulian, Yueh Z. Lee, Alan Kuntz, Ron Alterovitz, and Robert J. Webster III, "In Vivo Demonstration of a Bevel Tip Steerable Needle with an Integrated Fluid Channel," in *Proc. Hamlyn Symposium on Medical Robotics*, June 2024, pp. 25–26.

6. Khoa T. Dang, Stephen Qiu, Carter Hatch, Peter Connor, Tony Qin, Ron Alterovitz, Robert J. Webster III, and Caleb Rucker, "Design of Transmission Tubes for Surgical Concentric Push-Pull Robots," in *Proc. International Symposium on Medical Robotics (ISMR)*, June 2024, pp. 1–7.
   (**Best Paper Award - 1st Place**)

7. Janine Hoelscher, Bryce Ikeda, Daniel Szafir, and Ron Alterovitz, "Incorporating Retakes in a Robotics Class with Labs," in *Proc. ACM Technical Symposium on Computer Science Education (SIGCSE)*, Mar. 2024, pp. 1676—1677.

8. Bryce Ikeda, Janine Hoelscher, Ron Alterovitz, and Daniel Szafir, "Guiding the Development of Undergraduate Educational Robotics," in *Proc. ACM Conference on Global Computing Education (CompEd)*, Dec. 2023, pp. 71–77.
(**Program Chair's Award, the Best Paper in which the first author is a student**)

9. Inbar Fried, Janine Hoelscher, Jason A. Akulian, Stephen Pizer, and Ron Alterovitz, "Landmark Based Bronchoscope Localization for Needle Insertion Under Respiratory Deformation," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Oct. 2023, pp. 1–16.

10. Angelos Angelopoulos, Matthew Verber, Collin McKinney, James Cahoon, and Ron Alterovitz, "High-Accuracy Injection Using a Mobile Manipulation Robot for Chemistry Lab Automation," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Oct. 2023, pp. 1–16.

11. Tony Qin, Peter Connor, Khoa Dang, Ron Alterovitz, Robert J. Webster III, and Caleb Rucker, "Computational Analysis of Design Parameters for a Bimanual Concentric Push-Pull Robot," in *Proc. Hamlyn Symposium on Medical Robotics*, June 2023, pp. 19–20.

12. Janine Hoelscher, Inbar Fried, Mengyu Fu, Mihir Patwardhan, Max Christman, Jason Akulian, Robert J. Webster III, and Ron Alterovitz, "A Metric for Finding Robust Start Positions for Medical Steerable Needle Automation," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Oct. 2022, pp. 9526–9533.

13. Mengyu Fu, Kiril Solovey, Oren Salzman, and Ron Alterovitz, "Resolution-Optimal Motion Planning for Steerable Needles," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2022, pp. 9652–9659.

14. Mengyu Fu, Oren Salzman, and Ron Alterovitz, "Toward Certifiable Motion Planning for Medical Steerable Needles," in *Proc. Robotics: Science and Systems (RSS)*, July 2021, pp. 1–16.
(**Best Paper Award Finalist**)

15. Inbar Fried, Janine Hoelscher, Mengyu Fu, Maxwell Emerson, Tayfun Efe Ertop, Margaret Rox, Josephine Granna, Alan Kuntz, Jason A. Akulian, Robert J. Webster III, and Ron Alterovitz, "Design Considerations for a Steerable Needle Robot to Maximize Reachable Lung Volume," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2021, pp. 1418–1425.

16. Mengyu Fu, Oren Salzman, and Ron Alterovitz, "Computationally-Efficient Roadmap-based Inspection Planning via Incremental Lazy Search," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2021, pp. 7449–7456.

17. Maxwell Emerson, James M. Ferguson, Tayfun Efe Ertop, Margaret Rox, Josephine Granna, Michael Lester, Fabien Maldonado, Erin A. Gillaspie, Ron Alterovitz, Robert J. Webster III, and Alan Kuntz, "A Recurrent Neural Network Approach to Roll Estimation for Needle Steering," in *Proc. International Symposium on Experimental Robotics (ISER)*, Nov. 2020, pp. 334–342.

18. Tayfun Efe Ertop, Maxwell Emerson, Margaret Rox, Josephine Granna, Robert Webster, Fabien Maldonado, Erin Gillaspie, Michael Lester, Alan Kuntz, Caleb Rucker, Mengyu Fu, Janine Hoelscher, Inbar Fried, and Ron Alterovitz, "Steerable needle trajectory following in

the lung: torsional deadband compensation and full pose estimation with 5DOF feedback for needles passing through flexible endoscopes," in *Proc. ASME Dynamic Systems and Control Conference (DSCC)*, Oct. 2020, pp. 1–9.
(**Best Student Paper Award Finalist**)

19. Haonan Chen, Hao Tan, Alan Kuntz, Mohit Bansal, and Ron Alterovitz, "Enabling Robots to Understand Incomplete Natural Language Instructions Using Commonsense Reasoning," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2020, pp. 1963–1969.

20. Jeffrey Ichnowski, William Lee, Victor Murta, Samuel Paradis, Ron Alterovitz, Joseph E. Gonzalez, Ion Stoica, and Ken Goldberg, "Fog Robotics Algorithms for Distributed Motion Planning Using Lambda Serverless Computing," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2020, pp. 4232–4238.

21. Alan Kuntz, Mengyu Fu, and Ron Alterovitz, "Planning High-Quality Motions for Concentric Tube Robots in Point Clouds via Parallel Sampling and Optimization," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Nov. 2019, pp. 2205–2212.

22. Jeffrey Ichnowski and Ron Alterovitz, "Multilevel Incremental Roadmap Spanners for Reactive Motion Planning," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Nov. 2019, pp. 1504–1509.

23. Sherdil Niyaz, Alan Kuntz, Oren Salzman, Ron Alterovitz, and Siddhartha S. Srinivasa, "Optimizing Motion-Planning Problem Setup via Bounded Evaluation with Application to Following Surgical Trajectories," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Nov. 2019, pp. 1355–1362.

24. Shiwei Fang, Ron Alterovitz, and Shahriar Nirjon, "Non-Line-of-Sight Around the Corner Human Presence Detection Using Commodity WiFi Devices," in *Proc. ACM International Workshop on Device-Free Human Sensing (DFHS)*, Nov. 2019, pp. 22–26.

25. Mengyu Fu, Alan Kuntz, Oren Salzman, and Ron Alterovitz, "Toward Asymptotically-Optimal Inspection Planning Via Efficient Near-Optimal Graph Search," in *Proc. Robotics: Science and Systems (RSS)*, June 2019, pp. 1–10.

26. Alan Kuntz, Armaan Sethi, and Ron Alterovitz, "Estimating the Complete Shape of Concentric Tube Robots via Learning," in *Proc. Hamlyn Symposium on Medical Robotics*, June 2019, pp. 43–44.

27. Jeffrey Ichnowski and Ron Alterovitz, "Motion Planning Templates: A Motion Planning Framework for Robots with Low-power CPUs," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2019, pp. 612–618.

28. Chris Bowen and Ron Alterovitz, "Probability-weighted Temporal Registration for Improving Robot Motion Planning and Control Learned from Demonstrations," in *Algorithmic Foundations of Robotics (WAFR 2018)*, Dec. 2018, pp. 246–263.

29. Jeffrey Ichnowski and Ron Alterovitz, "Concurrent Nearest-Neighbor Searching for Parallel Sampling-based Motion Planning in SO(3), SE(3), and Euclidean Topologies," in *Algorithmic Foundations of Robotics (WAFR 2018)*, Dec. 2018, pp. 69–85.

30. Sherdil Niyaz, Alan Kuntz, Oren Salzman, Ron Alterovitz, and Siddhartha S. Srinivasa, "Following Surgical Trajectories with Concentric Tube Robots via Nearest-Neighbor Graphs," in *Proc. International Symposium on Experimental Robotics (ISER)*, Nov. 2018, pp. 3–13.

31. Mengyu Fu, Alan Kuntz, Robert J. Webster III, and Ron Alterovitz, "Safe Motion Planning for Steerable Needles Using Cost Maps Automatically Extracted from Pulmonary Images," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Oct. 2018, pp. 4942–4949.

32. Patrick Anderson, Tayfun Ertop, Alan Kuntz, Fabien Maldonado, Ron Alterovitz, and Robert J. Webster III, "Sand Blasting Inside a Patient: A CRISP Robot for Spraying Powder Inside the Chest Cavity to Preclude Lung Collapse," in *Hamlyn Symposium on Medical Robotics*, June 2018, pp. 121–122.

33. Alan Kuntz, Chris Bowen, Cenk Baykal, Arthur W. Mahoney, Patrick L. Anderson, Fabien Maldonado, Robert J. Webster III, and Ron Alterovitz, "Kinematic Design Optimization of a Parallel Surgical Robot to Maximize Anatomical Visibility via Motion Planning," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2018, pp. 926–933.

34. Chris Bowen and Ron Alterovitz, "Accelerating Motion Planning for Learned Mobile Manipulation Tasks using Task-Guided Gibbs Sampling," in *Proc. International Symposium on Robotics Research (ISRR)*, Dec. 2017, pp. 251–267.

35. Jeffrey Ichnowski, Jan Prins, and Ron Alterovitz, "The Economic Case for Cloud-based Computation for Robot Motion Planning," in *Proc. International Symposium on Robotics Research (ISRR)*, Dec. 2017, pp. 59–65.

36. Alan Kuntz, Chris Bowen, and Ron Alterovitz, "Fast Anytime Motion Planning in Point Clouds by Interleaving Sampling and Interior Point Optimization," in *Proc. International Symposium on Robotics Research (ISRR)*, Dec. 2017, pp. 929–945.

37. Alan Kuntz, Arthur W. Mahoney, Nicolas E. Peckman, Patrick L. Anderson, Fabien Maldonado, Robert J. Webster III, and Ron Alterovitz, "Motion Planning for Continuum Reconfigurable Incisionless Surgical Parallel Robots," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Sep. 2017, pp. 6463–6469.

38. Cenk Baykal and Ron Alterovitz, "Asymptotically Optimal Design of Piecewise Cylindrical Robots using Motion Planning," in *Proc. Robotics: Science and Systems (RSS)*, July 2017, pp. 1–10.
(**Best Paper Award**)

39. Qingyu Zhao, Stephen Pizer, Ron Alterovitz, Marc Niethammer, and Julian Rosenman, "Orthotropic Thin Shell Elasticity Estimation for Surface Registration," in *Proc. Information Processing in Medical Imaging (IPMI)*, June 2017, pp. 493–504.

40. Jeffrey Ichnowski, Jan Prins, and Ron Alterovitz, "Cloud-based Motion Plan Computation for Power-Constrained Robots," in *Algorithmic Foundations of Robotics (WAFR 2016)*, Dec. 2016, pp. 96–111.

41. Qingyu Zhao, True Price, Stephen Pizer, Marc Niethammer, Ron Alterovitz, and Julian Rosenman, "The Endoscopogram: A 3D Model Reconstructed from Endoscopic Video Frames," in *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, Oct. 2016, pp. 439–447.
(**Selected for oral presentation; only 5.0% of submissions presented orally**)

42. Alan Kuntz, Philip J. Swaney, Arthur W. Mahoney, Richard H. Feins, Yueh Z. Lee, Robert J. Webster III, and Ron Alterovitz, "Toward Transoral Peripheral Lung Access: Steering Bronchoscope-deployed Needles through Porcine Lung Tissue," in *Hamlyn Symposium on Medical Robotics*, June 2016, pp. 9–10.

43. Alan Kuntz, Luis G. Torres, Richard H. Feins, Robert J. Webster III, and Ron Alterovitz, "Motion Planning for a Three-Stage Multilumen Transoral Lung Access System," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Sep. 2015, pp. 3255–3261.

44. Cenk Baykal, Luis G. Torres, and Ron Alterovitz, "Optimizing Design Parameters for Sets of Concentric Tube Robots using Sampling-based Motion Planning," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Sep. 2015, pp. 4381–4387.

45. Qingyu Zhao, James Price, Stephen Pizer, Marc Niethammer, Ron Alterovitz, and Julian Rosenman, "Surface Registration in the Presence of Missing Patches and Topology Change," in *Proc. Medical Image Understanding and Analysis*, July 2015, pp. 8–13.
(**Best Paper Award**)

46. Philip J. Swaney, Hunter B. Gilbert, Richard J. Hendrick, Oliver Commichau, Ron Alterovitz, and Robert J. Webster III, "Transoral Steerable Needles in the Lung: How Non-annular Concentric Tube Robots Can Improve Targeting," in *Hamlyn Symposium on Medical Robotics*, June 2015, pp. 37–38.
(**Best Oral Presentation Award**)

47. Luis G. Torres, Alan Kuntz, Hunter B. Gilbert, Philip J. Swaney, Richard J. Hendrick, Robert J. Webster III, and Ron Alterovitz, "A Motion Planning Approach to Automatic Obstacle Avoidance during Concentric Tube Robot Teleoperation," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2015, pp. 2361–2367.

48. Philip J. Swaney, Arthur W. Mahoney, Andria A. Remirez, Erik Lamers, Bryan I. Hartley, Richard H. Feins, Ron Alterovitz, and Robert J. Webster III, "Tendons, Concentric Tubes, and a Bevel Tip: Three Steerable Robots in One Transoral Lung Access System," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2015, pp. 5378–5383.

49. Chris Bowen and Ron Alterovitz, "Closed-Loop Global Motion Planning for Reactive Execution of Learned Tasks," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Sep. 2014, pp. 1754–1760.

50. Wen Sun and Ron Alterovitz, "Motion Planning under Uncertainty for Medical Needle Steering Using Optimization in Belief Space," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Sep. 2014, pp. 1775–1781.

51. Jeffrey Ichnowski and Ron Alterovitz, "Fast Nearest Neighbor Search in SE(3) for Sampling-Based Motion Planning," in *Algorithmic Foundations of Robotics XI (WAFR 2014)*, H. L. Akin et al. (Eds.), STAR vol. 107, Springer, Aug. 2014, pp. 197–214.

52. Wen Sun, Jur van den Berg, and Ron Alterovitz, "Stochastic Extended LQR: Optimization-based Motion Planning Under Uncertainty," in *Algorithmic Foundations of Robotics XI (WAFR 2014)*, H. L. Akin et al. (Eds.), STAR vol. 107, Springer, Aug. 2014, pp. 609–626.

53. Luis G. Torres, Cenk Baykal, and Ron Alterovitz, "Interactive-rate Motion Planning for Concentric Tube Robots," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2014, pp. 1915–1921.

54. Jeffrey Ichnowski, Jan F. Prins, and Ron Alterovitz, "Cache-Aware Asymptotically-Optimal Sampling-Based Motion Planning," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2014, pp. 5804–5810.

55. Wen Sun, Islam S. M. Khalil, Sarthak Misra, and Ron Alterovitz, "Motion Planning for Paramagnetic Microparticles Under Motion and Sensing Uncertainty," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2014, pp. 5811–5817.

56. Pedro Moreira, Sachin Patil, Ron Alterovitz, and Sarthak Misra, "Needle Steering in Biological Tissue using Ultrasound-based Online Curvature Estimation," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2014, pp. 4368–4373.

57. Wen Sun, Luis G. Torres, Jur van den Berg, and Ron Alterovitz, "Safe Motion Planning for Imprecise Robotic Manipulators by Minimizing Probability of Collision," in *Proc. International Symposium on Robotics Research (ISRR)*, Dec. 2013, pp. 685–701.

58. Edgar Lobaton, Jinghua Fu, Luis G. Torres, and Ron Alterovitz, "Continuous Shape Estimation of Continuum Robots Using X-ray Images," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2013, pp. 717–724.

59. Luis G. Torres, Robert J. Webster III, and Ron Alterovitz, "Task-oriented Design of Concentric Tube Robots using Mechanics-based Models," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Oct. 2012, pp. 4449–4455.

60. Jeffrey Ichnowski and Ron Alterovitz, "Parallel Sampling-Based Motion Planning with Superlinear Speedup," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Oct. 2012, pp. 1206–1212.

61. Jur van den Berg, Sachin Patil, and Ron Alterovitz, "Efficient Approximate Value Iteration for Continuous Gaussian POMDPs," in *Proc. Twenty-Sixth AAAI Conference (AAAI-12)*, July 2012, pp. 1832–1838.

62. Sachin Patil, Jur van den Berg, and Ron Alterovitz, "Estimating Probability of Collision for Safe Planning under Gaussian Motion and Sensing Uncertainty," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2012, pp. 3238–3244.

63. Edgar Lobaton, Ram Vasudevan, Ron Alterovitz, and Ruzena Bajcsy, "Robust Topological Features for Deformation Invariant Image Matching," in *Proc. International Conference on Computer Vision (ICCV)*, Nov. 2011, pp. 2516–2523.

64. Luis G. Torres and Ron Alterovitz, "Motion Planning for Concentric Tube Robots Using Mechanics-based Models," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Sep. 2011, pp. 5153–5159.

65. Jur van den Berg, Sachin Patil, and Ron Alterovitz, "Motion Planning under Uncertainty using Differential Dynamic Programming in Belief Space," in *Proc. International Symposium on Robotics Research (ISRR)*, Aug. 2011, pp. 473–490.

66. Gu Ye and Ron Alterovitz, "Demonstration-Guided Motion Planning," in *Proc. International Symposium on Robotics Research (ISRR)*, Aug. 2011, pp. 291–307.

67. Sachin Patil, Jur van den Berg, and Ron Alterovitz, "Motion Planning Under Uncertainty in Highly Deformable Environments," in *Proc. Robotics: Science and Systems (RSS)*, June 2011, pp. 1–8.

68. Edgar Lobaton, Jinghe Zhang, Sachin Patil, and Ron Alterovitz, "Planning Curvature-Constrained Paths to Multiple Goals Using Circle Sampling," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2011, pp. 1463–1469.

69. Ron Alterovitz, Sachin Patil, and Anna Derbakova, "Rapidly-Exploring Roadmaps: Weighing Exploration vs. Refinement in Optimal Motion Planning," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2011, pp. 3706–3712.

70. Jur van den Berg, Sachin Patil, Ron Alterovitz, Pieter Abbeel, and Ken Goldberg, "LQG-Based Planning, Sensing, and Control of Steerable Needles," in *Algorithmic Foundations of Robotics IX (WAFR 2010)*, D. Hsu et al. (Eds.), STAR vol. 68, Springer-Verlag, 2010, pp. 373–389.

71. Sachin Patil and Ron Alterovitz, "Interactive Motion Planning for Steerable Needles in 3D Environments with Obstacles," in *Proc. IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics (BioRob)*, Sep. 2010, pp. 893–899.

72. Edgar Lobaton, Ram Vasudevan, Ruzena Bajcsy, and Ron Alterovitz, "Local Occlusion Detection Under Deformations Using Topological Invariants," in *Proc. European Conference on Computer Vision (ECCV)*, Lecture Notes in Computer Science 6313, Sep. 2010, pp. 101–114.
(**Selected for oral presentation; only 3.2% of submissions presented orally**)

73. Lisa A. Lyons, Robert J. Webster III, and Ron Alterovitz, "Planning Active Cannula Configurations Through Tubular Anatomy," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2010, pp. 2082–2087.

74. Sachin Patil and Ron Alterovitz, "Toward Automated Tissue Retraction in Robot-Assisted Surgery," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2010, pp. 2088–2094.

75. Lisa A. Lyons, Robert J. Webster III, and Ron Alterovitz, "Motion Planning for Active Cannulas," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Oct. 2009, pp. 801–806.

76. Jijie Xu, Vincent Duindam, Ron Alterovitz, Jean Pouliot, J. Adam M. Cunha, I-Chow Hsu, and Ken Goldberg, "Planning Fireworks Trajectories for Steerable Medical Needles to Reduce Patient Trauma," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Oct. 2009, pp. 4517–4522.

77. Kris Hauser, Ron Alterovitz, Nuttapong Chentanez, Allison Okamura, and Ken Goldberg, "Feedback Control for Steering Needles Through 3D Deformable Tissue Using Helical Paths," in *Proc. Robotics: Science and Systems (RSS)*, 2009, pp. 1–8.

78. Meysam Torabi, Kris Hauser, Ron Alterovitz, Vincent Duindam, and Ken Goldberg, "Guiding Medical Needles Using Single-Point Tissue Manipulation," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2009, pp. 2705–2710.
(**Finalist for Best Paper Award in Medical Robotics**)

79. Vincent Duindam, Jijie Xu, Ron Alterovitz, Shankar Sastry, and Ken Goldberg, "3D Motion Planning Algorithms for Steerable Needles Using Inverse Kinematics," in *Algorithmic Foundation of Robotics VIII (WAFR 2008)*, G. S. Chirikjian et al. (Eds.), STAR vol. 57, Springer-Verlag, Dec. 2008, pp. 535–549.

80. Kyle B. Reed, Vinutha Kallem, Ron Alterovitz, Ken Goldberg, Allison M. Okamura, and Noah J. Cowan, "Integrated Planning and Image-Guided Control for Planar Needle Steering," in *Proc. IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics (BioRob)*, Oct. 2008, pp. 819–824.

81. Jeremy Schiff, Anand Kulkarni, Danny Bazo, Vincent Duindam, Ron Alterovitz, Dezhen Song, and Ken Goldberg, "Actuator Networks for Navigating an Unmonitored Mobile Robot," in *Proc. IEEE International Conference on Automation Science and Engineering (CASE)*, Aug. 2008, pp. 53–60.

82. Jijie Xu, Vincent Duindam, Ron Alterovitz, and Ken Goldberg, "Motion Planning For Steerable Needles in 3D Environments with Obstacles Using Rapidly-Exploring Random Trees and Backchaining," in *Proc. IEEE International Conference on Automation Science and Engineering (CASE)*, Aug. 2008, pp. 41–46.

83. Vincent Duindam, Ron Alterovitz, Shankar Sastry, and Ken Goldberg, "Screw-Based Motion Planning for Bevel-Tip Flexible Needles in 3D Environments with Obstacles," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, May 2008, pp. 2483–2488.

84. Ron Alterovitz, Thierry Siméon, and Ken Goldberg, "The Stochastic Motion Roadmap: A Sampling Framework for Planning with Markov Motion Uncertainty," in *Robotics: Science and Systems III (Proc. RSS 2007)*, W. Burgard et al. (Eds.), MIT Press, 2008, pp. 233–241. (**Ranked in 2015 as a top 20 most cited paper from RSS in the last 10 years**)

85. Ron Alterovitz, Michael Branicky, and Ken Goldberg, "Constant-Curvature Motion Planning Under Uncertainty with Applications in Image-Guided Medical Needle Steering," in *Algorithmic Foundation of Robotics VII (WAFR 2006)*, S. Akella et al. (Eds.), STAR vol. 47, Springer-Verlag, 2008, pp. 319–334.

86. Ron Alterovitz, Andrew Lim, Ken Goldberg, Gregory S. Chirikjian, and Allison M. Okamura, "Steering Flexible Needles Under Markov Motion Uncertainty," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Aug. 2005, pp. 120–125.

87. Ron Alterovitz, Ken Goldberg, and Allison M. Okamura, "Planning for Steerable Bevel-tip Needle Insertion Through 2D Soft Tissue with Obstacles," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, Apr. 2005, pp. 1652–1657.

88. Ron Alterovitz, Ken Goldberg, John Kurhanewicz, Jean Pouliot, and I-Chow Hsu, "Image Registration for Prostate MR Spectroscopy Using Biomechanical Modeling and Optimization of Force and Stiffness Parameters," in *Proc. 26th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBS)*, Sep. 2004, pp. 1722–1725.

89. Ron Alterovitz, Jean Pouliot, Richard Taschereau, I-Chow Hsu, and Ken Goldberg, "Sensorless Planning for Medical Needle Insertion Procedures," in *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Oct. 2003, pp. 3337–3343. (**Best Paper Award Finalist**)

90. Ron Alterovitz, Jean Pouliot, Richard Taschereau, I-Chow Hsu, and Ken Goldberg, "Needle Insertion and Radioactive Seed Implantation in Human Tissues: Simulation and Sensitivity Analysis," in *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, Sep. 2003, pp. 1793–1799.

91. James Moller, Mathew Carlson, Ron Alterovitz, and Joseph Swartz, "Post-ejection Cooling Behavior of Injection Molded Parts," in *Proc. 56th Annual Technical Conference (ANTEC '98)*, vol. 1, Society of Plastics Engineers, Brookfield, CT, 1998, pp. 525–529.

Conference Abstracts, Posters, and Workshop Papers

1. Peter Connor, Khoa Dang, Carter Hatch, Tony Qin, Ron Alterovitz, Caleb Rucker, and Robert J. Webster III, "A Damped Least Squares Switching-Based Framework for Surgeon Control of Multiple Points Along Concentric Push-Pull Manipulators," in *IEEE International Conference on Robotics and Automation (ICRA) Workshop on the Evolving Landscape of Surgical Robotics (ELSR)*, Atlanta, GA, May 2025, pp. 1–3.

2. Inbar Fried, Janine Hoelscher, Jason A. Akulian, and Ron Alterovitz, "A Dataset of Anatomical Environments for Medical Robots: Modeling Respiratory Deformation," in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) Workshop on Data vs. Model in Medical Robotics*, Detroit, MI, Oct. 2023, pp. 1–4.
(**Best Poster Award (Top 2)**)

3. Inbar Fried, Jason A. Akulian, and Ron Alterovitz, "A Clinical Dataset for the Evaluation of Motion Planners in Medical Applications," in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) Workshop on Evaluating Motion Planning Performance*, Kyoto, Japan, Oct. 2022, pp. 1–4.

4. Margaret Rox, Maxwell Emerson, Tayfun Efe Ertop, Mengyu Fu, Inbar Fried, Janine Hoelscher, Alan Kuntz, Josephine Granna, Jason Mitchell, Michael Lester, Fabien Maldonado, Erin Gillaspie, Jason Akulian, Ron Alterovitz, and Robert J. Webster III, "An Aiming Device for Steerable Needles," in *Proc. IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)*, Late Breaking Results Poster, Boston, MA (held virtually), July 2020.

5. Maxwell Emerson, Tayfun Efe Ertop, Margaret Rox, Mengyu Fu, Inbar Fried, Janine Hoelscher, Alan Kuntz, Josephine Granna, Jason Mitchell, Michael Lester, Fabien Maldonado, Erin Gillaspie, Jason Akulian, Ron Alterovitz, and Robert J. Webster III, "A New Sheath for Highly Curved Steerable Needles," in *Proc. IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)*, Late Breaking Results Poster, Boston, MA (held virtually), July 2020.

6. Stephanie Amack, Margaret Rox, Jason Mitchell, Tayfun Efe Ertop, Maxwell Emerson, Alan Kuntz, Fabien Maldonado, Jason Akulian, Joshua Gafford, Ron Alterovitz, and Robert J. Webster III, "Design and Control of a Compact Modular Robot for Transbronchial Lung Biopsy," in *Proc. SPIE Medical Imaging*, vol. 109510I, San Diego, CA, Feb. 2019, pp. 1–8.

7. Sarah McGill, Julian Rosenman, Qingyu Zhao, Rui Wang, Ruibin Ma, Miao Fan, Marc Niethammer, Ron Alterovitz, Jan-Michael Frahm, Joel Tepper, and Stephen Pizer, "Missed Colonic Surface area at Colonoscopy Can Be Calculated with Computerized 3D Reconstruction," *Digestive Disease Week*, Washington, DC, June 2018.

8. Raul Wirz, Luis Torres, Philip Swaney, Hunter Gilbert, Ron Alterovitz, Robert Webster, Kyle Weaver, and Paul Russell, "Teleoperation of Concentric Tube Robots for Skull Base Applications: Pituitary Surgery at a Distance?," *North American Skull Base Society (NASBS) Annual Meeting*, Tampa, FL, Feb. 2015.

9. Andinet Enquobahrie, Vikas Shivaprabhu, Stephen Aylward, Julien Finet, Kevin Cleary, and Ron Alterovitz, "Patient-specific Port Placement for Laparoscopic Surgery Using Atlas-based Registration," *Proc. SPIE Medical Imaging*, Lake Buena Vista, FL, Feb. 2013.

10. Guus Vrooijink, Momen Abayazid, Sachin Patil, Ron Alterovitz, and Sarthak Misra, "Three-dimensional Flexible Needle Steering Using Two-dimensional Ultrasound Images," *4th Dutch Bio-Medical Engineering Conference*, Egmond aan Zee, The Netherlands, Jan. 2013.

11. Nuttapong Chentanez, Ron Alterovitz, Daniel Ritchie, Lita Cho, Kris K. Hauser, Ken Goldberg, Jonathan R. Shewchuk, and James F. O'Brien, "Simulation of Needle Insertion and Tissue Deformation for Modeling Prostate Brachytherapy," *American Brachytherapy Society (ABS) Annual Meeting*, Atlanta, GA, Apr. 2010.

12. Sophie Barbe, Isabelle Andre, Juan Cortes, Ron Alterovitz, Vincent Lafaquiere, David Guieysse, Pierre Monsan, Magali Remaud-Siméon, and Thierry Siméon, "A Robotic-based Path Planning Approach for Computing Large-Amplitude Motions of Flexible Molecules," *Fifteenth Meeting on Graphics and Molecular Modeling (GGMM)*, Grenoble, France, May 2007.

13. Michael Wehner, Ron Alterovitz, and Ken Goldberg, "Geometric Nonlinearity: Is it Important for Real-time FEM Surgical Simulation?," *Medicine Meets Virtual Reality 14 (MMVR14)*, Long Beach, CA, Jan. 2006.

14. Ron Alterovitz, Etienne Lessard, Jean Pouliot, I-Chow Hsu, James F. O'Brien, and Ken Goldberg, "High-dose-rate Brachytherapy Dose Optimization for Prostate Cancer Using Linear Programming," *Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting*, San Francisco, CA, Nov. 2005.

15. Ron Alterovitz, Yongbok Kim, John Kurhanewicz, Jean Pouliot, I-Chow Hsu, and Ken Goldberg, "Prostate MR Spectroscopy Image Registration Using Biomechanical Modeling of Tissue Deformations due to Endorectal Probe Insertion," *American Brachytherapy Society (ABS) 26th Annual Meeting*, San Francisco, CA, June 2005.

16. Ron Alterovitz, Ken Goldberg, John Kurhanewicz, Jean Pouliot, and I-Chow Hsu, "Registering MR with MRS Images for HDR Prostate Treatment using Finite Element Modeling," *46th American Association of Physicists in Medicine (AAPM) Annual Meeting*, Pittsburgh, PA, July 2004.

17. Ron Alterovitz, Jean Pouliot, Richard Taschereau, I-Chow Hsu, and Ken Goldberg, "Modeling Seed Misplacement by Simulating Tissue Deformations," *American Brachytherapy Society (ABS) 24th Annual Meeting*, New York, NY, May 2003.

18. Ron Alterovitz, Jean Pouliot, Richard Taschereau, I-Chow Hsu, and Ken Goldberg, "Simulating Needle Insertion and Radioactive Seed Implantation for Prostate Brachytherapy," in *Medicine Meets Virtual Reality 11 (MMVR11)*, J.D. Westwood et al. (Eds.), IOS Press, Jan. 2003, pp. 19–25.

Books

1. Ron Alterovitz and Ken Goldberg, *Motion Planning in Medicine: Optimization and Simulation Algorithms for Image-Guided Procedures*, Springer Tracts in Advanced Robotics, Berlin, Germany: Springer, 2008.

Book Chapters and Invited Articles

1. Arthur W. Mahoney, Trevor L. Bruns, Ron Alterovitz, and Robert J. Webster III, "Design, Sensing, and Planning: Fundamentally Coupled Problems for Continuum Robots," in *Robotics Research*, vol. 1, A. Bicchi and W. Burgard, Eds., Springer, 2015, pp. 267–282.

2. Noah J. Cowan, Ken Goldberg, Gregory S. Chirikjian, Gabor Fichtinger, Ron Alterovitz, Kyle B. Reed, Vinutha Kallem, Wooram Park, Sarthak Misra, and Allison M. Okamura, "Robotic Needle Steering: Design, Modeling, Planning, and Image Guidance," in *Surgical Robotics: System Applications and Visions*, J. Rosen, B. Hannaford, and R. M. Satava, Eds., ch. 23, Springer, 2011, pp. 557—582.

3. Ron Alterovitz and Jaydev P. Desai, "Surgical Robotics," *IEEE Robotics and Automation Magazine*, vol. 16, no. 2, pp. 16–17, June 2009.

Software and Datasets

1. *The Experiment Orchestration System (EOS)*, Available at `https://github.com/UNC-Robotics/eos`. EOS is a comprehensive software framework and runtime for laboratory automation, designed to serve as the foundation for one or more automated or self-driving labs (SDLs). Released Sep. 2024.

2. *Medical Robotics Anatomical Dataset (Med-RAD)*, Available at `https://github.com/UNC-Robotics/Med-RAD`. This repository contains a dataset of static and dynamic anatomical environments for medical robots meant to accelerate research and standardize simulation-based evaluations for new controllers, planners, and designs for medical robots. Released Oct. 2023.

3. *Medical Motion Planning Dataset (Med-MPD)*, Available at `https://github.com/UNC-Robotics/Med-MPD`. This repository contains static image-based anatomical environments for evaluating medical robot motion planners and minimally-invasive robot designs. This dataset was superseded by Med-RAD. Released Oct. 2022.

4. *Steerable Needle Planner*, Available at `https://github.com/UNC-Robotics/steerable-needle-planner`. For medical steerable needles, Steerable Needle Planner efficiently computes motion plans that consider constraints such as the steerable needle's maximum curvature and avoidance of anatomical obstacles. Released Jun. 2021.

5. *IRIS (Incremental Random Inspection-roadmap Search)*, Available at `https://github.com/UNC-Robotics/IRIS`. IRIS plans motions that allow a robot to inspect a set of points of interest (POIs), aiming at maximizing the number of POI inspected with the shortest plan length. Released Nov. 2019.

6. *Motion Planning Templates*, Available at `https://robotics.cs.unc.edu/mpt`. Motion Planning Templates (MPT) creates fast, parallel, robot-specific motion planners. Released May 2019.

7. *Nigh*, Available at `https://robotics.cs.unc.edu/nigh`. Nigh is a concurrent exact nearest neighbor searching library specifically optimized for spaces that arise in robot motion planning. As a concurrent data structure, it supports multiple threads concurrently inserting and querying the data structure with minimal wait time. It is ideal for use in parallel algorithms that require sharing a nearest neighbor data structure between multiple threads. Released Dec. 2018.

Patents

1. Ron Alterovitz, Angelos Angelopoulos, James F. Cahoon, Collin J. McKinney, and Matthew D. Verber, "Mobile manipulation robots for lab automation," United States Patent Application Serial No. 63/540,347, filed Sep. 2024.

2. Ron Alterovitz, Richard H. Feins, Bryan I. Hartley, Alan D. Kuntz, Erik Lamers, Arthur W. Mahoney, Andria A. Remirez, Philip J. Swaney, and Robert J. Webster III, "Methods, systems, and computer readable media for transoral lung access," United States Patent US10803662B2, filed May 2015, awarded Oct. 2020.

3. Ron Alterovitz, Luis G. Torres, Philip J. Swaney, Hunter B. Gilbert, Robert J. Webster III, and Richard J. Hendrick, "Methods, systems, and computer readable media for controlling a concentric tube probe," United States Patent US10846928B2, filed May 2015, awarded Nov. 2020.

4. Robert J. Webster III, Allison M. Okamura, Noah J. Cowan, Gregory S. Chirikjian, Ken Goldberg, and Ron Alterovitz, "Distal bevel-tip needle control device and algorithm," United States Patent US7822458B2, filed in 2005, awarded Oct. 2010.

Invited Talks

1. *Workshop on Workflow Orchestration*, University of Toronto (Virtual), Jan. 20, 2026.

2. *Workshop on Accelerating Discovery in Natural Science Laboratories with AI and Robotics*, Accelerate Conference, Toronto, Canada, Aug. 11, 2025.

3. *Workshop on the Evolving Landscape of Surgical Robotics (ELSR)*, IEEE International Conference on Robotics and Automation (ICRA), Atlanta, GA, May 19, 2025.

4. *Workshop on Open-Source Software for Intelligent Image-Guided Medical Robots*, International Symposium on Medical Robotics, Atlanta, GA, May 14, 2025.

5. *Workshop on Robotics for Nursing*, International Symposium on Medical Robotics, Atlanta, GA, May 14, 2025.

6. *Bookout Center Symposium on Robotics, Imaging, and Digital Surgery*, Houston Methodist, Texas Medical Center, Oct. 7, 2024.

7. *Johns Hopkins University*, Laboratory for Computational Sensing & Robotics (LCSR) Seminar, Baltimore, MD, Sep. 18, 2024.

8. *Workshop: Endoluminal Robots*, Hamlyn Symposium on Medical Robotics, London, England, June 28, 2024.

9. *Autonomous Robotic Surgery Meeting*, Advanced Research Projects Agency for Health (ARPA-H), Washington, DC, June 10, 2024.

10. *University of Maryland, College Park*, Maryland Robotics Center Seminar, College Park, MD, April 19, 2024.
11. *Duke University*, Medical Robotics Symposium, Durham, NC, Oct. 27, 2023.
12. *University of California, San Diego (UCSD)*, Biomechanics and Medical Devices Seminar, La Jolla, CA, Oct. 20, 2023.
13. *Workshop on Data vs. Models in Medical Robotics*, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Detroit, MI, Oct. 5, 2023.
14. *Data Science Day*, University of North Carolina at Chapel Hill, Chapel Hill, NC, Sep. 29, 2023.
15. *12th National Image-Guided Therapy Workshop*, Brigham and Women's Hospital (held virtually), May 19, 2022.
16. *Dunlevie Honors Colloquium*, University of North Carolina at Chapel Hill, Chapel Hill, NC, April 25, 2022.
17. *Workshop on Sensing and Feedback in Dexterous Medical/Surgical Robotics*, IEEE International Symposium on Medical Robotics (ISMR), Nov. 17, 2021.
18. *Frontiers in Photonics Science & Technology*, A Virtual Symposium hosted by the Fitzpatrick Institute for Photonics, May 16, 2020.
19. *Workshop on Intelligent Robot Interactions with the Anatomy*, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Macao, China, Nov. 8, 2019.
20. *Workshop on Learning Representations for Planning and Control*, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Macao, China, Nov. 8, 2019.
21. *Cutting Edge Forum on Surgical Robotics and AI*, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Macao, China, Nov. 6, 2019.
22. *US National Robotics Roadmap Workshop*, Chicago, IL, Sep. 12, 2019.
23. *National Institute of Biomedical Imaging and Bioengineering (NIBIB)*, National Institutes of Health (NIH), Bethesda, MD, July 24, 2019.
24. *Workshop on Cloud and Fog Robotics in the Age of Deep Learning*, Robotics: Science and Systems (RSS) Conference, Messe Freiburg, Germany, June 23, 2019.
25. *Workshop on Open Challenges and State-of-the-Art in Control System Design and Technology Development for Surgical Robotic Systems*, IEEE International Conference on Robotics and Automation (ICRA), Montreal, Canada, May 23, 2019.
26. *Workshop on Assistive Technologies for Precision Neurosurgery: Current Successes and Future Challenges*, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Madrid, Spain, Oct. 1, 2018.
27. *Blue Cross NC Tech Summit*, Raleigh, NC, Mar. 22, 2018.
28. *California Institute of Technology (Caltech)*, Department of Medical Engineering, Pasadena, CA, Feb. 22, 2018.

29. *City of Hope National Medical Center*, Duarte, CA, Feb. 22, 2018.
30. *University of California, San Diego (UCSD)*, Contextual Robotics Institute, La Jolla, CA, Oct. 19, 2017.
31. *Workshop on Medical Imaging Robotics*, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Vancouver, Canada, Sep. 28, 2017.
32. *Workshop on Continuum Robots in Medicine - Design, Integration, and Applications*, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Vancouver, Canada, Sep. 24, 2017.
33. *Workshop on Minimality and Trade-offs in Automated Robot Design*, Robotics: Science and Systems (RSS) Conference, Boston, MA, July 16, 2017.
34. *Workshop on POMDPs in Robotics: State of The Art, Challenges, and Opportunities*, Robotics: Science and Systems (RSS) Conference, Boston, MA, July 15, 2017.
35. *Robo-Healthcare Summit*, Boston, MA, June 28, 2017.
36. *Worcester Polytechnic Institute (WPI)*, Robotics Engineering Colloquium, Worcester, MA, June 26, 2017.
37. *Georgia Tech*, School of Interactive Computing, Atlanta, GA, Apr. 13, 2017.
38. *Yale University*, Department of Computer Science, New Haven, CT, Mar. 13, 2017.
39. *Vanderbilt University*, Department of Electrical Engineering and Computer Science, Nashville, TN, Feb. 23, 2017.
40. *University of Utah*, Scientific Computing and Imaging (SCI) Institute, Salt Lake City, UT, Jan. 12, 2017.
41. *Intuitive Surgical Inc.*, North Carolina Office, Raleigh, NC, Nov. 4, 2016.
42. *University of Chicago*, Department of Computer Science, Chicago, IL, Oct. 20, 2016.
43. *Wake Forest Institute of Regenerative Medicine (WFIRM)*, Winston-Salem, NC, Sep. 21, 2016.
44. *University of California, Berkeley*, Center for Information Technology Research in the Interest of Society (CITRIS), Berkeley, CA, Aug. 11, 2016.
45. *Stanford University*, Department of Mechanical Engineering, Stanford, CA, Aug. 9, 2016.
46. *Workshop: Towards Clinical Impact In Robotic Assisted Neuro And Skull-Base Surgery*, Hamlyn Symposium on Medical Robotics, London, England, June 28, 2016.
47. *Workshop on Planning for Human-Robot Interaction: Shared Autonomy and Collaborative Robotics*, Robotics: Science and Systems (RSS) Conference, Ann Arbor, MI, June 18, 2016.
48. *Cultural Event on Leading Innovation: Inventing the Future with Science*, Salem College (the oldest continuously operating women's educational institution in the United States), Salem, NC, Apr. 12, 2016.

49. *North Carolina Federal Advanced Technologies Quarterly Meeting*, Fayetteville, NC, Nov. 18, 2015.
50. *Schloss Dagstuhl – Leibniz Center for Informatics*, Seminar on Multimodal Manipulation Under Uncertainty, Dagstuhl, Germany, Oct. 5, 2015.
51. *Workshop on Navigation and Actuation of Flexible Instruments in Medical Applications*, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Hamburg, Germany, Oct. 2, 2015.
52. *Technical University of Berlin*, Robotics and Biology Laboratory, Berlin, Germany, June 26, 2015.
53. *Qualcomm Inc.*, San Diego, CA (via teleconference), Aug. 26, 2015.
54. *North Carolina Federal Advanced Technologies Review*, Raleigh, NC, June 3, 2015.
55. *Optimal Robot Motion Planning Workshop*, IEEE International Conference on Robotics and Automation (ICRA), Seattle, WA, May 30, 2015.
56. *Robotics Science and Systems 2015 Symposium: Frontiers of Robotics*, Rutgers University, New Brunswick, NJ, Mar. 27, 2015.
57. *Allied Health Sciences Research Forum*, Chapel Hill, NC, Feb. 25, 2015.
58. *Association for Advancing Automation (A3) Business Forum*, Orlando, FL, Jan. 23, 2015.
59. *University of Arizona*, Department of Electrical and Computer Engineering, Tucson, AZ, Nov. 6, 2014.
60. *École Polytechnique Fédérale de Lausanne (EPFL)*, Swiss National Centre of Competence in Research (NCCR) Robotics, Lausanne, Switzerland, Oct. 13, 2014.
61. *ABB Corporation*, Raleigh, NC, May 13, 2014.
62. *Hong Kong Polytechnic University*, Department of Industrial and Systems Engineering, Hong Kong, May 29, 2014.
63. *Texas A&M University*, Department of Computer Science and Engineering, College Station, TX, Feb. 26, 2014.
64. *University of Utah*, School of Computing, Salt Lake City, UT, Dec. 5, 2013.
65. *Massachusetts Institute of Technology*, Computer Science and Artificial Intelligence Laboratory (CSAIL), Cambridge, MA, Nov. 22, 2013.
66. *Johns Hopkins University*, Center for Computer Integrated Surgical Systems and Technology (CISST), Baltimore, MD, Nov. 20, 2013.
67. *Carnegie Mellon University*, Robotics Institute, Pittsburgh, PA, Nov. 15, 2013.
68. *Rice University*, Department of Computer Science, Houston, TX, Nov. 7, 2013.
69. *Sigma Xi: The Scientific Research Society*, Research Triangle Park, NC, Jan. 23, 2013.
70. *Workshop on Stochastic Motion Planning and Information-Based Control*, Robotics: Science and Systems (RSS) Conference, Sydney, Australia, July 11, 2012.

71. *Workshop on Pathways to Clinical Needle Steering*, IEEE International Conference on Robotics and Automation (ICRA), St. Paul, MN, May 18, 2012.

72. *Vanderbilt University*, Vanderbilt Initiative in Surgery and Engineering (VISE), Nashville, TN, Mar. 29, 2012.

73. *University of South Carolina*, Computer Science and Engineering Department, Columbia, SC, Nov. 18, 2011.

74. *SACNAS (Society for the Advancement of Chicanos and Native Americans in Science) National Conference*, San Jose, CA, Oct. 28, 2011.

75. *Case Western Reserve University*, Department of Electrical Engineering and Computer Science, Cleveland, OH, Aug. 11, 2009.

76. *Carnegie Mellon University*, Robotics Institute, Pittsburgh, PA, June 17, 2008.

77. *Arizona State University*, Department of Biomedical Informatics, Phoenix, AZ, May 22, 2008.

78. *Vanderbilt University*, Department of Mechanical Engineering, Nashville, TN, Apr. 21, 2008.

79. *University of North Carolina at Chapel Hill*, Department of Computer Science, Chapel Hill, NC, Mar. 17, 2008.

80. *Johns Hopkins University*, Center for Computer Integrated Surgical Systems and Technology (CISST), Baltimore, MD, Mar. 5, 2008.

81. *University of California, Davis*, Center for Information Technology Research in the Interest of Society, Sacramento, CA, Jan. 18, 2008.

82. *Workshop on Algorithmic Motion Planning*, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), San Diego, CA, Oct. 29, 2007.

83. *University of California, Berkeley*, Department of Electrical Engineering and Computer Sciences, Berkeley, CA, Oct. 11, 2007.

84. *LAAS-CNRS* (National Center for Scientific Research), Toulouse, France, Oct. 26, 2006.

85. *University of California, Irvine*, Department of Computer Science, Irvine, CA, Apr. 25, 2006.

86. *University of California, Berkeley*, Department of Industrial Engineering and Operations Research, Berkeley, CA, Oct. 28, 2005.

87. *Case Western Reserve University*, Department of Electrical Engineering and Computer Science, Cleveland, OH, Aug. 18, 2005.

88. *Workshop on Medical Robotics and Welfare*, IEEE International Conference on Robotics and Automation (ICRA), Barcelona, Spain, Apr. 18, 2005.

89. *George Washington University*, Colloquium of the Institute for Biomedical Engineering, Washington, DC, Mar. 25, 2005.

90. *Johns Hopkins University*, Center for Computer Integrated Surgical Systems and Technology (CISST), Baltimore, MD, Mar. 23, 2005.

91. *Workshop on Reality-Based Modeling of Tissues for Simulation and Robot-Assisted Surgery*, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Las Vegas, NV, Oct. 31, 2003.

92. *Workshop on Recent Advances in Medical Robotics*, IEEE International Conference on Robotics and Automation (ICRA), Taipei, Taiwan, Sep. 15, 2003.

Teaching Activities

Courses Taught and Developed

Technology of Today and Tomorrow (COMP 089-099) (**New course**)

Spring 2024 (24 students).

I created this new first-year seminar course to give students intuition about the underpinnings of key technologies that are changing our world. In each course module, we consider a recent news headline and delve into the relevant technology behind the headline, from the use of ChatGPT, to the deployment of self-driving cars, to new features of social media platforms. We explore how the technology works via interactive experiences, discussions, and presentations, and discuss its societal implications and ethical use. The goal is for future leaders and conscientious citizens to gain useful intuition about how societally-relevant computing technologies work at a high level, without requiring any previous computer science background.

Data Structures (COMP 410)

Fall 2014 (75 students), Fall 2015 (92 students).

This course, required for undergraduate Computer Science majors and minors, covers widely-used data structures from two perspectives: how to use them and how to implement them in an efficient manner. The course introduces terminology for expressing the efficiency of implementations, and techniques for evaluating algorithms to determine their efficiency. Students implement several data structures using the Java programming language.

Introduction to Robotics (COMP 581, formerly offered as COMP 590-099) (**New course**)

Spring 2011 (24 students), Spring 2012 (29 students), Spring 2013 (24 students), Fall 2017 (46 students), Fall 2018 (46 students), Spring 2020 (46 students), Fall 2020 (48 students), Spring 2022 (58 students), Fall 2024 (38 students), Fall 2025 (39 students).

I developed this new course to provide undergraduate juniors and seniors with a hands-on introduction to robotics emphasizing the computational and algorithmic aspects. Topics include robot kinematics, actuation, sensing, control, motion planning, and applications including personal assistance, autonomous vehicles, medical surgery, and manufacturing. In addition to participating in lectures and discussions, students design and program (using Java or Python) LEGO-based mobile robots, culminating in an end-of-semester robot contest.

Robotics (COMP 781, formerly offered as COMP 790-099)

Fall 2009 (12 students), Fall 2010 (16 students), Fall 2012 (27 students), Spring 2014 (26 students), Spring 2015 (18 students), Spring 2016 (20 students), Spring 2018 (28 students), Spring 2019 (24 students), Spring 2023 (17 students).

This course introduces graduate students to the programming and control of robotic systems. Topics include kinematics, actuation, sensing, manipulation, control, and motion planning. We discuss applications including industrial, transportation, and medical robotics. Students participate in interactive lectures and discussions, complete mathematical and programming assignments, and present an integrative course project.

Motion Planning in Physical and Virtual Worlds (COMP 782, formerly offered as COMP 790-099)

Spring 2010 (12 students), Fall 2011 (10 students), Fall 2016 (12 students), Spring 2021 (18 students).

This course introduces graduate students to the current state-of-the-art and challenges in computing motions for robots, agents, and characters in physical and virtual worlds. Topics include path planning for autonomous agents/robots, computing motion policies in uncertain environments, the theoretical underpinnings of motion planning, and applications to surgical planning, autonomous vehicles, graphics, games, and other areas. The course includes lectures, discussions on current research challenges, mathematical problem sets, programming assignments, and a course project.

Recent Advances in Medical Robotics and Simulation (COMP 790-099)

Spring 2009 (6 students).

This special topics graduate seminar covers recent research and open problems in medical robotics and physically-based simulation of medical procedures. Lectures cover medical robotics systems, image-guided motion planning for medical devices, tissue modeling, and surgery simulation. In addition, students present recent papers and undertake projects in medical robotics and simulation.

Technical Communication in Computer Science (COMP 915)

Spring 2015 (co-taught with Fred Brooks, 25 students), Spring 2016 (co-taught with David Stotts, 13 students).

This graduate student seminar covers teaching, short oral presentations, and writing in computer science. The goals are to lead students in thinking about teaching as a design challenge; have students practice techniques of planning, preparation, assignment design, and presentation; and give students exposure to the literature on teaching techniques for academic or professional life.

Professional Service

Editorial Boards, Program Committees, and Proposal Review Panels

2024–present *Senior Editorial Board*, International Journal of Robotics Research (currently a leading journal in robotics and historically the first scholarly publication on robotics research).

2017, 2019, 2020, 2021 *Reviewer*, National Institute of Biomedical Imaging and Bioengineering (NIBIB), National Institutes of Health (NIH), Bethesda, MD.

2011, 2013, 2014, 2015, 2020, 2024 *Panelist/Reviewer*, National Science Foundation (NSF)

2019 *Reviewer*, Center for Scientific Review, National Institutes of Health (NIH), Bethesda, MD.

2019 *Best Student Paper Award Committee Member*, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Macao, China.

2018 *Guest Editor*, IEEE Transactions on Automation Science and Engineering (T-ASE) Special Issue on the 2016 Workshop on the Algorithmic Foundations of Robotics (WAFR).

2014–2018 *Associate Editor*, IEEE Transactions on Automation Science and Engineering (T-ASE).

2018 *Program Committee Member*, International Symposium on Experimental Robotics (ISER).

2015 *Area Chair*, Robotics: Science and Systems Conference (RSS).

2008, 2011, 2014, 2017 *Program Committee Member*, Robotics: Science and Systems Conference (RSS).

2014 *Associate Editor*, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

2011–'13, '18 *Associate Editor*, IEEE International Conference on Robotics and Automation (ICRA).

2012, 2014, 2016, 2024 *Program Committee Member*, International Workshop on the Algorithmic Foundations of Robotics (WAFR).

2011 *Senior Program Committee (SPC) Member*, 2012 IEEE International Conference on Robotics and Automation (ICRA), SPC Meeting, Philadelphia, PA.

Conference Workshops and Special Sessions

2025 *Panelist*, Panel Discussion on the Role of AI and Advanced Algorithms in Surgical Robotics, Workshop on the Evolving Landscape of Surgical Robotics (ELSR), IEEE International Conference on Robotics and Automation (ICRA), Atlanta, GA, May 19, 2025.

2023 *Panelist*, Panel Discussion on the Role of Models and Data, Workshop on Data vs. Models in Medical Robotics, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Detroit, MI, Oct. 5, 2023.

2021 *Panelist*, Test of Time Panel, Robotics: Science and Systems (RSS) Conference, held remotely.

2017 *Co-Organizer*, Workshop on C^4 Surgical Robots: Compliant, Continuum, Cognitive, and Collaborative, at the IEEE International Conference on Robotics and Automation (ICRA), Singapore. Attended by over 60 international researchers.

2016 *Co-Organizer*, Open Problems Session at the Workshop on the Algorithmic Foundations of Robotics (WAFR), San Francisco, CA.

2012 *Co-Organizer*, Workshop on Algorithmic Frontiers in Medical Robotics, at the Robotics: Science and Systems (RSS) 2012 Conference, Sydney, Australia

2011 *Co-Organizer*, "50 Years of Robotics" Special Symposium on "Robot Motion Planning: Achievements and Emerging Approaches" at the IEEE/RSJ International Conference on Intelligent Robots and Systems, San Francisco, CA. The keynote speaker was motion planning pioneer Prof. Tomas Lozano-Perez from MIT.

2010 *Co-Organizer*, Workshop on Motion Planning: From Theory to Practice, at the 2010 Robotics: Science and Systems (RSS) Conference, Zaragoza, Spain.

2010 *Co-Organizer*, Workshop on Medical Cyber-Physical Systems, at the IEEE International Conference on Robotics and Automation (ICRA), Anchorage, AK. The workshop featured speakers from academia as well as industry (Intuitive Surgical, Inc.). Attended by over 50 international researchers.

2008 *Co-Organizer*, Workshop on Medical Needle Steering: Recent Results and Future Opportunities, at the 11th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), New York, NY.

Strategic Planning Symposia

2019 *Invited Contributor*, US National Robotics Roadmap Workshop, Chicago, IL. The workshop brought together participants from academia, government, and industry to create an updated roadmap for robotics in the United States. The first roadmap (to which I contributed in 2008) was used by government agencies, universities, and companies for guidance about trends and research challenges in robotics.

2015 *Invited Speaker and Panelist*, North Carolina Federal Advanced Technologies Review, an event organized by the North Carolina Military Business Center (NCMBC) to highlight ideas and products under development in North Carolina relevant to the Department of Defense.

2013 *Co-Organizer*, NSF Workshop on Robot Planning in the Real World: Research Challenges and Opportunities. The workshop brought together 37 select individuals from academia, industry, and government agencies to discuss a roadmap and identify challenge problems for the field of robot planning with the goal of making robots less reliant on human supervision and more widely deployable in the real world. Co-organized with Sven Koenig (University of Southern California) and Maxim Likhachev (Carnegie Mellon University).

2012 *Invited Contributor*, CCC/NSF/NIH Computing and Healthcare Symposium aimed at fostering interest in this interdisciplinary field and generating a report describing basic research questions at the intersection of computing and health.

2008 *Invited Contributor*, NSF/CCC/CRA Roadmapping for Robotics Workshop: A Research Roadmap for Medical and Healthcare Robotics, Arlington, VA. The resulting report helped build support for the National Robotics Initiative, a $70 million investment in robotics announced by the federal government in 2011.

Reviews for Journals and Conferences

Nature Communications

Science Robotics

International Journal of Robotics Research (IJRR)

IEEE Transactions on Robotics (T-RO)

IEEE Robotics and Automation Letters (RA-L)

IEEE Transactions on Information Technology in Biomedicine

IEEE Transactions on Biomedical Engineering

IEEE/ASME Transactions on Mechatronics

Mathematics of Operations Research

Medical Image Analysis Journal

Medical Physics (*Reviewer* and *Associate Editor*)

Computer Aided Surgery

International Journal of Computer Assisted Radiology and Surgery

Robotics: Science and Systems Conference (RSS)

Workshop on the Algorithmic Foundations of Robotics (WAFR)

Second International Symposium on Medical Simulation

IEEE International Conference on Robotics and Automation (ICRA)

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

IEEE Visualization

Modeling and Simulation in Medicine (MSM)

Medical Image Computing and Computer Assisted Interventions Conference (MICCAI)

Professional Societies

2025–present *Fellow*, IEEE (the world's largest engineering professional organization)

2021–2024 *Senior Member*, IEEE

2003–2021 *Member*, IEEE

2009–2015 *Co-Chair*, Technical Committee on Algorithms for Planning and Control of Robot Motion, IEEE Robotics and Automation Society. In a 2012 survey of IEEE Robotics and Automation Society members, this technical committee area was ranked #1 out of 28 in the category of "importance" to members' work and/or interests.

2008–2010 *Co-Chair*, Technical Committee on Surgical Robotics, IEEE Robotics and Automation Society.

University Committees

2017–2024 *Chair*, Graduate Admissions Committee, Department of Computer Science, University of North Carolina at Chapel Hill. (During my time as Chair, the number of graduate applications more than doubled. To handle this growth efficiently and fairly, I led an effort to design and implement detailed rubrics for reviewers and created written documentation of administrative processes to maximize staff efficiency. I also contributed to gaining university approval for a new Computer Science MS program and created admissions processes for it.)

2019, '22, '24 *Member*, Post-Tenure Review (PTR) Committee, Department of Computer Science, University of North Carolina at Chapel Hill. (Served on 2 PTR committees in both 2019 and 2022, one in 2024)

2021 *Chair*, Post-Tenure Review (PTR) Committee, Department of Computer Science, University of North Carolina at Chapel Hill.

2016, 2018–21 *Member*, Faculty Search Committee, Department of Computer Science, University of North Carolina at Chapel Hill.

2018–2019 *Member*, Potential Chair Nomination Survey (PCNS) Review Committee for the Department of Computer Science, College of Arts and Sciences, University of North Carolina at Chapel Hill.

2017–2018 *Member*, Science Complex Phase III Applied Physical Sciences User Group Committee, College of Arts & Sciences, University of North Carolina at Chapel Hill.

2009, 2012–16 *Member*, Graduate Admissions Committee, Department of Computer Science, University of North Carolina at Chapel Hill.
Served temporarily as Acting Chair in January 2016.

2014–2016 *Member*, Graduate Curriculum and Planning Committee, Department of Computer Science, University of North Carolina at Chapel Hill.

2012–2013 *Member*, Faculty Search Committee, UNC-NCSU Joint Department of Biomedical Engineering.

2009–2011 *Member*, Facilities and Web Committee, Department of Computer Science, University of North Carolina at Chapel Hill.

2009 *Member*, Faculty Search Committee, Curriculum in Applied Sciences and Engineering (CASE), University of North Carolina at Chapel Hill.

Press and Media

2024 *The American Society of Mechanical Engineers Topics & Resources*, "Self-Steering Robotic Needle for More Accurate Lung Biopsies," July 9, 2024. Available at `https://www.asme.org/topics-resources/content/self-steering-robotic-needle-for-more-accurate-lung-biopsies`

2024 *NIH Science Highlights*, "A self-driving needle steers through living lung tissue," Feb. 28, 2024. Available at `https://www.nibib.nih.gov/news-events/newsroom/self-driving-needle-steers-through-living-lung-tissue`

2023 *Tech Briefs*, "Bendy-but-Sturdy Robot Autonomously Travels Through Lung Tissue," Oct. 9, 2023. Available at `https://www.techbriefs.com/component/content/article/tb/stories/blog/49288`

2023 *Forbes*, "The Needle's Edge: Autonomous Robotic Surgery And Its Implications For Medicine," Oct. 6, 2023. Available at `https://www.forbes.com/sites/williamhaseltine/2023/10/06/the-needles-edge-autonomous-robotic-surgery-and-its-implications-for-medicine`

2023 *WRAL TechWire*, "Tiny robot capable of navigating live tissue could boost fight against lung cancer, UNC researchers report," Sep. 25, 2023, Available at `https://wraltechwire.com/2023/09/25/tiny-robot-capable-of-navigating-live-tissue-could-boost-fight-against-lung-cancer-unc-researchers-report/`

2023 *UNC College of Arts and Sciences*, "Autonomous medical robot successfully steers needles through living tissue," Sep. 21, 2023. Available at `https://college.unc.edu/2023/09/robotics-paper`

2023 *UNC Health press release published by over 30 news sites and blogs around the world including Science Daily, Newswise, MedicalXpress, Scienmag, DT Next, National Herald India, ecancer, World Today News, Meteored UK, and Gulf News*, "Scientists Successfully Maneuver Robot Through Living Lung Tissue," Sep. 21, 2023. Available at `https://news.unchealthcare.org/2023/09/scientists-successfully-maneuver-robot-through-living-lung-tissue/`

2022 *New Scientist*, "Robot guides needle into lungs more accurately than human doctors," Dec. 9, 2022. The article was featured as the lead article in the Technology section. Available at `https://www.newscientist.com/article/2350891-robot-guides-needle-into-lungs-more-accurately-than-human-doctors/`

2021 *The Jerusalem Post*, "Technion and UNC researchers develop algorithm for automated surgery," Oct. 8, 2021. Available at `https://www.jpost.com/science/technion-and-unc-researchers-develop-algorithm-for-automated-surgery-681437`

2021 *The Buttonwood Tree*, "CapVest Partners LP Acquires Datasite," Jan. 21, 2021. The article, in a digital business newspaper covering high finance, quotes me about the societal impact of robotics during the COVID-19 pandemic and beyond. Available at https://buttonwoodtree.net/index.php/2021/01/12/capvest-partners-lp-acquires-datasite/

2019 *Sigma Xi: The Scientific Research Honor Society*, "Members Earn Recognition from the White House," Aug. 5, 2019. Available at https://www.sigmaxi.org/news/news-archive/2019/08/05/members-earn-recognition-from-the-white-house

2019 *National Institute of Biomedical Imaging and Bioengineering (NIBIB) Newsroom*, "Four NIBIB grantees win prestigious Presidential early career awards," July 22, 2019. Available at https://www.nibib.nih.gov/news-events/newsroom/four-nibib-grantees-win-prestigious-presidential-early-career-awards

2019 *National Institutes of Health (NIH)*, "NIH Recipients of the Presidential Early Career Award for Scientists and Engineers (PECASE)," July 2019. Available at https://grants.nih.gov/grants/policy/pecase.htm

2019 *UNC News and Updates*, "Computer science professor receives Presidential Early Career Award for Scientists and Engineers," July 22, 2019. Available at https://www.unc.edu/posts/2019/07/22/computer-science-professor-receives-presidential-early-career-award-for-scientists-and-engineers/

2019 *WRAL TechWire*, "UNC professor's high-tech robot promises earlier detection of lung cancer," July 19, 2019. Available at https://www.wraltechwire.com/2019/07/19/unc-professors-high-tech-robot-promises-earlier-detection-of-lung-cancer/

2019 *UNC's Office of Research Development's FUNDAMENTALS*, "UNC Professor Receives Presidential Early Career Award for Scientists and Engineers," July 18, 2019. Available at https://us18.campaign-archive.com/?u=780d36a42454053cb2b08553d&id=17579620a1

2019 *UNC College of Arts & Sciences*, "Alterovitz receives Presidential Early Career Award for Scientists and Engineers," July 17, 2019. Available at https://college.unc.edu/2019/07/alterovitz-presidential-award/

2019 *The White House*, "President Donald J. Trump Announces Recipients of the Presidential Early Career Award for Scientists and Engineers," July 2, 2019. Available at https://www.whitehouse.gov/briefings-statements/president-donald-j-trump-announces-recipients-presidential-early-career-award-scientists-engineers/

2019 *College of Arts & Sciences*, "When robots commit wrongdoing, people may incorrectly assign the blame," Apr. 5, 2019. Available at https://college.unc.edu/2019/04/robot-responsibility/

2017 *ABC 11 TV Eyewitness News*, "Tech takeover: Will a robot put you out of a job?," by Jon Camp, May 25, 2017. The ABC 11 TV station serves North Carolina's Research Triangle (Raleigh-Durham-Chapel Hill) and Fayetteville. The news report, which featured robots in our lab, discussed the capabilities of emerging robots and the potential impact of robotics on careers of the future. Available at http://abc11.com/technology/tech-takeover-will-a-robot-put-you-out-of-a-job/2032292/

2016 *The Daily Tar Heel*, "Professor is the brains behind robots that advance in-home medical assistance," by Dominic Andrews, Aug. 28, 2016. The Daily Tar Heel is an independent student newspaper with an average daily print circulation of around 10,000. Available at `http://www.dailytarheel.com/article/2016/08/professor-is-the-brains-behind-robots-that-advance-in-home-medical-assistance`

2015 *Ivanhoe Broadcast News*, "Snakelike robotic device fighting cancer." Aired on media with a circulation (unique monthly viewers) of over 1 million, including local news TV shows in Texas, Pennsylvania, Michigan, and Alabama in Apr. 2015.

2015 *Forbes*, "Robots and Real-World Variability: When Change Happens, Adapt," by Jim Lawton, Apr. 4, 2015. Video from research group featured in the article available at `http://www.forbes.com/sites/jimlawton/2015/04/01/robots-and-real-world-variability-when-change-happens-adapt/2/`

2015 *ExitEvent*, "Meet the UNC Researchers Behind Sugar-Scooping, Surgery-Performing, Self-Driving Robots," by Aaron Scarboro, Feb. 18, 2015. Available at `http://www.exitevent.com/article/meet-the-unc-researchers-behind-sugar-scooping-robots-150218`

2014 *UNC-Chapel Hill's main web page*, "Algorithms, robotics: healing potential," by Zach Read and Scott Jared, Feb. 24, 2014. Spotlight appeared on `http://unc.edu`. Article available at `http://www.unc.edu/spotlight/algorithms-robotics-healing-potential/`

2014 *UNC School of Medicine Vital Signs*, "Human Interactions, Robotic Solutions: The university's culture of collaboration is leading to new possibilities for diagnosing and attacking cancers – by using robots," by Zach Read, Feb. 6, 2014. Spotlight appeared on `http://med.unc.edu`. Article available at `http://news.unchealthcare.org/som-vital-signs/2014/feb-6/human-interactions-robotic-solutions`

2014 *American Scientist Magazine*, "Pizza Lunch Podcasts: Robots in Clinical and Home Environments," by Katie-Leigh Lubinsky, Feb. 3, 2014. Available at `http://www.americanscientist.org/science/pub/robots-in-clinical-and-home-environments`

2013 *Radio In Vivo: Your Link to the Triangle Science Community*, Radio Show Guest, Jun. 19, 2013. Podcast available at `http://radioinvivo.org/2013/06/19/computational-robotics/`

2012 *Endeavors Magazine*, "They, Robots: The future where robots inhabit the earth is already here," by Susan Hardy, Oct. 4, 2012. Available at `http://endeavors.unc.edu/they_robots`

2012 *Carolina Arts & Sciences Magazine*, "They, Robots: The future is already here," by Susan Hardy, Sep. 18, 2012. Available at `http://college.unc.edu/2012/09/18/robots/`

2010 *US News & World Report*, "Teaching Medical Robots: Research aims to make robots smarter," by Marlene Cimons, Nov. 22, 2010. Available at `http://www.usnews.com/science/articles/2010/11/22/teaching-medical-robots.html`

Community Outreach

2021 *Guest*, "John News." As a guest on the show on July 2, 2021, I shared information about Computer Science and Robotics to encourage interest in STEM fields among

elementary school students. The show was started by an 8-year old from his home in Chapel Hill, NC during the COVID-19 pandemic. Other guests on his show have included the Mayor of Chapel Hill and an astronaut who helped build the International Space Station.

2020 *Mentor*, "Decoding Graduate Programs in CS." In an online event targeted at undergraduate students at UNC and NCSU, I served as a mentor in a video breakout room to discuss the graduate admissions process and tips for applying to graduate school in Computer Science.

2020 *Invited Speaker*, "Frontiers in Photonics Science & Technology," a Virtual Symposium hosted by the Fitzpatrick Institute for Photonics that was featured as an official event in UNESCO's 2020 International Day of Light. I presented research on semi-autonomous robots in healthcare.

2016 *Invited Speaker and Panelist*, Cultural Event on Leading Innovation: Inventing the Future with Science, Salem College, Salem, NC. Presented the state-of-the-art in medical robots to community members and students at the oldest continuously operating women's educational institution in the United States.

2014 *Invited Speaker and Panelist*, Program in the Humanities and Human Values, UNC-Chapel Hill College of Arts and Sciences. Discussed robotics at the "Minds and Machines" session of the *Adventures in Ideas* weekend seminar series that features in-depth explorations of topics for lifelong learners in the general public.

2013 *Safety Advisor/Judge*, FIRST Robotics NC Regional Tournament for high school students in Raleigh, NC.

2012 *Panelist*, Deep Dish Theater Company in Chapel Hill, NC. Invited by Artistic Director Paul Frellick to answer audience questions about robotics at a post-performance panel discussion of Alan Ayckbourn's *Henceforward...*, a play involving a robot in a futuristic society.

2012 *Faculty Mentor*, Science and Math Achievement and Resourcefulness Track Program (SMART), sponsored by NSF to increase the number of underrepresented minority undergraduate students who earn degrees in science, technology, engineering, and mathematics (STEM) disciplines.

2011 *Invited Speaker and Poster Judge*, SACNAS (Society for the Advancement of Chicanos and Native Americans in Science) National Conference, San Jose, CA

2011–present YouTube Channel UNCRobotics: `http://www.youtube.com/user/UNCRobotics`
Our videos showing our research on medical and assistive robots have been viewed over 700,000 times.

2009–present Worked with my research group to create interactive robotics demonstrations for hundreds of high school and middle school students and community members attending department-organized events and the annual UNC Science Expo.