

Alan Kuntz

CONTACT INFORMATION	Kahlert School of Computing University of Utah Salt Lake City, UT, 84112	<i>Email:</i> alan.kuntz@utah.edu <i>Website:</i> http://cs.utah.edu/~adk
EDUCATION	The University of North Carolina at Chapel Hill , North Carolina USA Ph.D., Computer Science, 2019 Dissertation: <i>Integrating Optimization and Sampling for Robot Motion Planning with Applications in Healthcare</i> Committee: Ron Alterovitz (Chair), Nancy M. Amato, Jessica Burgner-Kahrs, Parasara Sridhar Duggirala, Marc Niethammer The University of North Carolina at Chapel Hill , North Carolina USA M.S., Computer Science, 2016 The University of New Mexico , Albuquerque, New Mexico USA B.S., Computer Science with Mathematics Minor, 2014 Institutional Honors: Cum Laude Departmental Honors: Summa Cum Laude Advisor: Lydia Tapia Central New Mexico Community College , Albuquerque, New Mexico USA Paramedic Certificate, 2010	
RESEARCH INTERESTS	Robot Motion Planning, Autonomous Systems, Shared Autonomy in Robotic Systems, Computational Robot Design Optimization, Novel Tentacle-like Surgical Robots	
EXPERIENCE	University of Utah , Salt Lake City, UT Kahlert School of Computing and Robotics Center <i>Assistant Professor</i> January 2020 - Present Department of Mechanical Engineering <i>Adjunct Assistant Professor</i> September 2022 - Present Vanderbilt University , Nashville, TN Medical Engineering and Discovery Lab <i>Postdoctoral Researcher</i> August 2019 - December 2019 Designed hardware and software for novel minimally-invasive tentacle-like surgical robot systems with applications in lung cancer diagnosis and treatment. Developed image guidance techniques for surgeon control interfaces in clinically available surgical robots. Assisted in the supervision of seven Ph.D. students across three research projects. The University of North Carolina at Chapel Hill , Chapel Hill, NC Computational Robotics Research Group <i>Graduate Research Assistant</i> June 2014 - August 2019 Developed novel algorithms for general manipulator robots and snake-like surgical robots that plan motions to enable the robots to accomplish tasks in their environment while avoiding obstacles. Created new algorithms that combine the separate paradigms of optimization-based and sampling-based motion planning to leverage the benefits of both with respect to computation speed and global optimality. Integrated motion planning into global optimization for patient specific design of parallel surgical manipulators.	

The University of New Mexico, Albuquerque, NM

Adaptive Motion Planning Research Group

Undergraduate Research Assistant

May 2012 to May 2014

Developed novel algorithms to simulate and analyze immune system molecules using motion planning techniques. Projects included the simulation and study of antigen antibody interaction using antigens of varying structure and binding sites, and using graph theory to map simulated protein aggregation structures to structures found in experimental data.

Los Alamos National Laboratory, Los Alamos, NM

Dynamics Summer School

Undergraduate Research Assistant

June 2013 to August 2013

Designed a graphene-oxide sensor skin for structural health monitoring and developed evolutionary algorithms applied to printed capacitive and resistive sensor shape and circuitry design as part of a highly interdisciplinary research group.

PROFESSIONAL
EXPERIENCE

Albuquerque Ambulance Service, Albuquerque, NM

EMT/Paramedic and EVO Field Instructor

January 2008 to August 2012

Worked as an Emergency Medical Technician (EMT) and Emergency Vehicle Operator (EVO) and then as a Paramedic in the 911 system of Albuquerque. Provided advanced life support for patients and facilitated interagency communication. Additionally, supervised the field portion of new EMT/EVO training.

PATENTS

Alan D. Kuntz, Jacob J. Abbott, and Trevor J. Schwehr, "Magnetically Steerable Screw-Tip Cannula," United States Patent Application 17/943,622, 2023.

Ron Alterovitz, Richard H. Feins, Bryan I. Hartley, Alan D. Kuntz, Erik Lamers, Arthur W. Mahoney, Andria A. Ramirez, Philip J. Swaney, and Robert J. Webster III, "Methods, systems, and computer readable media for transoral lung access," United States Patent No. 10,803,662, 2020.

GRANTS

Active Awarded:

NSF - "Modeling, Control, and Motion Planning of Magnetic-screw Microrobots in Soft Tissue," 2023-2026

PI - Alan Kuntz, Co-PI Jake Abbott

\$740,283

NSF - "NRI: Liquid-Solid Metal for Embodied Intelligence in Semi-Soft, Human-Collaborative Robots," 2021-2025

PI - Alan Kuntz, Co-PI Robert J. Webster III

\$1,489,077, Kuntz share: \$607,359

AHRQ R18 - "Reconfiguring the patient room as a fall protection strategy to increase patient stability during ambulation," 2018-2023

PIs - Janice Morse, Andrew Merryweather, Co-I Bob Wong, Bo Foreman, SP - Alan Kuntz

\$1,990,321, Kuntz share: \$39,128 Added after award.

Intuitive Technology Research Grant - "Learning Safe Surgical Grasping and Manipulation from Video and Expert Demonstration with Safety-Aware Lifelong

Learning,” 2020

PI - Alan Kuntz Co-I Tucker Hermans, Jake Abbott, John Stringham
daVinci Research Kit Robot (equipment) and Clinical API

Completed:

NIH R44 - “Reopening the Central Airway with Needle-Size Tentacle Manipulators,”
2019-2021

PI - Richard Hendrick Co-I Robert J. Webster III, Duke Herrell, Fabien Maldonado,
Erin Gillaspie, Otis Rickman, SP - Alan Kuntz

\$1,571,367, Kuntz share: \$22,705 Added after award.

JOURNAL
PUBLICATIONS

1. Michael Bentley[†], Caleb Rucker, Chakravarthy Reddy, Oren Salzman, and Alan Kuntz, “Safer Motion Planning of Steerable Needles via a Shaft-to-Tissue Force Model,” *Journal of Medical Robotics Research*, 2023, in press.
2. Adam J. Sperry, Trevor J. Schwehr[‡], Emma K. Pinegar[†], Olivia B. Richards[†], John D. Rolston, Matthew D. Alexander, Brittany Coats, Jake J. Abbott, and Alan Kuntz, “Screw-tip Soft Magnetically Steerable Needles,” *IEEE Transactions on Medical Robotics and Bionics*, 2023, in press.
3. 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*, vol. 42, issue 4-5, pp. 150-175, 2023.
4. Margaret Rox, Daniel S. Esser, Mariana E. Smith, Tayfun Efe Ertop, Maxwell Emerson, Fabien Maldonado, Erin A. Gillaspie, Alan Kuntz, and Robert J. Webster III, “Toward Continuum Robot Tentacles for Lung Interventions: Exploring Folding Support Disks,” *IEEE Robotics and Automation Letters*, vol. 8, no. 6, pp. 3494-3501, 2023.
5. Michael Bentley[†], Caleb Rucker, and Alan Kuntz, “Interactive-rate Supervisory Control for Arbitrarily-routed Multi-tendon Robots via Motion Planning,” *IEEE Access*, vol. 10, pp. 80999-81019, August 2022. [2022 IEEE Access Best Video Award Part 1](#)
6. 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, April 2021.
7. Margaret F. Rox, Maxwell Emerson, Tayfun Efe Ertop, Inbar Fried, Mengyu Fu, Janine Hoelscher, Alan Kuntz, Josephine Granna, Jason Mitchell, Michael Lester, Fabien Maldonado, Erin A. Gillaspie, Jason A. 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, October 2020.
8. James M. Ferguson, E. Bryn Pitt, Alan Kuntz, Josephine Granna, Nicholas L. Kavoussi, Naren Nimmagadda, Eric J. Barth, S. Duke Herrell, III, and Robert J. Webster III, “Comparing the Accuracy of the da Vinci Xi and da Vinci Si for Image Guidance and Automation,” *The International Journal of Medical Robotics and Computer Assisted Surgery*, e2149, August 2020.

[†] denotes student of which I am the primary advisor, [‡] denotes student of which I am a co-advisor

9. 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.
10. James M. Ferguson, E. Bryn Pitt, Andria A. Remirez, Michael A. Siebold, Alan Kuntz, Nicholas L. Kavoussi, Eric J. Barth, S. Duke Herrell, III, and Robert J. Webster III, “Toward Practical and Accurate Touch-Based Image Guidance for Robotic Partial Nephrectomy,” *IEEE Transactions on Medical Robotics and Bionics*, vol. 2, no. 2, pp. 196-205, May 2020.
11. Nathan Sharp, Alan Kuntz, Cole Brubaker, Stephanie Amos, Wei Gao, Gautum Gupta, Charles R. Farrar, David D. Mascarenas, Aditya Mohite, “Crack Detection Sensor Layout and Bus Configuration Analysis,” *Smart Materials and Structures*, 23(5):055021, 2014.
12. Nathan Sharp, Alan Kuntz, Cole Brubaker, Stephanie Amos, Wei Gao, Gautum Gupta, Aditya Mohite, Charles R. Farrar, David D. Mascarenas, “A Bio-Inspired Asynchronous Skin System for Crack Detection Applications,” *Smart Materials and Structures*, 23(5):055020, 2014.

PUBLICATIONS IN
REFEREED
CONFERENCES

1. Alexandra Leavitt[†], Ryan Lam[†], Nichols Crawford Taylor, Daniel S. Drew, and Alan Kuntz, “Toward a Millimeter-Scale Tendon-Driven Continuum Wrist with Integrated Gripper for Microsurgical Applications,” *The Hamlyn Symposium on Medical Robotics*, pp. 61-62, 2023.
2. Mariana E. Smith, Daniel S. Esser, Margaret Rox, Alan Kuntz, and Robert J. Webster III, “A Radial Folding Mechanism to Enable Surgical Continuum Manipulators to Fit Through Smaller Ports,” *International Symposium on Medical Robotics (ISMR)*, 2023.
3. Trevor J. Schwehr[‡], Adam J. Sperry, John D. Rolston, Matthew D. Alexander, Jake J. Abbott, and Alan Kuntz, “Toward Targeted Therapy in the Brain by Leveraging Screw-Tip Soft Magnetically Steerable Needles,” *The Hamlyn Symposium on Medical Robotics*, 2022.
4. Margaret Rox, Aidan Copinga[†], Robert P. Naftel, Robert J. Webster, III, and Alan Kuntz, “Optimizing Continuum Robot Tendon Routing for Minimally Invasive Brain Surgery,” *The Hamlyn Symposium on Medical Robotics*, 2022.
5. Bao Thach[†], Brian Y. Cho[†], Alan Kuntz, and Tucker Hermans, “Learning Visual Shape Control of Novel 3D Deformable Objects from Partial-View Point Clouds,” *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 8274-8281, 2022.
6. Brian Y. Cho[†], Tucker Hermans, and Alan Kuntz, “Planning Sensing Sequences for Subsurface 3D Tumor Mapping,” *International Symposium on Medical Robotics (ISMR)*, 2021.
7. Yixuan Huang, Michael Bentley[†], Tucker Hermans, and Alan Kuntz, “Toward Learning Context-Dependent Tasks from Demonstration for Tendon-Driven Surgical Robots,” *International Symposium on Medical Robotics (ISMR)*, 2021. **Best Student Paper Award Finalist and Best Paper Award Finalist**
8. 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,” *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 1418-1425, 2021.
9. Sarvenaz Chaeibakhsh[‡], Roya Sabbagh Novin, Tucker Hermans, Andrew Merryweather, and Alan Kuntz, “Optimizing Hospital Room Layout to Reduce the Risk of Patient Falls,” *The International Conference on Operations Research and Enterprise Systems (ICORES)*, pp. 36-48, February 2021.
 10. Maxwell Emerson, James M. Ferguson, Tayfun Efe Ertop, Margaret F. 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,” *International Symposium on Experimental Robotics (ISER)*, pp. 334-342, 2020.
 11. Tayfun Efe Ertop, Maxwell Emerson, Margaret F. Rox, Josephine Granna, Fabien Maldonado, Erin Gillaspie, Michael Lester, Alan Kuntz, D. Caleb Rucker, Mengyu Fu, Janine Hoelscher, Inbar Fried, Ron Alterovitz, and Robert J. Webster, III, “Steerable Needle Trajectory Following in the Lung: Torsional Deadband Compensation and Full Pose Estimation with 5DOF Feedback for Needles Passing Through Flexible Endoscopes”, *ASME Dynamic Systems and Control Conference*, October 2020. **Best Student Paper Award Finalist**
 12. Haonan Chen, Hao Tan, Alan Kuntz, Mohit Bansal, and Ron Alterovitz, “Enabling Robots to Understand Incomplete Natural Language Instructions Using Commonsense Reasoning,” *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 1963-1969, Paris, France, June 2020.
 13. Alan Kuntz, Mengyu Fu, and Ron Alterovitz, “Planning High-Quality Motions for Concentric Tube Robots in Point Clouds via Parallel Sampling and Optimization,” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 2205-2212, Macau, China, November 2019.
 14. 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,” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 1355-1362, Macau, China, November 2019.
 15. Alan Kuntz, Armaan Sethi, and Ron Alterovitz, “Estimating the Complete Shape of Concentric Tube Robots via Learning,” *The Hamlyn Symposium on Medical Robotics*, pp. 43-44, London, United Kingdom, June 2019.
 16. Mengyu Fu, Alan Kuntz, Oren Salzman, and Ron Alterovitz, “Toward Asymptotically-Optimal Inspection Planning via Efficient Near-Optimal Graph Search,” *Robotics: Science and Systems (RSS)*, Freiburg im Breisgau, Germany, June 2019.
 17. Sherdil Niyaz, Alan Kuntz, Oren Salzman, Ron Alterovitz, and Siddhartha S. Srinivasa, “Following Surgical Trajectories with Concentric Tube Robots via Nearest-Neighbor Graphs,” *International Symposium on Experimental Robotics (ISER)*, Buenos Aires, Argentina, November 2018.
 18. 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,” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 4942-4949, Madrid, Spain, October 2018.
 19. 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,” *The Hamlyn Symposium on Medical Robotics*, pp. 121-122, London, United Kingdom, June 2018.

20. 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," *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 926-933, Brisbane, Australia, May 2018.
21. Alan Kuntz, Chris Bowen, and Ron Alterovitz, "Fast Anytime Motion Planning in Point Clouds by Interleaving Sampling and Interior Point Optimization," *Proc. International Symposium on Robotics Research (ISRR)*, Puerto Varas, Chile, December 2017.
22. 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," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 6463-6469, Vancouver, BC, Canada, September 2017.
23. Alan Kuntz, Philip J. Swaney, Arthur 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," *The Hamlyn Symposium on Medical Robotics*, pp. 9-10, London, United Kingdom, June 2016.
24. 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," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 3255-3261, Hamburg, Germany, September 2015.
25. 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," *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 2361-2367, Seattle, WA, USA, May 2015.
26. Nathan Sharp, Alan Kuntz, Cole Brubaker, Stephanie Amos, Wei Gao, Gautum Gupta, Aditya Mohite, Charles Farrar, David Mascarenas, "An Asynchronous Sensor Skin for Structural Health Monitoring Applications," *Conference on Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems*, San Diego, CA, USA, March 2014.

PUBLICATIONS IN
WORKSHOPS AND
NON-REFEREED
CONFERENCES

1. Nooshin Seddighi, Ying-Ching Chen, Andrew Merryweather, K. Bo Foreman, Alan Kuntz, Edoardo Battaglia, Haohan Zhang, Ellen Taylor, Bob Wong, and Peter C. Fino. "The impact of design factors on user behavior in a virtual reality hospital room for enhanced fall prevention strategies," *American Society of Biomechanics Annual Meeting*, 2023.
2. Nooshin Seddighi, Ying-Ching Chen, Andrew Merryweather, K. Bo Foreman, Alan Kuntz, Edoardo Battaglia, Haohan Zhang, Bob Wong, Ellen Taylor, and Peter C. Fino. "The impact of design factors on user behavior in a virtual reality hospital room for enhanced fall prevention strategies," *Rocky Mountain American Society of Biomechanics Regional Meeting*, 2023.
3. Bao Thach[†], Alan Kuntz, and Tucker Hermans "DeformerNet: A Deep Learning Approach to 3D Deformable Object Manipulation," *RSS Workshop on Deformable Object Simulation in Robotics (DO-Sim)*, 2021. **Best Paper Award Honorable Mention**

4. Margaret F. 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". *IEEE/ASME International Conference on Advanced Intelligent Mechatronics*, 2020.
5. Maxwell Emerson, Tayfun Efe Ertop, Margaret F. 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". *IEEE/ASME International Conference on Advanced Intelligent Mechatronics*, 2020.
6. Stephanie Amack, Margaret Rox, Jason Mitchell, Maxwell Emerson, Alan Kuntz, Ron Alterovitz, Robert J. Webster III, "A New Approach to Homing and Tool Changes in Needle-Like Surgical Robots," *SPIE Medical Imaging*, vol. 10951, San Diego, CA, USA, February, 2019.
7. Alan Kuntz, Cole Brubaker, Stephanie Amos, Nathan Sharp, Wei Gao, Gautum Gupta, Aditya Mohite, Charles R. Farrar, David D. Mascarenas, "Endowing Structures with a Nociceptive Sense Enabled by a Graphene-Oxide Sensing Skin," *Structural Health Monitoring, Volume 5*, ser. Conference Proceedings of the Society for Experimental Mechanics Series, pp. 117-123, Orlando, FL, USA, February, 2014.
8. Kasra Manavi, Alan Kuntz, Lydia Tapia, "Geometrical Insights into the Process of Antibody Aggregation" In *Proceedings of the AAAI Workshop on Artificial Intelligence and Robotics Methods in Computational Biology (AIRMCB)*, pp. 26-31, Bellevue, WA, USA, July 2013.

INVITED
PRESENTATIONS

1. "Deformable Robots and Deformable Tissue: Novel Mechanical and Algorithmic Solutions Enabling Robots in Surgical and Interventional Medicine," *Technion Robotics Seminar (TRS)*, Technion – Israel Institute of Technology, June 2023.
2. "The Cutting Edge of Surgery: Robots Improving Precision, Efficiency, and Accessibility," Keynote, Guest Faculty Speaker, *Computer Science Graduate Student Association Student Conference*, University of New Mexico, April 2023.
3. "Autonomously Manipulating Deformable Tissue and Novel Micro-Scale Continuum Robots," The Holistic Forum of Medical Robotics Junior Professors, *International Symposium on Medical Robotics (ISMR)*, April 2023.
4. "Deformable Objects and Continuum Robots: Novel Mechanical and Algorithmic Solutions to Leverage Robots in Surgical and Interventional Medicine," *Vanderbilt Institute for Surgery and Engineering Seminar*, Vanderbilt University, March 2023.
5. "Continuum Robots and Deformable Object Manipulation: Novel Mechanical and Algorithmic Solutions to Leverage Robots in Surgical and Interventional Medicine," *Contextual Robotics Institute Seminar*, University of California, San Diego, February 2023.
6. "Tentacle-Like Continuum Robots and Sub-Task Automation," *Artificial Intelligence and Machine Learning Symposium 10.0*, Idaho National Laboratory, January 2023.
7. "Motion Planning for Continuum Robots," *RBE 522: Continuum Robotics*, Worcester Polytechnic Institute, Guest Lecture, October 2022.

8. “Large-Scale Simulation for Calibration-Free Sim to Real Transfer of Deformable Object Manipulation,” 2nd Workshop on Representing and Manipulating Deformable Objects, *IEEE International Conference on Robotics and Automation (ICRA)*, May 2022.
9. “Motion Planning in Human-Centric Environments... Such as INSIDE Humans”, *ME 686: Human-Robot Systems*, University of Tennessee, Guest Lecture, April 2022.
10. “Deformable Robots and Deformable Tissues,” Surgical Robotics: The Next Generation, *International Symposium on Medical Robotics (ISMR)*, April 2022.
11. “Artificial Intelligence in Robot Assisted Surgery,” *Utah Informatics Initiative (UI2) and Tanner Humanities Center Artificial Intelligence & Society Symposium*, September 2021.
12. “Targeted Therapy Delivery in the Lung: Semi-Autonomous Transbronchoscopic Needle Steering,” Autonomous System in Medicine: Current Challenges in Design, Modeling, Perception, Control and Applications, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, October 2020.
13. “A Continuum Robot for Lung Tumor Biopsy,” Robot Guru II Workshop, *Robotics Science and Systems*, Ann Arbor, MI, USA, May 2016.

MEDIA
ATTENTION

1. “Award-winning tentacle robots help create less invasive surgeries”
February 2023, <https://www.cs.utah.edu/award-winning-tentacle-robots-help-create-less-invasive-surgeries/>
2. “Robot guides needle into lungs more accurately than human doctors”
New Scientist magazine, December 2022, <https://www.newscientist.com/article/2350891-robot-guides-needle-into-lungs-more-accurately-than-human-doctors/>

PUBLISHED
EXTERNAL
TUTORIALS

1. “Introduction to Motion Planning for Continuum Robots - Part 1,” *Open Continuum Robotics Project*, June 23 2023,
<https://www.cs.toronto.edu/~jbjk/opencontinuumrobotics/101/2023/06/23/intro-mp-part1.html>
2. “Introduction to Motion Planning for Continuum Robots - Part 2,” *Open Continuum Robotics Project*, June 28 2023,
<https://www.cs.toronto.edu/~jbjk/opencontinuumrobotics/101/2023/06/28/intro-mp-part2.html>

TEACHING
EXPERIENCE

Courses Taught

1. CS 6370 / ME EN 6225, Motion Planning, University of Utah, Spring 2023, 43 students. **Top 15% Course Evaluation Scores in the College of Engineering**
2. CS 7939 / ME EN 6892 / ECE 6868, Robotics Seminar, University of Utah, Spring 2023, 31 students.
3. CS 4300, Introduction to Artificial Intelligence, University of Utah, Fall 2022, 116 students. **Top 15% Course Evaluation Scores in the College of Engineering**

4. CS 4300, Introduction to Artificial Intelligence, University of Utah, Spring 2022, 127 students. **Top 15% Course Evaluation Scores in the College of Engineering**
5. CS 6956, Medical Robotics, University of Utah, Fall 2021, 8 students.
6. CS 4300, Introduction to Artificial Intelligence, University of Utah, Spring 2021, 122 students. **Top 15% Course Evaluation Scores in the College of Engineering**
7. CS 6370 / ME EN 6225, Motion Planning, University of Utah, Fall 2020, 21 students.
8. CS 4300, Introduction to Artificial Intelligence, University of Utah, Spring 2020, 118 students. **Top 15% Course Evaluation Scores in the College of Engineering**

Students Advising

- Brian Cho, PhD student
- Bao Thach, PhD student
- Emma Pinegar, PhD student
- Alexandra Leavitt, BS student
- Ryan Lam, BS student
- Shing-Hei Ho, BS student
- Olivia Richards, BS student
- Tanner Watts, BS student

Students Graduated

- Michael Bentley, PhD student
- Sarvenaz Chaeibakhsh, PhD student (co-advised)
- Rahul Thomas Benny, MS student
- Aidan Copinga, BS student
- Jiawen Song, BS student
- Qianlang Chen, BS student
- Trevor Schwehr, BS student
- Laura Brannan, BS student

Committee Membership

- Akansha Kalra, PhD Computer Science
- Siyeon Kim, PhD Computing: Robotics
- Yixuan Huang, PhD Computing: Robotics
- Griffin Tabor, PhD Computing: Robotics
- Xiwen Li, PhD Computer Science
- Nate Luttmmer, PhD Mechanical Engineering
- Nate Baum, PhD Mechanical Engineering
- Martin Matak, PhD Computing: Robotics
- Adam Conkey, PhD Computing: Robotics
- Ashkan Pourkand, PhD Computing: Robotics
- Eric Lang, PhD Computing: Human-Centered Computing
- Adam Sperry, PhD Mechanical Engineering: Robotics
- Margaret Rox, PhD Mechanical Engineering, Vanderbilt University
- Maxwell Emerson, PhD Mechanical Engineering, Vanderbilt University
- Ashkan Pourkand, PhD Computing: Robotics
- Nathan Olsen, MS-Thesis Mechanical Engineering
- Matthew Goodell, MS-Thesis Mechanical Engineering
- Elena Pradhan, MS-Thesis Mechanical Engineering
- Rebecca Eileen Miles, MS-Project Computing: Robotics
- Sharath Chandan Reddy Patlolla, MS-Project Computer Science

Field Instructor for new EMT Basics and Intermediates at Albuquerque Ambulance Service, 2009–2012

HONORS AND AWARDS

- 2022 IEEE Access Best Video Award Part 1
- Best Student Paper Award Finalist and Best Paper Award Finalist, International Symposium on Medical Robotics (ISMR), 2021
- Best Paper Award Honorable Mention, Robotics: Science and Systems (RSS) Workshop on Deformable Object Simulation in Robotics (DO-Sim), 2021
- Best Student Paper Award Finalist, ASME Dynamic Systems and Control Conference, October 2020
- Thomas S. Kenan III Graduate Fellow, Awarded to 10 exceptional graduate students in UNC's College of Arts and Sciences, 2018
- Timothy L. Quigg Student Inventor of the Year, Awarded to the student who has demonstrated the highest inventive skills and entrepreneurship in UNC CS, 2018
- NSF Graduate Research Fellowship–Honorable Mention, 2016
- Finalist (One of Three Males Nationally)–Computing Research Association Outstanding Undergraduate Researcher, 2014
- Honorable Mention (One of Forty-One Males Nationally)–Computing Research Association Outstanding Undergraduate Researcher, 2013
- Van Dyke Software Engineering Scholarship (Full Tuition Award), an award given to high achieving undergraduates in Computer Science at UNM, 2012–2014

PROFESSIONAL AND SERVICE ACTIVITIES

Faculty Mentor, Los Alamos Dynamics Summer School (LADSS), Los Alamos National Laboratory, 2023.

Proposal Reviewer, Department of Energy Office of Science, Funding for Accelerated, Inclusive Research (FAIR), 2023.

Member of the AI and Autonomous Function group of the IDEAL collaboration robotics colloquium, a group which has been formed in alliance with the Royal College of Surgeons of England and with the UK's National Institute for Health Research in order to develop comprehensive guidelines on how surgical robots should be evaluated. 2021-2023

Panelist, NSF - CISE, 2021.

Associate Editor, *IEEE Robotics and Automation Letters*, 2020-present.

Session Co-Chair, *International Symposium on Medical Robotics (ISMR)*, 2022.

Session Co-Chair, *Modeling, Control, and Learning for Soft Robots 2*, IROS 2020.

Program Committee Member, *Workshop on Machine Learning in Planning and Control of Robot Motion (MLPC)*, ICRA 2020.

Program Committee Member, *Workshop on the Algorithmic Foundations of Robotics (WAFR)*, 2020, 2022.

Program Committee Member, *Robotics: Science and Systems (RSS)*, 2020.

Associate Editor, *IEEE International Conference on Robotics and Automation (ICRA)*, 2020.

Rowland Hall High School FIRST Robotics Team Mentor, 2020.

Panel Member on advice for continuing robotics education targeted at undergraduate and community college students, Robot Guru II Workshop, *Robotics Science and Systems*, Ann Arbor, MI, May 2016.

Computer Science Student Association Officer—a representative for the graduate student body at UNC CS. Personally organized initiatives including a first year graduate student mentorship program and represented the graduate students at faculty meetings, 2017–2018

Invited to Peer-Review Papers for Journal Publications and Conference Proceedings:

- International Journal of Robotics Research (IJRR)
- IEEE Transactions on Robotics (T-RO)
- IEEE Robotics and Automation Letters (RA-L)
- IEEE Transactions on Medical Robotics and Bionics (TMRB)
- IEEE Transactions on Biomedical Engineering
- International Journal of Computer Assisted Radiology and Surgery (IJCARS)
- IEEE Transactions on Control Systems Technology
- Journal of Medical Robotics Research (JMRR)
- International Symposium on Experimental Robotics (ISER)
- Robotics: Science and Systems Conference (RSS)
- Workshop on the Algorithmic Foundations of Robotics (WAFR)
- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
- Robotics and Autonomous Systems
- ACM/IEEE International Conference on Human Robot Interaction
- Computer-Aided Design
- Simulation: Transactions of the Society for Modeling and Simulation International
- PLOS ONE

Outreach involving Computer Science and Robotics Demonstrations/Presentations at:

- University of Utah Engineering Day, 2022
- Rowland Hall High School 2020, 2021, 2022
- UNC Science Expos in 2015, 2016, and 2018
- UNC Department of Computer Science 50th Anniversary
- UNC Department of Computer Science Open House for 6th-12th grade students 2015–2018
- Southwestern Indian Polytechnique Institute
- Albuquerque Institute of Math and Science
- New Mexico Supercomputing Challenge
- Dennis Chavez Elementary School with continued student correspondence regarding Computer Science education and career opportunities