Aditya Mandalika

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Research Interests

Artificial Intelligence and Robotics: search-based planning, trajectory optimization, planning with learning from experience, applications of planning to autonomous vehicles, mobile manipulators and articulated robots.

Education

2017–Current **PhD, Computer Science and Engineering**, University of Washington.
Advisor: Dr. Siddhartha Srinivasa

2016–2017 **MS, Robotics**, Carnegie Mellon University.
Advisor: Dr. Siddhartha Srinivasa

2012–2016 **B.Tech, Mechanical Engineering**, Indian Institute of Technology Madras.
Advisor: Dr. Arun D. Mahindrakar

Research Experience

2017–Current **Graduate Research Assistant, Personal Robotics Laboratory**, *University of Washington*.
With a research interest that lies at the intersection of planning and learning, I work on search-based geometric motion planning and decision-making under uncertainty in application to robotics.

2016–2017 **Graduate Research Assistant, Personal Robotics Laboratory**, *Carnegie Mellon University*.
Studied the application of double quaternions for solving the inverse kinematics of high DoF robot manipulators, specifically the Kinova Jaco.

2015–2016 **Undergraduate Research Assistant, Dynamics and Control Laboratory**, *IIT Madras*.
Investigated the application of Leapfrog algorithm and Pontryagin's Maximum Principle to generate time, distance and fuel optimal trajectories for mobile robots.

Work Experience

Fall 2019 **Software Engineer, Motion Planning Team**, *Aurora Innovation Inc*, Pittsburgh, USA.
Contributing to the Motion Planning infrastructure to enable intelligent and safe self-driving cars.

2019 **Robotics Engineer**, *Robotics Collaborative Technology Alliance (RCTA)*, USA.
Developed the motion planning stack on RoMAN, a tracked bimanual robot, to grasp and transport a diverse range of unmodelled items from an unstructured pile of debris.

Summer 2015 **Research Intern**, *Systemantics Pvt. Ltd*, Bangalore, India.
Modelled the dynamics of a hybrid manipulator for trajectory tracking and control in performing industry-precision manipulation tasks.

2013-2014 **Vehicle Dynamics Engineer, Raftar Formula Racing**, *IIT Madras*, Chennai, India.
Designed and manufactured the suspension system of a Formula-style racecar for Formula Student Combustion (FSC) Germany, 2014.

Robots

2019–Current **Bimanual Mobile Manipulator**, *Motion Planning*.
I am developing the motion planning stack for the mobile manipulation platform RoMAN for ARL's RCTA project. RoMAN is equipped with two 7-DoF arms and a 1-DoF torso, and aims towards robust outdoor manipulation of unstructured and unmodelled objects like debris.

2016–Current **Bimanual Mobile Manipulator**, *Motion Planning and Control*.
HERB is a home robot with two 7-DoF Barrett WAM arms on a Neobotix base, and Pan-Tilt Schunk PW70 for a neck. I am developing the software architecture for the robot to perform two-arm mobile manipulation tasks with and around humans. I also maintain the hardware health of the Barrett arms.

2016–Current **Assistive Manipulator**, *Motion Planning and Control*.
ADA is a 6-DoF Kinova Jaco Arm mounted on a wheelchair. The system is being developed primarily as an assistive robot for users with upper-extremity impairments. I am developing the motion planning stack for the manipulator to enable safe assistive feeding.

Academic Honors

2019 **Best Student Paper Award [See C1]**.
29th International Conference on Automated Planning and Scheduling (ICAPS)
Generalized Lazy Search for Robot Motion Planning: Interleaving Search and Edge Evaluation via Event-based Toggles.

2018 **Best Demonstration Award [See D1]**.
32nd Conference on Neural Information Processing Systems (NeurIPS)
Autonomous robot feeding for upper-extremity mobility impaired people: Integrating sensing, perception, learning, motion planning, and robot control.

Select Publications

International Conferences

C1 A. Mandalika, S. Choudhury, O. Salzman and S.S. Srinivasa, *Generalized Lazy Search for Robot Motion Planning: Interleaving Search and Edge Evaluation via Event-based Toggles*, In: International Conference on Automated Planning and Scheduling (ICAPS), 2019. **Best Student Paper Award**.

C2 R. Kumar, A. Mandalika, S. Choudhury and S.S. Srinivasa, *LEGO: Learning to Sample Robust Adaptive Roadmaps*, In: International Conference on Intelligent Robots and Systems (IROS), 2019.

C3 G. Lee, B. Hou, A. Mandalika, J. Lee and S.S. Srinivasa, *Bayesian Policy Optimization for Model Uncertainty*, In: International Conference on Learning Representations (ICLR), 2019.

C4 A. Mandalika, O. Salzman and S.S. Srinivasa, *Lazy Receding Horizon A* for Efficient Path Planning in Graphs with Expensive-to-Evaluate Edges*, In: International Conference on Automated Planning and Scheduling (ICAPS), 2018.

Workshops

W1 L. Pinto, A. Mandalika, B. Hou and S.S. Srinivasa., *Sample-Efficient Learning of Nonprehensile Manipulation Policies via Physics-Based Informed State Distributions*, In: Robotics Science and Systems (RSS), 2019.

Demonstrations

D1 T. Bhattacharjee, D. Gallenberger, D. Dubois, L. L'ÃĽcuyer-Lapiere, Y. Kim, A. Mandalika, R. Scalise, R. Qu, H. Song, E. Gordon, and S.S. Srinivasa, *Autonomous robot feeding for upper-extremity mobility impaired people: Integrating sensing, perception, learning, motion planning, and robot control* , In: Conference on Neural Information Processing Systems (NeurIPS), 2018. **Best Demonstration Award**.

Teaching and Invited Talks

Winter 2019 **Robotics: Algorithms and Applications**, University of Washington.
Teaching Assistant to Dr. Tapomayukh Bhattacharjee

Fall 2017 **Advanced Robotics: Manipulation Algorithms**, University of Washington.
Teaching Assistant to Dr. Siddhartha Srinivasa

Fall 2017 Guest Lecturer at Lakeside High School, Seattle

Mentoring

Summer 2019 **Rajat Kumar Jenamani**, *Multi-Agent Motion Planning*.

Spring 2019 **Andrey Ryabtsev**, *Motion Planning Benchmarking Framework*.

Summer 2018 **Rahul Kumar Vernwal**, *Learning Efficient Roadmaps for Robust Motion Planning*.

Open Source Software

2016–Present **Contributor to AIKIDO**.
C++ Library for solving robotic motion planning and decision-making problems.
Repository at https://github.com/personalrobotics/aikido

Technical Skills

Languages C++, C, Python, MATLAB, LaTeX

Libraries ROS, OMPL, OpenCV, MoveIt!, Abseil

Tools cmake, bazel