MAXIM LIKHACHEV

PROFESSOR
The Robotics Institute, School of Computer Science
Carnegie Mellon University

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EDUCATION

09/01 – 09/05 Carnegie Mellon University Pittsburgh, PA
Ph.D., Computer Science, M.S., Computer Science
Thesis Title: "Search-based Planning for Large Dynamic Environments"
Advisors: Sebastian Thrun and Geoff Gordon
Thesis Committee: Geoff Gordon (co-chair), Sebastian Thrun (co-chair), Manuel Blum, Sven Koenig

05/94 - 07/99 Stevens Institute of Technology Hoboken, NJ
M.E., Electrical Engineering/Digital Signal Processing
GPA: 4.0/4.0
B.S., Major: Mathematics, Minor: Computer Science
Major GPA: 4.0/4.0 Minor GPA: 4.0/4.0 Cumulative GPA: 3.9/4.0

RESEARCH INTERESTS

Artificial Intelligence and Robotics: graph search-based planning, real-time planning, planning with learning from experience and demonstrations, planning under uncertainty, applications of planning to single and multi-agent systems including unmanned ground and aerial vehicles, mobile manipulators, articulated robots and small teams of robots

ACADEMIC PROFESSIONAL EXPERIENCE

06/23 – presently Carnegie Mellon University Pittsburgh, PA
Professor

06/18 – 05/23 Carnegie Mellon University Pittsburgh, PA
Associate Professor

09/15 – 05/18 Carnegie Mellon University Pittsburgh, PA
Associate Research Professor

09/10 – 08/15 Carnegie Mellon University Pittsburgh, PA
Assistant Research Professor

04/09 – 09/10 University of Pennsylvania Philadelphia, PA
Research Assistant Professor

09/07 – 04/09 University of Pennsylvania Philadelphia, PA
Research Associate

09/05 – 09/07 Carnegie Mellon University Pittsburgh, PA
Postdoctoral Fellow – worked under the supervision of Prof. A. Stentz and was also part of Tartanracing team that won the DARPA Urban Challenge in 2007 (the third DARPA Grand Challenge competition)

09/01 – 09/05 Carnegie Mellon University Pittsburgh, PA
Graduate Research Assistant – worked under the supervision of Profs. S. Thrun and G. Gordon.

09/99 – 09/01 Georgia Institute Of Technology Atlanta, GA
Graduate Research Assistant – worked under the supervision of Profs. S. Koenig and R. Arkin

NON-ACADEMIC PROFESSIONAL EXPERIENCE

09/21 – present Waymo, Pittsburgh, PA
Sr. Staff Software Engineer
Guided the development of planning technologies for self-driving vehicles.

09/13 – present TravelWits, LLC, Pittsburgh, PA
Co-founder/Former CEO
Co-founded and co-led an online travel tech company that brings AI to make travel logistics easier. The company reached over $100M in annual transactions.

01/14 – 08/21 RobotWits, LLC, Pittsburgh, PA
CEO/Founder
Founded and led the company focused on developing planning and decision-making technologies for self-driving vehicles. With no dilution by external investors, the company reached over $1M in annual revenues and was acquired by Waymo.

01/97 – 07/01 Intel Corporation, Parsippany, NJ
DSP Engineer II
Researched and implemented voice quality improvement algorithms for the use in telecommunication systems.

TEACHING EXPERIENCE

01/25 – 05/25 Carnegie Mellon University Pittsburgh, PA
Instructor for undergraduate Planning Techniques for Robotics class (16-350)

09/24 – 12/24 Carnegie Mellon University Pittsburgh, PA
Instructor for graduate Planning & Decision-making in Robotics class (16-782)

01/24 – 05/24 Carnegie Mellon University Pittsburgh, PA
Instructor for undergraduate Planning Techniques for Robotics class (16-350)

09/23 – 12/23 Carnegie Mellon University Pittsburgh, PA
Instructor for graduate Planning & Decision-making in Robotics class (16-782)

01/23 – 05/23 Carnegie Mellon University Pittsburgh, PA
Instructor for undergraduate Planning Techniques for Robotics class (16-350)

09/22 – 12/22 Carnegie Mellon University Pittsburgh, PA
Instructor for graduate Planning & Decision-making in Robotics class (16-782)

01/21 – 05/21 Carnegie Mellon University Pittsburgh, PA
Instructor for undergraduate Planning Techniques for Robotics class (16-350)

09/20 – 12/20 Carnegie Mellon University Pittsburgh, PA
Instructor for graduate Planning & Decision-making in Robotics class (16-782)

01/20 – 05/20 Carnegie Mellon University Pittsburgh, PA
Instructor for undergraduate Planning Techniques for Robotics class (16-350)

09/19 – 12/19 Carnegie Mellon University Pittsburgh, PA
Instructor for graduate Planning & Decision-making in Robotics class (16-782)

01/19 – 05/19 Carnegie Mellon University Pittsburgh, PA
Instructor for undergraduate Planning Techniques for Robotics class (16-350)

09/18 – 12/18 Carnegie Mellon University Pittsburgh, PA
Instructor for graduate Planning & Decision-making in Robotics class (16-782)

01/18 – 05/18 Carnegie Mellon University Pittsburgh, PA
Instructor for undergraduate Planning Techniques for Robotics class (16-350)

09/17 – 12/17 Carnegie Mellon University Pittsburgh, PA
Instructor for graduate Planning & Decision-making in Robotics class (16-782)

01/17 – 05/17 Carnegie Mellon University Pittsburgh, PA
Instructor for undergraduate Planning Techniques for Robotics class (16-350)

09/16 – 12/16 Carnegie Mellon University Pittsburgh, PA
Co-instructor for graduate Planning, Execution & Learning class (15-887)

09/15 – 12/15 Carnegie Mellon University Pittsburgh, PA
Instructor for undergraduate Game Programming class (CS 15-466/15-666)

09/14 – 12/14 Carnegie Mellon University Pittsburgh, PA
Instructor for undergraduate Game Programming class (CS 15-466/15-666)

09/13 – 12/13 Carnegie Mellon University Pittsburgh, PA
Instructor for undergraduate Game Programming class (CS 15-466/15-666)

09/12 – 12/12 Carnegie Mellon University Pittsburgh, PA
Instructor for undergraduate Game Programming class (CS 15-466/15-666)

09/11 – 12/11 Carnegie Mellon University Pittsburgh, PA
Instructor for undergraduate Game Programming class (CS 15-466)

01/10 – 05/10 University of Pennsylvania Philadelphia, PA
Co-Instructor for graduate Advanced Robotics class (MEAM 620)

01/09 – 05/09 University of Pennsylvania Philadelphia, PA

Co-Instructor for graduate Advanced Robotics class (MEAM 620)

01/08 – 05/08 University of Pennsylvania Philadelphia, PA
Co-Instructor for graduate Advanced Robotics class (MEAM 620)

09/04 – 12/04 Carnegie Mellon University Pittsburgh, PA
Graduate Teaching Assistant for a Ph.D.-level graduate Machine Learning class (instructors: Andrew Moore and Ziv Bar-Joseph)

01/03 – 05/03 Carnegie Mellon University Pittsburgh, PA
Graduate Teaching Assistant for an undergraduate Artificial Intelligence class (instructor: Jaime Carbonell)

HONORS AND AWARDS

- AAAI 2019 Classic Paper Honorable Mention for "D* Lite" paper at AAAI'02
- Influential 10-year Paper Award for the "Anytime Dynamic A*: An Anytime, Replanning Algorithm" paper at ICAPS, 2017
- Honorable Mention for my student Mike Phillips's Best Dissertation Award at International Conference on Automated Planning and Scheduling (ICAPS), 2016
- Best Poster Award at Symposium on Combinatorial Search (SoCS), 2014
- Part of the CTC-NREC team that won the Gold Edison award for the Advanced Robotic Laser Coating Removal System in 2013
- Best Student Paper Honorable Mention at International Conference on Automated Planning and Scheduling (ICAPS), 2013
- Best Paper Award at Robotics: Science and Systems Conference (RSS), 2011
- Selected to participate on the DARPA 2010 Computer Science Study Panel
- Part of the Tartanracing team that won the 1st place in the Urban Challenge competition sponsored by DARPA in 2007
- Stevens Cooperative Education Program Award for Academic Excellence (Stevens Institute of Technology, 1997)
- Charles I. Petschek Scholarship Award for a strong interest in mathematics (Stevens Institute of Technology, 1995)
- Distinguished Scholar Award (Brookdale Community College, 1995)
- National Dean's List (all semesters)
- Bachelor of Science with High Honor

FUNDING

- "Development of multi-agent planning algorithms," gift by Alert Innovation, **PI at CMU: M. Likhachev**, $85K, 2021

- "A mobile manipulation robotics system for autonomous recharging of electric vehicles," sponsored by Honda R&D Americas, **PI: M. Likhachev**, $150K, 2021-2022

- Defense University Research Instrumentation Program (DURIP) grant by ARO for "Robocop: Robotic platform for forceful mobility through and interactions with dynamic, potentially adversarial, environments," sponsored by Army Research Office,

PI: M. Likhachev, 287K, 2021-2022

- "Reinforcing high-school mathematics with robotics," sponsored by Richard King Mellon Foundation, **PI: M. Likhachev**, Co-PIs: Rachel Burcin, $150K, 2021

- "Learning to Manipulate using Massive Simulations and Occasional Human Demonstrations," sponsored by Army Research Laboratory, **PI: M. Likhachev**, Co-PIs: O. Kroemer, B. Lewis (Lockheed Martin), $1.95M, 2020-2024

- "ISimA: Intelligent Simulation for Testing and Training of Autonomous Single- and Multi-Vehicle Systems," ARL Phase I STTR, Lead PI: RobotWits, LLC, **PI at CMU: M. Likhachev**, $60K for CMU, 2020-2021

- "Planning for soft-long robots," sponsored by Mitsubishi Heavy Industries, **PI: M. Likhachev**, $406K, 2020-2021

- "Anytime planning for multi-robot coverage with Learning to Improve Performance from Experience-Phases II, III, IV" sponsored by Mitsubishi Heavy Industries, **PI: M. Likhachev**, $320K, 2019-2021

- "A Robotics Framework for Integrating Model-based Reasoning and Experience-based Learning," sponsored by Office of Naval Research, **PI: M. Likhachev**, Co-PIs: O. Kroemer, D. Fox (UWash), $2M, 2018-2022

- "Development of technologies for Advanced Mobile Manipulation," granted by UBTech, **PI: M. Likhachev**, $700K, 2018

- "Planning and Sensing for Cooperative Self-Driving," sponsored by Honda R&D Americas, **PI: M. Likhachev**, $665K, 2018-2019

- "Anytime planning for multi-robot coverage with Learning to Improve Performance from Experience," sponsored by Mitsubishi, **PI: M. Likhachev**, $300K, 2018-2019

- "Real-time Decision-making under Uncertainty and Planning for Seamless Navigation in Crowds," sponsored by Honda, **PI: M. Likhachev**, $150K, 2018

- "Humanoid Cognition: Real-time Planning and Perception with Learning for Humanoid Robots," sponsored by Mitsubishi, **PI: M. Likhachev**, $1,295K, 2016-2018

- "Real-time Planning Under Uncertainty with Application to Landmark-based Route Guidance," sponsored by Apple, **PI: M. Likhachev**, $303K, 2015-2016

- "Unmanned Tactical Autonomous Command and Control–Phase II," sponsored by US Marine Corps., Lead: Sierra Nevada Corp., **PI at CMU: M. Likhachev**, $261K for CMU, 2015-2016

- "Anytime Resource Optimization with Sliding Performance for Mission Planning and Sensor Management" sponsored by ONR, **PI: M. Likhachev**, Co-PIs: V.Kumar (University of Pennsylvania), Isaac Kaminer (Naval Postgraduate School), $763K total,

2015-2018

- "Collaborative Operations in Denied Environments (CODE)" sponsored by DARPA, Phase I, Lead: Lockheed Martin, **PI at CMU: M. Likhachev**, $350K for CMU, 2015-2016

- "Experience-Based Planning: A Framework for Lifelong Planning" sponsored by NSF, Collaborative project with USC, **PI at CMU: M. Likhachev**, $340K for CMU, 2014-2017

- "Collaborative Search for Objects of Interest" sponsored by US Marine Corps., Lead: Sierra Nevada Corp., **PI at CMU: M. Likhachev**, $163K for CMU, 2014-2015

- DARPA 2010 Computer Science Study Panel Phase III award for "Robust Autonomy in Dynamic Adversarial Environments", **PI: M. Likhachev**, $250K, 2014

- "Advanced Programming and Teaching Interfaces for Autonomous System Control," OSD/Army Phase I SBIR, PI for the project: RobotWits, LLC, **PI at CMU: M. Likhachev**, $150K total, 2014

- "The Role of Pre-Planning and Experience In Handing Accidents and Repetitive Tasks," granted by Google, **PI: M. Likhachev**, Co-PI: C. Atkeson, $100K total, 2013

- "Robotics Challenge" by DARPA, PI: A. Stentz, **Co-PI: M. Likhachev**, up to $3M total, 2012-2015

- "Autonomous Aerial Cargo Utility System (AACUS)" sponsored by ONR, Lead: Lockheed Martin, **PI at CMU: M. Likhachev**, $350K for CMU, 2012-2014

- "Development of Search-based Planning Library and its Application to Planning for Mobile Manipulation," granted by Willow Garage, **PI: M. Likhachev**, $110K, 2012

- "Intelligent Course of Action (ICOA) Generation for Air Vehicle Self-Defense," AFRL Phase I SBIR, PI for the project: Dragonfly Pictures Inc., **PI at CMU: M. Likhachev**, $50K total, 2012

- Defense University Research Instrumentation Program (DURIP) grant by ARO for "Intelligent Mobile Manipulation in the Context of Missions by Highly Heterogeneous Teams of Robots", **PI: M. Likhachev**, $250K, 2011

- DARPA 2010 Computer Science Study Panel Amendment grant for "Tight Coupling of Visual Understanding and Actions for Mobility and Manipulation in Human-populated Environments", **PI: M. Likhachev**, $300K, 2011

- DARPA 2010 Computer Science Study Panel Phase II award for "Robust Autonomy in Dynamic Adversarial Environments", **PI: M. Likhachev**, $400K, 2011

- "Building a Human Lifting Segbot for UAV-Ground Robotic Evacuation" grant by Dragonfly Pictures Inc., **PI: M. Likhachev,** Co-PI: E. Meyhofer, $39K, 2011

- Artificial Intelligence Journal (AIJ) grant for the support of the Fourth International Symposium on Combinatorial Search (SoCS), **PI: M. Likhachev**, $5K, 2011

- "Development of Standardized Library of Search-based Planning Algorithms and its Application to Planning for Mobile Manipulation and Navigation," granted by Willow Garage, **PI: M. Likhachev**, $80K, 2010

- "Cyber-enabled Analysis and Control of Building Evacuation," NSF Human-Centered Computing grant, PI: A. Safonova, **Co-PI: M. Likhachev** and A. Malkawi, $500K total, 2010

- PR2 Beta program sponsored by Willow Garage, **PI: M. Likhachev**, Co-PIs: K. Daniilidis, K. J. Kuchenbecker, V. Kumar, D. Lee, J. Shi, C.J. Taylor, M. Yim, 2010

- Robotics CTA 2010 sponsored by ARL, 5 base years plus 5 option years program, $64M total, lead: GDRS, $9.8M funding for UPenn, **Co-PI**, 2010

- DARPA 2010 Computer Science Study Panel Phase I award, **PI: M. Likhachev**, $100K, 2010

- "Detecting and Tracking Multiple Moving Objects from a Moving Platform," DARPA Phase II SBIR, PI for the project: Dragonfly Pictures Inc., **PI at UPenn: M. Likhachev**, Co-PI: J. Shi, $750K total, 2010

- "Path Planning in Dynamic Environments," DARPA Phase II SBIR, PI for the project: Dragonfly Pictures Inc., **PI at UPenn: M. Likhachev**, $750K total, 2010

- "II-EN: Mobile Manipulation," NSF Infrastructure grant, **PI: M. Likhachev**, Co-PIs: K. Daniilidis, K. J. Kuchenbecker, D.D. Lee, J. Shi, $298K, 2009

- "Development of Standardized Library of Planning Algorithms and New Planning Algorithms for Manipulation Tasks," granted by Willow Garage, **PI: M. Likhachev**, $110K, 2009

- "Decentralized Reasoning in Reduced Information Spaces," ONR BAA 08-019 MURI program starting in 2009, 3 base plus 2 option years, lead institution: CMU, **PI at UPenn: M. Likhachev**, Co-PI: Jianbo Shi, anticipated funding for UPENN for the base 3 years: $1.05M, 2009

- "ANTIDOTE: Adaptive Networks for Threat and Intrusion Detection Or TErmination," ONR BAA 08-019 MURI program starting in 2009, 3 base plus 2 option years, lead institution: USC, PI at UPenn: V. Kumar, **Co-PI: M. Likhachev**, R. Ghrist, anticipated funding for UPENN for the base 3 years: $1.35M, 2009

- "Real-time Determination and Prediction of Aircraft Trajectories Using Limited Sensor Data," NAVAIR Phase I STTR, PI for the project: Dragonfly Pictures Inc., **PI at UPenn: M. Likhachev**, $100K total, 2009

- "Rapid Complex Mapping" funded by SPARWAR, PI: Sarnoff, subcontracted to UPenn, funding for UPenn: $100K, PI: K. Daniilidis, **Co-PI:** J. Shi and **M. Likhachev**,

2009

- "Unmanned Ground & Air System For CBRNE Contaminated Personnel Recovery," Army Phase II SBIR, PI for the project: Dragonfly Pictures Inc., **PI at UPenn: M. Likhachev**, Co-PI at Upenn: V. Kumar, $750K total, 2009

- "Detecting and Tracking Multiple Moving Objects from a Moving Platform," DARPA Phase I SBIR, PI for the project: Dragonfly Pictures Inc., **PI at UPenn: M. Likhachev**, Co-PI: J. Shi, $100K total, 2009

- "Micro Autonomous Systems Technologies (MAST)," 10-year program starting at 2008, funded by ARL, **Co-PI**

- "Development of Standardized Library of Planning Algorithms and New Planning Algorithms for Manipulation Tasks," granted by Willow Garage, **PI: M. Likhachev**, $110K, 2008

- "Autonomous Landing Site Selection and Confirmation for Unmanned Helicopters," granted by Dragonfly Pictures Inc., **PI: M. Likhachev**, $75K, 2008

- "Path Planning for Unmanned Helicopters Navigating Urban Environments," granted by Dragonfly Pictures Inc., **PI: M. Likhachev**, $97K, 2008

- "Path Planning in Dynamic Environments," DARPA Phase I SBIR, PI for the project: Dragonfly Pictures Inc., **PI at UPenn: M. Likhachev**, $100K total, 2008

- "Unmanned Ground & Air System For CBRNE Contaminated Personnel Recovery," Army Phase I SBIR, PI for the project: Dragonfly Pictures Inc., **PI at UPenn: M. Likhachev**, Co-PI at Upenn: V. Kumar, $70K total, 2008

PUBLICATIONS

Journal and Magazine Articles, Book Chapters:

1. Shohin Mukherjee, Sandip Aine, and Maxim Likhachev, "***MPLP: Massively Parallelized Lazy Planning***," IEEE Robotics and Automation Letters (RA-L), 2022.
2. Zhongqiang Ren, Sivakumar Rathinam, Maxim Likhachev, and Howie Choset, "***Multi-Objective Path-Based D* Lite***," IEEE Robotics and Automation Letters (RA-L), 2022.
3. Fahad Islam, Oren Salzman, Aditya Agarwal, and Maxim Likhachev, "***Provably Constant-time Planning and Replanning for Real-time Grasping Objects off a Conveyor Belt***," International Journal of Robotics Research (IJRR), 2021.
4. Anahita Mohseni-Kabir, Manuela Veloso, and Maxim Likhachev, "***Optimal Planning Over Long and Infinite Horizons for Achieving Independent Partially-Observable Tasks That Evolve Over Time***," IEEE Robotics and Automation Letters (RA-L), 2021.
5. Ramkumar Natarajan, Howie Choset and Maxim Likhachev, "***Interleaving Graph Search and Trajectory Optimization for Aggressive Quadrotor Flight***," IEEE Robotics and Automation Letters (RA-L), 2021.
6. Vinitha Ranganeni, Sahit Chintalapudi, Oren Salzman and Maxim Likhachev, "***Effective Footstep Planning Using Homotopy-Class Guidance***," Artificial Intelligence Journal (AIJ), 2020.

7. Dina Youakim, Patryk Cieslak, Andrew Dornbush, Albert Palomer, Pere Ridao and Maxim Likhachev "***Multi-Representation, Multi-Heuristic A* Search-based Motion Planning for a Free-floating Underwater Vehicle Manipulator System in Unknown Environment***," Journal of Field Robotics (JFR), 2020.
8. Sandip Aine and Maxim Likhachev, "***Truncated Incremental Search***," Artificial Intelligence Journal (AIJ), 2016
9. Mike Phillips, Victor Hwang, Sachin Chitta and Maxim Likhachev, "***Learning to Plan for Constrained Manipulation from Demonstrations***," Autonomous Robots (AURO), 2016
10. Ron Alterovitz, Sven Koenig and Maxim Likhachev, "***Robot Planning in the Real World: Research Challenges and Opportunities***," Artificial Intelligence Magazine, 2015
11. Sandip Aine, Siddharth Swaminathan, Venkatraman Narayanan, Victor Hwang and Maxim Likhachev, "***Multi-Heuristic A****," International Journal of Robotics Research (IJRR), 2015
12. Benjamin Cohen, Sachin Chitta and Maxim Likhachev, "***Single- and Dual-Arm Motion Planning with Heuristic Search***," International Journal of Robotics Research (IJRR), 2013
13. Subhrajit Bhattacharya, Maxim Likhachev and Vijay Kumar, ***"Topological Constraints in Search-based Robot Path Planning,***" Autonomous Robots (AURO), 2012
14. Jon Butzke, Kostas Daniilidis, Alex Kushleyev, Dan D. Lee, Maxim Likhachev, Cody Phillips, Mike Phillips, "***The University of Pennsylvania MAGIC 2010 multi-robot unmanned vehicle system,***" Journal of Field Robotics (JFR), 2012
15. Maxim Likhachev and Dave Ferguson, "***Planning Long Dynamically-Feasible Maneuvers for Autonomous Vehicles,***" The International Journal of Robotics Research (IJRR), 2009
16. Maxim Likhachev and Anthony Stentz, "***Path Clearance,***" IEEE Robotics and Automation Magazine (RAM), Special Issue on Cooperative Control of Multiple Heterogeneous Unmanned Aerial Vehicles for Coverage and Surveillance, 2009
17. Maxim Likhachev and Anthony Stentz, "***Probabilistic Planning with Clear Preferences on Missing Information,***" Artificial Intelligence Journal (AIJ), Volume 173(5-6), pp. 696-721, 2009
18. Dave Ferguson, Thomas Howard, and Maxim Likhachev, "***Motion Planning in Urban Environments,***" Journal of Field Robotics (JFR), 25(11-12), pp. 939-960, 2008
19. Chris Urmson et al., "***Autonomous Driving in Urban Environments: Boss and the Urban Challenge***," Journal of Field Robotics (JFR), Special Issue on the 2007 DARPA Urban Challenge, Part I, 25 (8), pp. 425-466, June 2008
20. Maxim Likhachev, Dave Ferguson, Geoff Gordon, Anthony Stentz, and Sebastian Thrun, "***Anytime Search in Dynamic Graphs,"*** Artificial Intelligence Journal (AIJ), Volume 172(14), pp. 1613-1643, 2008
21. Sven Koenig and Maxim Likhachev, "***Fast Replanning for Navigation in Unknown Terrain,***" Transactions on Robotics (and Automation), Volume 21(3), pp. 354-363, 2005
22. Sven Koenig, Maxim Likhachev, Yaxin Liu, and David Furcy, "***Incremental Heuristic Search in Artificial Intelligence,***" Artificial Intelligence Magazine, 25(2), pp. 99-112, 2004

23. Sven Koenig, Maxim Likhachev, and David Furcy, "***Lifelong Planning A*,"*** Artificial Intelligence Journal (AIJ), 155(1-2), pp. 93-146, 2004
24. Maxim Likhachev and Sven Koenig, "***Lifelong Planning for Mobile Robots ,***" Lecture Notes in Artificial Intelligence, Vol. 2466: Advances in Plan-Based Control of Robotic Agents, M. Beetz, J. Hertzberg, M. Ghallab, and M. Pollack (Eds.), Springer, pp. 140-156, 2002

Full-length Publications at Conferences:

1. Muhammad Suhail Saleem, Raghav Sood, Sho Onodera, Rohit Arora, Hiroyuki Kanazawa, and Maxim Likhachev, "***Search-Based Path Planning for a High Dimensional Manipulator in Cluttered Environments Using Optimization-Based Primitives***," Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.
2. Shohin Mukherjee, Chris Paxton, Arsalan Mousavian, Adam Fishman, Maxim Likhachev, Dieter Fox, "***Reactive Long Horizon Task Execution Via Visual Skill and Precondition Models***," Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.
3. Anahita Mohseni-Kabir, Manuela Veloso, and Maxim Likhachev, "***Optimal Planning Over Long and Infinite Horizons for Achieving Independent Partially-Observable Tasks That Evolve Over Time***," Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.
4. Ishani Chatterjee, Yash Oza, Maxim Likhachev, and Manuela Veloso, "***Search-Based Planning with Learned Behaviors for Navigation among Pedestrians***," Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.
5. Sandip Aine, Yash Oza, and Maxim Likhachev, "***Disruption-Limited Planning for Robot Navigation in Dynamic Environments***," Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.
6. Ishani Chatterjee, Tushar Kusnur, and Maxim Likhachev, "***Fast Bounded Suboptimal Probabilistic Planning with Clear Preferences on Missing Information***," Proceedings of the International Symposium on Combinatorial Search (SoCS), 2021.
7. Jasmeet Kaur, Ishani Chatterjee, and Maxim Likhachev, "***Speeding Up Search-Based Motion Planning using Expansion Delay Heuristics***," Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), 2021.
8. Paritosh Kelkar, Parth Chopra, Savio Pereira, Dan DeLano, Aaron Miller, Kyungzun Rim, Samer Rajab, Jonathan Butzke, and Maxim Likhachev, "***Affordable Autonomy through Cooperative Sensing and Planning***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2021.
9. Dhruv Mauria Saxena, Muhammad Suhail Saleem, and Maxim Likhachev, "***Manipulation Planning Among Movable Obstacles Using Physics-Based Adaptive Motion Primitives***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2021.
10. Fahad Islam, Chris Paxton, Clemens Eppner, Bryan Peele, Maxim Likhachev, and Dieter Fox, "***Alternative Paths Planner (APP) for Provably Fixed-time Manipulation Planning in Semi-structured Environments***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2021.
11. Tushar Kusnur, Dhruv Mauria Saxena, and Maxim Likhachev, "***Search-based Planning for Active Sensing in Goal-Directed Coverage Tasks***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2021.
12. Anirudh Vemula, J. Andrew Bagnell and Maxim Likhachev, "***CMAX++:***

Leveraging Experience in Planning and Execution Using Inaccurate Models," Proceedings of the AAAI Conference on Artificial Intelligence (AAAI), 2021.

13. Aditya Agarwal, Yupeng Han and Maxim Likhachev, "***PERCH 2.0: Fast and Accurate GPU-Based Perception via Search for Object Pose Estimation***," Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020.
14. Raghav Sood, Shivam Vats and Maxim Likhachev, "***Learning to Use Adaptive Motion Primitives in Search-Based Motion Planning for Navigation***," Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020.
15. Fahad Islam, Oren Salzman, Aditya Agarwal and Maxim Likhachev, "***Provably Constant-time Planning and Re-planning for Real-time Grasping Objects off a Conveyor Belt***," Proceedings of the Robotics: Science and Systems Conference (RSS), 2020.
16. Anirudh Vemula, Yash Oza, J. Andrew Bagnell and Maxim Likhachev, "***Planning and Execution using Inaccurate Models with Provable Guarantees***," Proceedings of the Robotics: Science and Systems Conference (RSS), 2020.
17. Wei Du, Fahad Islam and Maxim Likhachev, "***Multi-Resolution A****," Proceedings of the International Symposium on Combinatorial Search (SoCS), 2020.
18. Muhammad Suhail Saleem and Maxim Likhachev, "***Planning with Selective Physics-based Simulation for Manipulation Among Moveable Objects***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2020.
19. Fahad Islam, Anirudh Vemula, Sung-Kyun Kim, Andrew Dornbush, Oren Salzman, and Maxim Likhachev, "***Planning, Learning and Reasoning Framework for Robot Truck Unloading***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2020.
20. Aaron Miller, Kyungzun Rim, Parth Chopra, Paritosh Kelkar, and Maxim Likhachev, "***Cooperative Perception and Localization for Cooperative Driving***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2020.
21. Dhruv Mauria Saxena, Sangjae Bae, Alireza Nakhaei, and Maxim Likhachev, "***Driving in Dense Traffic with Model-Free Reinforcement Learning***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2020.
22. Anahita Mohseni-Kabir, Maxim Likhachev and Manuela Veloso, "***Efficient Robot Planning for Achieving Multiple Independent Partially Observable Tasks that Evolve Over Time***," Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), 2020.
23. Allen Cheng, Dhruv Mauria Saxena, Maxim Likhachev, "***Bidirectional Heuristic Search for Motion Planning with an Extend Operator***," Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019.
24. Wei Du, Sung-Kyun Kim, Oren Salzman, and Maxim Likhachev, "***Escaping Local Minima in Search-Based Planning Using Soft Duplicate Detection***," Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019.
25. Tushar Kusnur, Shohin Mukherjee, Dhruv Mauria Saxena, Tomoya Fukami, Takayuki Koyama, Oren Salzman, and Maxim Likhachev, "***A Planning Framework for Persistent, Multi-UAV Coverage with Global Deconfliction***," Proceedings of the 12th Conference on Field and Service Robotics (FSR), 2019.
26. Kalyan Vasudev Alwala, Margarita Safonova, Oren Salzman, and Maxim Likhachev, "***Intuitive, Reliable Plans with Contingencies: Planning with Safety***

Nets for Landmark-Based Routing," Proceedings of the International Symposium on Combinatorial Search (SoCS), 2019.

27. Ishani Chatterjee, Maxim Likhachev, Ashwin Khadke and Manuela Veloso, "***Speeding Up Search-based Motion Planning via Conservative Heuristics***," Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), 2019.
28. Fahad Islam, Oren Salzman and Maxim Likhachev, "***Provable Infinite-Horizon Real-Time Planning for Repetitive Tasks***," Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), 2019.
29. Sung-Kyun Kim, Oren Salzman and Maxim Likhachev, "***POMHDP: Search-based Belief Space Planning using Multiple Heuristics***," Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), 2019.
30. Dina Youakim, Andrew Dornbush, Maxim Likhachev and Pere Ridao, "***Motion Planning for an Underwater Mobile Manipulator by Exploiting Loose Coupling***," Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2018.
31. Piero Micelli and Maxim Likhachev, "***FOCS: Planning by Fusion of Optimal Control and Search and its Application to Navigation***," Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2018.
32. Fahad Islam, Oren Salzman and Maxim Likhachev, "***Online, Interactive User Guidance for High-dimensional, Constrained Motion Planning***," Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI), 2018.
33. Vinitha Ranganeni, Oren Salzman and Maxim Likhachev, "***Effective Footstep Planning for Humanoids Using Homotopy-Class Guidance***," Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), 2018.
34. Andrew Dornbush, Karthik Vijayakumar, Sameer Bardapurkar, Fahad Islam and Maxim Likhachev, "***A Single-Planner Approach to Multi-Modal Humanoid Mobility***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2018.
35. John Drake, Alla Safonova and Maxim Likhachev, "***Towards Adaptability of Demonstration-Based Training of NPC Behavior***," Proceedings of the AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE), 2017.
36. Venkatraman Narayanan and Maxim Likhachev, "***Heuristic Search on Graphs with Existence Priors for Expensive-to-Evaluate Edges***," Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), 2017.
37. Shivam Vats, Venkatraman Narayanan and Maxim Likhachev, "***Learning to Avoid Local Minima in Planning for Static Environments***," Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), short paper, 2017.
38. Venkatraman Narayanan and Maxim Likhachev, "***Deliberative Object Pose Estimation in Clutter***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2017.
39. Sung-Kyun Kim and Maxim Likhachev, "***Parts Assembly Planning under Uncertainty with Simulation-Aided Physical Reasoning***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2017.
40. Venkatraman Narayanan and Maxim Likhachev, "***Discriminatively-guided Deliberative Perception for Pose Estimation of Multiple 3D Object Instances***," Proceedings of the Robotics: Science and Systems Conference (RSS), 2016.

41. Sandip Aine and Maxim Likhachev, "***Search Portfolio with Sharing***," Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), 2016.
42. John Drake, Alla Safonova and Maxim Likhachev, "***Demonstration-Based Training of Non-Player Character Tactical Behaviors***," Proceedings of the Twelfth Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE), 2016.
43. Venkatraman Narayanan and Maxim Likhachev, "***PERCH: Perception via Search for Multi-Object Recognition and Localization***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2016.
44. Fahad Islam, Venkatraman Narayanan and Maxim Likhachev, "***A*-Connect: Bounded Suboptimal Bidirectional Heuristic Search***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2016.
45. Sung-Kyun Kim and Maxim Likhachev, "***Planning for Grasp Selection of Partially Occluded Objects***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2016.
46. Jonathan Butzke, Kalin Gochev, Benjamin Holden, Eui-Jung Jung and Maxim Likhachev, "***Planning for a Ground-Air Robotic System with Collaborative Localization***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2016.
47. Mike Phillips, Venkatraman Narayanan, Sandip Aine and Maxim Likhachev, "***Efficient Search with an Ensemble of Heuristics***," Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI), 2015.
48. Jonathan Butzke, Andrew Dornbush and Maxim Likhachev, "***3-D Exploration with an Air-Ground Robotic System***," Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2015.
49. Soonkyum Kim and Maxim Likhachev, "***Path Planning for a Tethered Robot Using Multi-Heuristic A* with Topology-Based Heuristics***," Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2015.
50. Venkatraman Narayanan, Sandip Aine and Maxim Likhachev, "***Improved Multi-Heuristic A* for Searching with Uncalibrated Heuristics***," Proceedings of the International Symposium on Combinatorial Search (SoCS), 2015.
51. Venkatraman Narayanan and Maxim Likhachev, "***Task-Oriented Planning for Manipulating Articulated Mechanisms under Model Uncertainty***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2015.
52. Fahad Islam, Venkatraman Narayanan and Maxim Likhachev, "***Dynamic Multi-Heuristic A****," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2015.
53. Siddharth Swaminathan, Mike Phillips and Maxim Likhachev, "***Planning for multi-agent teams with leader switching***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2015.
54. Victor Hwang, Mike Phillips, Siddhartha Srinivasa and Maxim Likhachev, "***Lazy Validation of Experience Graphs***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2015.
55. Ellis Ratner, Benjamin Cohen, Mike Phillips and Maxim Likhachev, "***A Web-based Infrastructure for Recording User Demonstrations of Mobile Manipulation Tasks***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2015.

56. Mike Phillips and Maxim Likhachev, "***Speeding up heuristic computation in planning with Experience Graphs***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2015.
57. Kalin Gochev, Alla Safonova and Maxim Likhachev,"Anytime Tree-Restoring Weighted A* Graph Search," Proceedings of the International Symposium on Combinatorial Search (SoCS), 2014.
58. Jonathan Butzke, Krishna Sapkota, Kush Prasad, Brian MacAllister and Maxim Likhachev, ***"State Lattice with Controllers: Augmenting Lattice-Based Path Planning with Controller-Based Motion Primitives,"*** Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2014.
59. Sung-Kyun Kim, Joonhee Jo, Yonghwan Oh, Sang-Rok Oh, Siddhartha Srinivasa and Maxim Likhachev, ***"Robotic Handwriting: Multi-Contact Manipulation Based on Reactional Internal Contact Hypothesis,"*** Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2014.
60. Sandip Aine, Siddharth Swaminathan, Venkatraman Narayanan, Victor Hwang and Maxim Likhachev, ***"Multi-Heuristic A*,"*** Proceedings of the Robotics: Science and Systems Conference (RSS), 2014.
61. Benjamin Cohen, Mike Phillips and Maxim Likhachev, ***"Planning Single-arm Manipulations with n-Arm Robots,"*** Proceedings of the Robotics: Science and Systems Conference (RSS), 2014.
62. John Drake, Maxim Likhachev and Alla Safonova, ***"Prioritized Computation for Numerical Sound Propagation,"*** Proceedings of the 17th International Conference on Digital Audio Effects (DAFx), 2014.
63. James Keller, Dinesh Thakur, Vladimir Dobrokhodov, Kevin Jones, Maxim Likhachev, Jean Gallier, Isaac Kaminer and Vijay Kumar, ***"Coordinated Commencement of Pre-Planned Routes for Fixed-Wing UAS Starting from Arbitrary Locations - a Near Real-Time Solution,"*** Proceedings of International Conference on Unmanned Aircraft Systems, (ICUAS) 2014.
64. Arjun Menon, Benjamin Cohen and Maxim Likhachev, "***Motion Planning for Smooth Pickup of Moving Objects***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2014
65. Kalin Gochev, Venkatraman Narayanan, Benjamin Cohen, Alla Safonova and Maxim Likhachev, "***Motion Planning for Robotic Manipulators with Independent Wrist Joints***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2014
66. Mike Phillips, Sven Koenig and Maxim Likhachev "***Parallel A* for Planning with Time-consuming State Expansions***," Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), 2014
67. Aline Normoyle, Maxim Likhachev and Alla Safonova, "***Stochastic Activity Authoring with Direct User Control***," Proceedings of the ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D), 2014
68. Anthony Cowley, Benjamin Cohen, William Marshall, Camillo J. Taylor and Maxim Likhachev, "***Perception and Motion Planning for Pick-and-Place of Dynamic Objects***," Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2013
69. Dinesh Thakur, Maxim Likhachev, James Keller, Vijay Kumar, Vladimir Dobrokhodov, Kevin Jones, Jeff Wurz and Isaac Kaminer, "***Planning for Opportunistic Surveillance with Multiple Robots***," Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2013

70. Mike Phillips, Victor Hwang, Sachin Chitta and Maxim Likhachev, "***Learning to Plan for Constrained Manipulation from Demonstrations***," Proceedings of the Robotics: Science and Systems Conference (RSS), 2013
71. Sandip Aine and Maxim Likhachev, "***Anytime Truncated D*: Anytime Replanning with Truncation***," Proceedings of the International Symposium on Combinatorial Search (SoCS), 2013
72. Sandip Aine and Maxim Likhachev,"***Truncated Incremental Search: Faster Replanning by Exploiting Suboptimality***," Proceedings of the National Conference on Artificial Intelligence (AAAI), 2013
73. Kalin Gochev, Alla Safonova and Maxim Likhachev, "***Incremental Planning with Adaptive Dimensionality***," Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), 2013 (**Best Student Paper Honorable Mention**)
74. Mike Phillips, Andrew Dornbush, Sachin Chitta and Maxim Likhachev, "***Anytime Incremental Planning with E-Graphs***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2013
75. Steven Gray, Sachin Chitta, Vijay Kumar and Maxim Likhachev, "***A Single Planner for a Composite Task of Approaching, Opening and Navigating through Non-spring and Spring-loaded Doors***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2013
76. Venkatraman Narayanan, Paul Vernaza, Maxim Likhachev and Steven M LaValle, "***Planning Under Topological Constraints Using Beam-Graphs***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2013
77. Brian MacAllister, Jonathan Butzke, Aleksandr Kushleyev and Maxim Likhachev, "***Path Planning for Non-Circular Micro Aerial Vehicles in Constrained Environments***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2013
78. Bradford Neuman and Maxim Likhachev, "***Planning with Approximate Preferences and its Application to Disambiguating Human Intentions in Navigation***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2013
79. Armin Hornung, Andrew Dornbush, Maxim Likhachev and Maren Bennewitz, "***Anytime Footstep Planning with Suboptimality Bounds***," Proceedings of the IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS), 2012
80. Venkatraman Narayanan, Mike Phillips and Maxim Likhachev, "***Anytime Safe Interval Path Planning for Dynamic Environments***," Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2012
81. Aline Normoyle, John Drake, Maxim Likhachev and Alla Safonova, "***Game-based Data Capture for Player Metrics***," Proceedings of the Eight Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE), 2012
82. Nathan R. Sturtevant, Ariel Felner, Maxim Likhachev and Wheeler Ruml, "***Heuristic search comes of age***," In Proceedings of the Twenty-Sixth Conference on Articial Intelligence (AAAI), 2012. Invited Paper.
83. Subhrajit Bhattacharya, Maxim Likhachev and Vijay Kumar, "***Search-based Path Planning with Homotopy Class Constraints in 3D***," In Proceedings of the Twenty-Sixth Conference on Articial Intelligence (AAAI), 2012. Invited Paper.
84. Mike Phillips, Benjamin Cohen, Sachin Chitta and Maxim Likhachev, "***E-Graphs: Bootstrapping Planning with Experience Graphs***," In Proceedings of the Robotics:

Science and Systems Conference (RSS), 2012.

85. Paul Vernaza, Venkatraman Narayanan and Maxim Likhachev, "***Efficiently finding optimal winding-constrained loops in the plane***," In Proceedings of the Robotics: Science and Systems Conference (RSS), 2012.
86. Benjamin Cohen, Sachin Chitta and Maxim Likhachev, ***"Search-Based Planning for Dual-Arm Manipulation with Upright Orientation Constraints,***" Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2012.
87. Kalin Gochev, Alla Safonova and Maxim Likhachev, ***"Planning with Adaptive Dimensionality for Mobile Manipulation,***" Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2012.
88. Haojie Zhang, Jon Butzke, and Maxim Likhachev, ***"Combining Global and Local Planning with Guarantees on Completeness,***" Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2012.
89. Juan Pablo Gonzalez, Andrew Dornbush and Maxim Likhachev, ***"Using State Dominance for Path Planning in Dynamic Environments with Moving Obstacles,***" Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2012.
90. Armin Hornung, Mike Phillips, Edward Gil Jones, Maren Bennewitz, Maxim Likhachev and Sachin Chitta, ***"Navigation in Three-Dimensional Cluttered Environments for Mobile Manipulation,***" Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2012.
91. Haifeng Gong, Jack Sim, Maxim Likhachev, and Jianbo Shi,***"Multi-hypothesis Motion Planning for Visual Object Tracking,***" International Conference on Computer Vision (ICCV), 2011.
92. Aleksandr Kushleyev, Brian MacAllister and Maxim Likhachev, ***"Planning for Landing Site Selection in the Aerial Supply Delivery,***" Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2011.
93. Jonathan Butzke and Maxim Likhachev, ***"Planning for Multi-Robot Exploration With Multiple Objective Utility Functions,***" Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2011.
94. Mike Phillips and Maxim Likhachev, ***"Planning in Domains with Cost Function Dependent Actions,***" Proceedings of the National Conference on Artificial Intelligence (AAAI), 2011.
95. Subhrajit Bhattacharya, Maxim Likhachev and Vijay Kumar, ***"Identification and Representation of Homotopy Classes of Trajectories for Search-based Path Planning in 3D,***" Proceedings of the Robotics: Science and Systems Conference (RSS), 2011 (**Best Paper Award**).
96. Juan Pablo Gonzalez and Maxim Likhachev, ***"Search-Based Planning with Provable Suboptimality Bounds for Continuous State Spaces,*** " Proceedings of the International Symposium on Combinatorial Search (SoCS), 2011.
97. Kalin Gochev, Benjamin Cohen, Jonathan Butzke, Alla Safonova and Maxim Likhachev, ***"Path Planning with Adaptive Dimensionality,*** " Proceedings of the International Symposium on Combinatorial Search (SoCS), 2011.
98. Benjamin Cohen, Gokul Subramanian, Sachin Chitta and Maxim Likhachev, ***"Planning for Manipulation with Adaptive Motion Primitives,***" Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2011
99. Mike Phillips and Maxim Likhachev, ***"SIPP: Safe Interval Path Planning for Dynamic Environments,*** " Proceedings of the IEEE International Conference on

Robotics and Automation (ICRA), 2011

100. Jonathan Scholz, Sachin Chitta, Bhaskara Marthi and Maxim Likhachev, "***Cart Pushing with a Mobile Manipulation System: Towards Navigation with Moveable Objects***," Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2011
101. Subhrajit Bhattacharya, Vijay Kumar and Maxim Likhachev, ***"Distributed Optimization with Pairwise Constraints and its Application to Multi-robot Path Planning,"*** Proceedings of the Robotics: Science and Systems Conference (RSS), 2010 [accept. rate 16%]
102. Subhrajit Bhattacharya, Vijay Kumar and Maxim Likhachev, ***"Search-based Path Planning with Homotopy Class Constraints,***" Proceedings of the National Conference on Artificial Intelligence (AAAI), 2010 [accept. rate 26.9%]
103. Sachin Chitta, Benjamin Cohen and Maxim Likhachev, ***"Planning for Autonomous Door Opening with a Mobile Manipulator,***" Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2010
104. Benjamin Cohen, Sachin Chitta, and Maxim Likhachev, ***"Search-based Planning for Manipulation with Motion Primitives,***" Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2010
105. Joseph T. Kider Jr., Mark Henderson, Maxim Likhachev, and Alla Safonova, ***"High-dimensional Planning on the GPU,***" Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2010
106. Subhrajit Bhattacharya, Maxim Likhachev, and Vijay Kumar, ***"Multi-agent Path Planning with Multiple Tasks and Distance Constraints,***" Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2010
107. Jennifer King and Maxim Likhachev, *"**Efficient Cost Computation in Cost Map Planning for Non-Circular Robots,***" Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2009
108. Alex Nash, Sven Koenig and Maxim Likhachev, "***Incremental Phi*: Incremental Any-Angle Path Planning on Grids***," Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI), 2009 [accept. rate 25.7%]
109. Aleksandr Kushleyev and Maxim Likhachev, "***Time-bounded Lattice for Efficient Planning in Dynamic Environments*,**" Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2009
110. Paul Vernaza, Maxim Likhachev, Subhrajit Bhattacharya, Sachin Chitta, Aleksandr Kushleyev and Daniel D. Lee, "***Search-based Planning for a Legged Robot over Rough Terrain*,**" Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2009
111. Dave Ferguson, Thomas Howard, and Maxim Likhachev, "***Motion Planning in Urban Environments: Part I,***" Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2008
112. Dave Ferguson, Thomas Howard, and Maxim Likhachev, "***Motion Planning in Urban Environments: Part II,***" Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2008
113. Maxim Likhachev and Dave Ferguson, "***Planning Long Dynamically-Feasible Maneuvers for Autonomous Vehicles***," Proceedings of the Robotics: Science and Systems Conference (RSS), 2008 [accept. rate 25%]
114. Maxim Likhachev and Anthony Stentz, "***R* Search,***" Proceedings of the National Conference on Artificial Intelligence (AAAI), 2008 [accept. rate 24.2%]

115. Dave Ferguson, Chris Baker, Maxim Likhachev and John Dolan, "***A Reasoning Framework for Autonomous Urban Driving,***" Proceedings of the IEEE Intelligent Vehicles Symposium (IV), oral presentation, 2008

116. Maxim Likhachev and Anthony Stentz, "***Information Value-Driven Approach to Path Clearance with Multiple Scout Robots,***" Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2008

117. Maxim Likhachev and Anthony Stentz, "***Goal Directed Navigation with Uncertainty in Adversary Locations,***" Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2007

118. Sven Koenig, Maxim Likhachev and Xiaoxun Sun, " ***Speeding up Moving-Target Search,***" Proceedings of the International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2007 [accept. rate 22.8%]

119. Maxim Likhachev and Anthony Stentz, "***Path Clearance Using Multiple Scout Robots,***" Proceedings of the Army Science Conference (ASC), 2006

120. Maxim Likhachev and Anthony Stentz, "***PPCP: Efficient Probabilistic Planning with Clear Preferences in Partially-Known Environments,***" Proceedings of the National Conference on Artificial Intelligence (AAAI), 2006 [accept. rate 21%]

121. Sven Koenig and Maxim Likhachev, "***Real-Time Adaptive A*,***" Proceedings of the International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2006 [accept. rate 23.1%]

122. H. Brendan McMahan, Maxim Likhachev, and Geoff Gordon, "***Bounded Real-Time Dynamic Programming: RTDP with monotone upper bounds and performance guarantees,*** " Proceedings of the International Conference on Machine Learning (ICML), 2005 [accept. rate 27.3%]

123. Maxim Likhachev, Dave Ferguson, Geoff Gordon, Anthony Stentz, and Sebastian Thrun, "***Anytime Dynamic A*: An Anytime, Replanning Algorithm,***" Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), 2005 [accept. rate 25%]

124. Maxim Likhachev, and Sven Koenig, " ***A Generalized Framework for Lifelong Planning A*,***" Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), 2005 [accept. rate 25%]

125. Maxim Likhachev, Geoff Gordon and Sebastian Thrun, "***Planning for Markov Decision Processes with Sparse Stochasticity,***" Advances in Neural Information Processing Systems 17 (NIPS), MIT Press, Cambridge, MA, 2005 [accept. rate 25%]

126. Maxim Likhachev, Geoff Gordon and Sebastian Thrun, "***ARA*: Anytime A* with Provable Bounds on Sub-Optimality,***" Advances in Neural Information Processing Systems 16 (NIPS), MIT Press, Cambridge, MA, 2004 [accept. rate 30%]

127. Maxim Likhachev and Sven Koenig, "***Speeding up the Parti-Game Algorithm,***" Advances in Neural Information Processing Systems 15 (NIPS), MIT Press, Cambridge, MA, 2003 [accept. rate 27.6%]

128. Maxim Likhachev and Sven Koenig, "***Incremental Replanning for Mapping,***" Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Vol. 1, pp. 667-672, 2002

129. Sven Koenig and Maxim Likhachev, "***D* Lite,***" Proceedings of the National Conference on Artificial Intelligence (AAAI), pp. 476-483, 2002 [accept. rate 26%]

130. Maxim Likhachev, Michael Kaess, and Ronald C. Arkin, "***Learning Behavioral Parameterization Using Spatio-Temporal Case-Based Reasoning,***" Proceedings of

the IEEE International Conference on Robotics and Automation (ICRA), Vol. 2, pp. 1282-1289, 2002

131. J. Brian Lee, Maxim Likhachev, and Ronald C. Arkin, "***Selection of Behavioral Parameters: Integration of Discontinuous Switching via Case-Based Reasoning with Continuous Adaptation via Learning Momentum,***" Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), Vol. 2, pp. 1275-1281, 2002
132. Sven Koenig and Maxim Likhachev, "***Incremental A*,***" Advances in Neural Information Processing Systems 14 (NIPS), MIT Press, Cambridge, MA, 2002 [accept. rate 31.1%]
133. Maxim Likhachev and Ronald C. Arkin, "***Spatio-Temporal Case-Based Reasoning for Behavioral Selection,***" Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), Vol. 2, pp. 1627-1634, 2001
134. Maxim Likhachev and Ronald C. Arkin, "***Robotic Comfort Zones,***" Proceedings of SPIE: Sensor Fusion and Decentralized Control in Robotic Systems III Conference, Vol. 4196, pp. 27-41, 2000

Short-length Publications at Conferences:

- Sandip Aine, Charupriya Sharma and Maxim Likhachev, "***Learning to Search More Efficiently from Experience: A Multi-heuristic Approach***," Proceedings of the International Symposium on Combinatorial Search (SoCS), 2015.
- Mark Henderson, Joseph T. Kider Jr., Maxim Likhachev and Alla Safonova, *"**High-Dimensional Planning on the GPU,***" NVIDIA GPU Technology Conference, 2009 (**Best Poster Award**).
- Dave Ferguson and Maxim Likhachev, "***Efficiently Using Cost Maps For Planning Complex Maneuvers,***" Proceedings of ICRA Workshop on Planning with Cost Maps, 2008.
- Maxim Likhachev and Sven Koenig, "***Incremental Heuristic Search in Games: The Quest for Speed,*** " Proceedings of the Artificial Intelligence and Interactive Digital Entertainment Conference (AIIDE), Poster Abstract, 2006
- Dave Ferguson, Maxim Likhachev and Anthony Stentz, "***A Guide to Heuristic-based Path Planning,***" Proceedings of ICAPS Workshop on Planning under Uncertainty for Autonomous Systems, 2005
- Sven Koenig and Maxim Likhachev, "***A New Principle for Incremental Heuristic Search: Theoretical Results,*** " Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), Poster Abstract, 2005
- Sven Koenig and Maxim Likhachev, "***Adaptive A*,*** " Proceedings of the International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS), Poster Abstract, 2005

PATENTS

- Provisional patent 63/168,565 (filed on 03/31/21), "**Multi-dimensional extended trajectory planning with changing dimensionality based on horizon steps**," (Denso Corp. and RobotWits, LLC)
- Patent 10,766,487 (issued 09/08/20, filed 08/13/18), "**Vehicle driving system**," (Denso Corp. and RobotWits, LLC)
- Patent 10,730,521 (issued 08/04/20, filed 05/09/18), "**System for autonomous lane merging**," (Denso Corp. and RobotWits, LLC)
- Patent 9,933,781 (issued 04/03/18, filed 11/23/16), "**Data-driven planning for automated driving**," (Denso Corp. and RobotWits, LLC)
- Patent 7,136,813 (issued 11/14/2006, filed 09/25/2005), "**Probabilistic networks for detecting signal content,**" (Intel Corporation).

INVITED TALKS AND TUTORIALS

- Keynote talk "Learning in Search-based Planning for Robotics," at ICAPS'22 PlanRob workshop
- Keynote talk "Search-based Planning for Higher-dimensional Robotic Systems," at IROS'21
- Invited tutorial "Search-based Planning for Low- and High-dimensional Robotic Systems," at the 5th Summer School on AI organized by the Russian Association for the Artificial Intelligence, 2021
- Invited talk (together with R. Burcin), "Session II: Materials & Career Paths in Robotics & Tech," Technology & Engineering Education Association of Pennsylvania (TEEAP) webinar, 2021
- Invited talk (together with R. Burcin), "Session I: An Insider's Guide to Robotics: A Conversation with the Carnegie Mellon's Robotics Institute," Technology & Engineering Education Association of Pennsylvania (TEEAP) webinar, 2021
- Invited talk (together with R. Burcin), "The Robot Doctor - Inspiring Math Learners Through Robotics," Three Rivers Educational Technology Conference, 2021
- Invited talk "Planning for High-dimensional Robotic Systems by Solving Problems in Low-dimensional Manifolds," at Bringing geometric methods to robot learning, optimization and control workshop at IROS'20
- Invited talk (together with R. Burcin and T. Heffernan), "Math Through Virtual Innovative Robotics Content: Robot Doctor," Technology & Engineering Education Association of Pennsylvania Conference, 2020
- Invited talk (together with R. Burcin), "Math through Robotics: Reimagining Access to Robotics Education for Pennsylvania Students," CS4All Conference, 2020
- Invited talk "The Robot Doctor Series: High-school Math through the Lens of Robotics," at BitHacks, Student-Led, Non-Profit STEM Organization, 2020
- Invited talk "Search-based Planning for High-dimensional Robotic Systems" at Max Planck Institute for Intelligent Systems, 2020
- Invited talk "Offline Learning for Online Planning" at Scalable Learning for Integrated Perception and Planning workshop at RSS'19
- Invited talk "Computation and Use of Topology-based Heuristic Functions for

Motion Planning" at Topological Methods in Robot Planning workshop at ICRA'19

- Invited talk "Search-based Planning for High-dimensional Robotic Systems" at University of Oklahoma, 2019
- Invited talk "Search-based Planning for High-dimensional Robotic Systems Using Ensembles of Solutions to Their Low-dimensional Abstractions" at University of Washington, 2018
- Invited talk "Learning in Heuristic Search-based Planning" at Machine Learning in Robot Motion Planning workshop at IROS'18
- Invited talk "Search-based Planning for High-dimensional Robotic Systems" at Yale, 2017
- Tutorial "A* Planning and Model Predictive Control with Dynamics-based and Multiple Heuristics" at IROS (together with Emmanuel Collins), 2017
- Invited talk "Model-based Planning with Learning from Experience and Demonstrations" at Resilient Intelligence in Autonomous Systems: Challenges and Opportunities workshop at RSS, 2017
- Invited talk "Heuristic Search-based Planning with Learning" at Florida State University, 2017
- Invited talk "The Search-based Planning Library" at Second Online MoveIt! Community Meeting (jointly with Andrew Dornbush), 2016
- Invited talk "Search-based Planning by Decomposition for Teams of Heterogeneous Robots" at ARL-sponsored workshop on Heterogeneity, Diversity and Resilience in Multi-Robot Systems, 2016
- Invited talk "Search-based Motion Planning with Topology-based Heuristic Functions" at Emerging Topological Techniques workshop at ICRA, 2016
- Invited speaker at Symposium on Combinatorial Search (SoCS), 2015
- Invited talk "Search-based Planning with Multiple Inadmissible Heuristics" at Optimal Robot Motion Planning workshop at ICRA, 2015
- Invited short talk "From Robotic Systems to Robotics-grounded AI Systems" at NSF-sponsored workshop on Research Issues at the Boundary of AI and Robotics, at AAAI, 2015
- Tutorial "Search-Based Planning: Toward High Dimensionality and Differential Constraints" at IROS (together with Mihail Pivtoraiko and Sven Koenig), 2013
- Invited talk "Planning for Robotics and Beyond" at The International Baccalaureate Conference for the middle- and high-school educators, Pittsburgh, 2013
- Tutorial "Motion Planning for Mobile Manipulation: State-of-the-art Methods and Tools" at ICRA (together with Sachin Chitta, Ioan Alexandru Sucan, Lydia Kavraki, Mark Moll), 2013
- Invited talk "Lifelong Search-based Planning: From Incremental Planning to Planning with Experience" at Lifelong Learning for Mobile Robotics Applications workshop at IROS 2012
- Tutorial "Search-Based Planning: Toward High Dimensionality and Differential Constraints" at AAAI (together with Mihail Pivtoraiko and Sven Koenig), 2012

- Invited talk "Search-based Planning in Robotics" at Virginia Tech, 2010
- Invited talk "Solving hard planning problems in robotics with simple graph searches" at Stevens Institute of Technology, 2010
- Invited talk "Search-based Planning with Motion Primitives" at CoTeSys-ROS Fall School on Cognition-enabled Mobile Manipulation, Munich, Germany, 2010
- Invited talk “Solving hard planning problems in robotics with a series of simple A*-like searches” at NREC, CMU, 2010
- Tutorial “Real-Time Planning in Dynamic and Partially-Known Domains” at ICRA (together with Sven Koenig), 2010
- Invited talk “Solving Hard Planning Problems in Robotics with Simple Graph Searches” at MIT, 2010
- Invited talk “Search-based Planning in Robotics” at Transport and Telecommunications Institute, Riga, Latvia, 2010
- Tutorial “Real-Time Planning in Dynamic and Partially-Known Domains” at ICAPS (together with Sven Koenig), 2009
- Tutorial “Real-Time Planning in Dynamic and Partially-Known Domains” at IJCAI (together with Sven Koenig), 2009
- Internal talk “Solving Hard Planning Problems in Robotics with Simple Graph Searches” at GRASP seminar at University of Pennsylvania, 2008
- Invited talk “Solving Hard Planning Problems in Robotics with Simple A*-like searches” at the First International Symposium on Search Techniques in Artificial Intelligence and Robotics (at AAAI conference), 2008
- Invited talk “Planning Long Dynamically-Feasible Complex Maneuvers for Autonomous Vehicles” at NREC, CMU, 2008
- Invited talk “Challenges of Planning in Dynamic Cluttered Environments” at DARPA sponsored workshop on Cognitive Mobile Robotics, 2008
- Invited talk “Pushing the Limits of Search-based Planning” at Intel Research, Pittsburgh, 2007
- Invited talk “Search-based Planning under Time Constraints and under Uncertainty” at NREC, CMU, 2007
- Invited talk “Search-based Planning under Time Constraints and under Uncertainty” at State University of New York, Stony Brook, 2007
- Invited talk “Fast Replanning” at ICAPS Summer School on Artificial Intelligence Planning 2006 (together with Sven Koenig)
- Invited talk “Search-based Planning for Large Dynamic Environments” at Palo Alto Research Center (PARC) 2005
- Part of the tutorial “Greedy On-Line Planning” given by Sven Koenig and Anthony Stentz at AAAI 2005
- Part of the tutorial “Greedy On-Line Planning” given by Sven Koenig and Anthony Stentz at ICRA 2005

PROFESSIONAL SERVICES

- **Executive Co-Producer** for TV series The Robot Doctor, aired multiple times on PBS all across Pennsylvania, 2020-2021
- **Member of advisory boards/councils for**: Symposium on Combinatorial Search (SoCS)
- **Chair for:** Dept. of Education-sponsored "The Robot Doctor Pioneers" educational workshop for K-12 educators, 2020 (co-chair), NSF-sponsored workshop on "Robot Planning in the Real World: Research Challenges and Opportunities", 2013 (co-chair), Symposium on Combinatorial Search (SoCS), 2012 (co-chair), Symposium "Robot Motion Planning: New Frameworks and High Performance" at IROS'11 (co-chair), Symposium "Robot Motion Planning: Achievements and Emerging Approaches" at IROS'11 (co-chair), Symposium on Combinatorial Search (SoCS), 2011 (co-chair), Workshop "Bridging the Gap Between the Task and Motion Planning" at the National Conference on Artificial Intelligence (AAAI), 2010(co-chair), Workshop "Bridging the Gap Between the Task and Motion Planning" at the International Conference on Automated Planning and Scheduling (ICAPS), 2009 (co-chair)
- **Area Chair for:** AAAI Conference on Artificial Intelligence (AAAI) 2023, 2021, Robotics: Science and Systems (RSS) Conference 2021, 2020, International Joint Conferences on Artificial Intelligence (IJCAI-PRICAI) 2020, International Joint Conferences on Artificial Intelligence (IJCAI) 2019, Robotics: Science and Systems (RSS) Conference 2014, 2013
- **Member of Senior Program Committee for:** International Conference on Automated Planning and Scheduling (ICAPS) 2022, International Joint Conferences on Artificial Intelligence (IJCAI) 2018, 2016, 2011, AAAI Conference on Artificial Intelligence (AAAI) 2015
- **Associate Editor for:** Artificial Intelligence Journal 2021-2024, International Symposium on Robotics Research (ISRR) 2019, IEEE International Conference on Robotics and Automation (ICRA) 2015, 2014, 2013, 2012, 2011, IEEE International Conference on Intelligent Robots and Systems (IROS) 2015, 2012, 2011
- **Guest Associate Editor for:** Autonomous Robotics journal (AURO) special edition on best papers in RSS 2020 (jointly with editor S. Behnke), Autonomous Robotics journal (AURO) special edition on best papers in RSS 2014 (jointly with editor L. Kavraki)
- **Member of Program Committee for:** Symposium on Combinatorial Search (SoCS) 2022, 2021, Workshop on Algorithmic Foundations on Robotics (WAFR) 2022, 2020, Symposium on Combinatorial Search (SoCS) 2020, Robotics: Science and Systems (RSS) Conference 2018, 2017, International Conference on Automated Planning and Scheduling (ICAPS) 2019 (Main track and Robotics track), 2018, 2017 (Robotics track), Symposium on Combinatorial Search (SoCS) 2019, 2018, 2017, Workshop on Algorithmic Foundations on Robotics (WAFR) 2016, International Conference on Automated Planning and Scheduling (ICAPS) 2016, Symposium on Combinatorial Search (SoCS) 2016, Doctoral Consortium at AAAI 2016, Robotics: Science and Systems (RSS) Conference 2015, International Joint Conferences on Artificial Intelligence (IJCAI) 2015, International Conference on Automated Planning and Scheduling (ICAPS) 2015, Symposium on Combinatorial Search (SoCS) 2015, Workshop on Algorithmic Foundations on Robotics (WAFR) 2014, International Conference on Automated Planning and Scheduling (ICAPS) 2014

(Robotics track), National Conference on Artificial Intelligence (AAAI) 2013 (Physically-grounded AI track), International Conference on Automated Planning and Scheduling (ICAPS) 2013, Robotics: Science and Systems (RSS) Conference 2012, National Conference on Artificial Intelligence (AAAI) 2012 (Regular track and Robotics track), International Conference on Automated Planning and Scheduling (ICAPS) 2012, Robotics: Science and Systems (RSS) Conference 2011, National Conference on Artificial Intelligence (AAAI) 2011 (Physically-grounded AI track), International Conference on Automated Planning and Scheduling (ICAPS) 2011, International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2011, Robotics: Science and Systems (RSS) Conference 2010, National Conference on Artificial Intelligence (AAAI) 2010, Symposium on Combinatorial Search (SoCS) 2010, International Joint Conferences on Artificial Intelligence (IJCAI) 2009, Symposium on Combinatorial Search (SoCS) 2009, National Conference on Artificial Intelligence (AAAI) 2008 (PC member at both the main track and Physically-grounded AI track), Workshop "Search in Artificial Intelligence and Robotics" at AAAI'08, Workshop "Path Planning on Costmaps" at ICRA'08, International Conference on Machine Learning (ICML) 2007

- **Session Chair for:** International Conference on Automated Planning and Scheduling (ICAPS) 2022, IEEE International Conference on Robotics and Automation (ICRA) 2022, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020, 2019, IEEE International Conference on Robotics and Automation (ICRA) 2015, National Conference on Artificial Intelligence (AAAI) 2015, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2013, IEEE International Conference on Robotics and Automation (ICRA) 2013, IEEE International Conference on Robotics and Automation (ICRA) 2012, International Joint Conferences on Artificial Intelligence (IJCAI) 2011, National Conference on Artificial Intelligence (AAAI) 2010, Symposium on Combinatorial Search (SoCS), 2010, IEEE International Conference on Robotics and Automation (ICRA) 2010, National Conference on Artificial Intelligence (AAAI) 2008, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2007
- **NSF Panel Participant 2017, 2013, 2012, 2010**
- **Reviewer of Proposals for:** NASA Fellowships 2017, Army Research Office (ARO) 2019, 2014, 2013, 2012, Israel Science Foundation (ISF) 2013, French National Research Agency 2012, Qatar National Research Fund 2010
- **Reviewer for the following journals:** International Journal of Robotics Research (IJRR) 2014, ACM Transactions on Intelligent Systems and Technology 2014, IEEE Transactions on Robotics (TRO) 2013, IEEE Transactions on Computational Intelligence and AI in Games 2013, IEEE/ACM Transactions on Computational Biology and Bioinformatics 2013, IEEE Transactions on Intelligent Transportations Systems 2013, International Journal of Robotics Research (IJRR) 2013, AI Communications 2013, International Journal of Robotics Research (IJRR) 2012, Artificial Intelligence Journal (AIJ) 2012, Computational Intelligence Journal 2012, Journal of Autonomous Agents and Multi-agent Systems (AAMAS) 2011, Computational Intelligence Journal 2011, Artificial Intelligence Journal (AIJ) 2011, IEEE Transactions on Robotics (TRO) 2011, Autonomous Robots 2011, International Journal of Robotics Research (IJRR) 2010, IEEE Transactions on Robotics (TRO) 2010, International Journal of Robotics Research (IJRR) 2009, IEEE Transactions on Robotics (TRO) 2009, Journal of Artificial Intelligence Research (JAIR) 2008, Artificial Intelligence Journal (AIJ) 2008, Journal of Intelligent and

Robotic Systems (JINT) 2008, Artificial Intelligence Journal (AIJ) 2007, Artificial Intelligence Journal (AIJ) 2006, Journal of Artificial Intelligence Research (JAIR) 2006 (2 papers), IEEE Transactions on Robotics (TRO) 2006, Journal of Machine Learning Research (JMLR) 2005, Journal of Artificial Intelligence Research (JAIR) 2005, IEEE Transactions on Robotics (TRO) 2005, IEEE Transactions on Robotics and Automation (TRA) 2003, IEEE Transactions on Robotics and Automation (TRA) 2002.

- **Reviewer for the following conferences:** IEEE International Conference on Intelligent Robots and Systems (IROS) 2015, SIGGRAPH 2014, WAFR 2012, SIGGRAPH ASIA 2012, SIGGRAPH 2011, IEEE International Conference on Robotics and Automation (ICRA) 2011, SIGGRAPH ASIA 2011, IEEE International Conference on Robotics and Automation (ICRA) 2010, IEEE International Conference on Intelligent Robots and Systems (IROS) 2010, IEEE International Conference on Intelligent Robots and Systems (IROS) 2009, IEEE International Conference on Robotics and Automation (ICRA) 2009, American Control Conference (ASC) 2009, IEEE International Conference on Robotics and Automation (ICRA) 2008, IEEE Multi-conference on Systems and Control (MSC) 2008, IEEE International Conference on Robotics and Automation (ICRA) 2007, International Joint Conference on Artificial Intelligence (IJCAI) 2007 (5 papers), Robotics: Science and Systems (RoSS) 2006, International Joint Conference on Artificial Intelligence (IJCAI) 2005, International Conference on Intelligent Autonomous Systems (IAS) 2005 (2 papers), IEEE International Conference on Robotics and Automation (ICRA) 2005, International Joint Conference on Artificial Intelligence (IJCAI) 2003, Advances in Neural Information Processing Systems (NIPS) 2002 (6 papers).
- **Departmental Service:** faculty senate representative 2020-2022, faculty search committee 2017 and 2018, search committee for a director of Quality of Life Technology (QoLT) center at CMU 2012-2013, admission committee for the graduate program at Robotics Institute at CMU
- **Other:** AAAI/SIGART Doctoral Consortium mentor at AAAI 2020, 2019, Doctoral Consortium mentor at ICAPS 2017, AAAI/SIGART Doctoral Consortium mentor at AAAI 2015

STUDENTS

Current PhD students:

- Ishani Chatterjee (PhD student in Robotics, CMU, co-advised with M. Veloso)
- Jacky Liang (PhD student in Robotics, CMU, co-advised with O. Kroemer)
- Shohin Mukherjee (PhD student in Robotics, CMU)
- Ramkumar Natarajan (PhD student in Robotics, CMU, co-advised with H. Choset)
- Muhammad Suhail Saleem (PhD student in Robotics, CMU)
- Dhruv Saxena (PhD student in Robotics, CMU)
- Shivam Vats (PhD student in Robotics, CMU, co-advised with O. Kroemer)
- Rishi Veerapaneni (PhD student in Robotics, CMU)

Current Masters students:

- Manash Pratim Das (Robotics, CMU)
- Tushar Kusnur (Robotics, CMU)
- Yash Oza (Robotics, CMU)

Graduated PhD students:

- Anirudh Vemula (PhD student in Robotics, CMU, co-advised with D. Bagnell), 2022
- Fahad Islam (PhD student in Robotics, CMU), 2021
- Anahita Mohseni Kabir (PhD student in Robotics, CMU, co-advised with M. Veloso), 2021
- Sung Kyun Kim with thesis "Planning under Uncertainty with Multiple Heuristics," Robotics, CMU, 2019
- John Drake with thesis "Planning For Non-Player Characters by Learning From Demonstration," Computer and Information Science, University of Pennsylvania, 2018
- Jonathan Butzke with thesis "Planning for a Small Team of Heterogeneous Robots: from Collaborative Exploration to Collaborative Localization," Robotics, CMU, 2017
- Venkatraman Narayanan with thesis "Deliberative Perception," Robotics, CMU, 2017
- Kalin Gochev with thesis "Planning with Adaptive Dimensionality," UPenn, 2016
- Mike Phillips with thesis "Experience Graphs: Leveraging Experience in Planning," Robotics, CMU, 2015
- Ben Cohen with thesis "Motion Planning for Manipulation with Heuristic Search," Computer and Information Science, UPenn, 2015
- Steven Gray with thesis "Motion Primitives and Planning for Robots with Closed Chain Systems and Changing Topologies," MEAM, UPenn, co-advised with V. Kumar, 2013
- Subhrajit Bhattacharya with thesis "Topological And Geometric Techniques In Graph Search-Based Robot Planning," MEAM, UPenn, co-advised with V. Kumar, 2011

Graduated Masters Students:

- Shanshan Xie, Robotics, CMU, 2021
- Raghav Sood, ME, CMU, 2020
- Muhammad Suhail Saleem, ME, CMU, 2020
- Aditya Agarwal, Robotics, CMU, 2020
- Allen Cheng, Robotics, CMU, 2020
- Wei Du, ME, CMU, 2019
- Aaron Miller, Robotics, CMU, 2019
- Lingyao Zhang, Machine Learning, CMU, 2018
- Kalyan Vasudev, Robotics, CMU, 2018

- Sameer Bardapurkar, Robotics, CMU, 2017
- Karthik Vijayakumar, Robotics, CMU, 2017
- Ben Holden, Robotics, CMU, 2016
- Victor Hwang, Robotics, CMU, 2014
- Arjun Menon, Robotics, CMU, 2014
- Siddharth Swaminathan, Robotics, CMU, 2014
- Bradford Neuman, Robotics, CMU, co-advised with A. Stentz, 2013
- Venkatraman Narayanan with thesis "Anytime Safe Interval Path Planning for Dynamic Environments", Robotics, CMU, 2012
- Shinsuke Okada, Robotics, UPenn, 2011
- Dinesh Thakur with thesis "Opportunistic Refinement: Path Planning With Dynamic Constraints," Robotics, UPenn, co-advised with V. Kumar, 2010
- Ian Ferguson with thesis "Heterogeneous Multi-Robot Coverage Mapping," Robotics, UPenn, 2010
- Sameera Anirudh Peesapati with thesis "High-Fidelity Dynamics And Stabilization Controls For Quadrotor UAV", ESE, UPenn, 2010
- Alex Kushleyev with thesis "Efficient Planning For Problems With Structured Uncertainty," ESE, UPenn, 2009

Member of PhD Thesis Committees:

- Joseph Norby, advised by A. Johnson, CMU, defended in 2022
- Mengwen "Alex" He, advised by R. Rajkumar, proposed in 2022
- Jingwei Chen, advised by N. Sturtevant, Univ. of Alberta, defended in 2022
- Zhongqiang (Richard) Ren, advised by H. Choset, CMU, proposed in 2021
- Aditya Mandalika, advised by S. Srinivasa, UWash, defended in 2021
- Arjav Ashesh Desai, advised by N. Michael, CMU, defended in 2021
- Jayanth Krishna Mogali, advised by S. Smith, CMU, defended in 2021
- Wenda Xu, advised by J. Dolan, CMU, defended in 2021
- Wenhao Luo, advised by K. Sycara, CMU, defended in 2021
- Di Deng, advised by S. Kenji, CMU, defended in 2021
- Liron Cohen, advised by S. Koenig, USC, defended in 2020
- Ellen A. Cappo, advised by N. Michael, CMU, defended in 2020
- Eugene Fang, advised by R. Whittaker, CMU, defended in 2020
- Jinwook Huh, advised by D. Lee, University of Pennsylvania, defended in 2019
- Philip Cooksey, advised by M. Veloso, CMU, defended in 2019
- Sasanka Nagavalli, advised by K. Sycara, CMU, defended in 2018
- Vishnu Desaraju, advised by N. Michael, CMU, defended in 2017

- Breelyn Kane Styler, advised by R. Simmons, CMU, defended in 2018
- Glenn Wagner, advised by H. Choset, CMU, defended in 2016
- Tiago Raul Pereira, advised by M. Veloso and A. Moreira, CMU, defended in 2019
- Danny Zhu, advised by M. Veloso, CMU, defended in 2017
- Jennifer King, advised by S. Srinivasa, CMU, defended in 2016
- Chris Dellin, advised by S. Srinivasa, CMU, defended in 2016
- Scott Kiesel, advised by W. Ruml, University of New Hampshire, USA, defended in 2016
- James Keller, advised by V. Kumar, University of Pennsylvania, USA, defended in 2016
- Michael Dille, advised by S. Singh, CMU, USA, defended in 2013
- Soonkyum Kim, advised by V. Kumar, University of Pennsylvania, USA, defended in 2013
- Martin Rufli, advised by R. Siegwart, ETH Zurich, Switzerland, defended in 2012
- Xiaoxun Sun, "Incremental Search-based Path Planning for Agent Navigation towards a Moving Target," advised by S. Koenig, University of Southern California, USA, defended in 2012
- Paul Vernaza, "Efficient Learning and Inference for High-dimensional Lagrangian Systems," advised by D. Lee, University of Pennsylvania, USA, defended in 2011
- Thomas Allen, "Time-optimal Active Decision Making", advised by S. Scheding, University of Sydney, Australia, defended in 2011
- Collin Green, advised by A. Kelly, CMU, USA, proposed in 2010
- Liming Zhao, "Constructing Good Quality Motion Graphs for Realistic Human Animation," advised by A. Safonova and N. Badler, University of Pennsylvania, USA, defended in 2009

LANGUAGES

Fluent in English & Russian. Some knowledge of Latvian language.

INTERESTS AND ACTIVITIES

Downhill skiing, the history of old silver

CITIZENSHIP STATUS

Citizenship of USA