

# ANDREW STEFAN KIMMEL

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Applied Scientist II	Advanced Research and Development Amazon Robotics North Reading, MA 01864	akimmel42@gmail.com tel: (775)-240-7571 LinkedIn:/in/akimmel42/
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## PROFILE

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15+ years of experience in robotics researching, developing, and integrating large-scale C++ solutions in academia, industry, and government. Published extensive research in the areas of motion planning, manipulation, multi-robot systems, machine learning, and robotics software engineering. Extensive experience developing on ROS, working on robots utilizing ROS (Turtlebot, Baxter, Kuka), as well as industrial robots (Yaskawa SDA10f Motoman, ABB, Kuka). Key member of the Rutgers University team in the 2015 and 2016 Amazon Picking Challenge. One of the primary developers of the manipulation and task planning software used by the PRACSYS research group at Rutgers University. Lead scientist which created motion planning software deployed in production for Amazon's Cardinal and Sparrow automated workcells.

## TECHNICAL SKILLS

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<b>Programming Languages</b>	C/C++, Java, Python, C#, XML, YAML
<b>Tools</b>	ROS (Robot Operating System), Matlab, Visual Studios, L <sup>A</sup> T <sub>E</sub> X

## EDUCATION

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**Rutgers, The State University of New Jersey** , New Brunswick, NJ 2012-2019  
Ph.D. in Computer Science, GPA: 3.9  
Robotics, Motion and Path Planning, Manipulation,  
Planning Under Uncertainty, Multi-Agent Systems, Machine Learning.

**University of Nevada, Reno**, Reno, NV 2009-2012  
M.S. in Computer Science, GPA: 3.8  
Software Engineering, Robotics, Decentralized Multi-Robot Coordination.

**University of Nevada, Reno**, Reno, NV 2004-2009  
B.S. in Computer Science, Graduated with Distinction, GPA: 3.64  
Software Engineering, Computer Graphics, Embedded Systems.

## WORK AND RESEARCH EXPERIENCE

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**Amazon Robotics** December 2022 - January 2024  
Applied Scientist II, Product Motion Planning and Controls Team.

- Mentored team of junior scientists and software engineers in motion and task planning.
- Proposed, led, and implemented cross-organizational effort to unify motion planning production software for Cardinal and Sparrow.
- Developed extensive automated tests evaluating motion planning solutions in production.

**Amazon Robotics** September 2019 - December 2022  
Applied Scientist II (Grasping/ML), Advanced Research and Development Team.

- Created novel physics based simulation platform for compliance control manipulators.
- Researched, proposed, and developed motion and task planning algorithms for container packing.
- Implemented and tested solutions at scale on industrial-grade robots. Developed and deployed methods to reduce sim-to-real gap.

**Rutgers, The State University of New Jersey**

July 2012 - September 2019

Research and Teaching Assistant - PRACSYS Robotics Research Laboratory.

- Developed methods for grasping (2017) and motion planning (2018) for manipulation in dense clutter. Developed method for first instance of robotic handwriting with inhand manipulation using underactuated hands (2018), further improved with machine learning (2019).
- Developed methods for scheduling tasks allowing for simultaneous arm movements of a dual-arm manipulator (2015,2016). Developed methods for coordinating the paths of multiple agents without explicit communication (2013, 2014).

**Intelligent Automation Incorporated**

May 2017 - August 2017

Robotics Engineer Intern - Signals and Systems Division. Rockville, MD

**University of Nevada, Reno**

August 2009 - June 2012

Research and Teaching Assistant - Robotics Research Laboratory.

- Worked in a team to develop a large-scale, open-source software platform for simulating and planning for multiple physics-based robots (PRACSYS). Developed methods for maintaining a team of agents within some proximity constraint without using any communication (2012).

**University of Nevada, Reno**

December 2007 - June 2009

Systems Administrator - Engineering Computing Center.

- Network security, hardware and software management, server maintenance

**PUBLICATIONS**

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1. Kimmel, A; Sintov, A; Bekris, K E; Boularias, A, "Motion Planning with Competency-Aware Transition Models for Underactuated Adaptive Hands", IEEE-RAS ICRA, 2020.
2. Kimmel, A.; Shome, R.; Bekris, K.E., "Anytime Motion Planning for Prehensile Manipulation in Dense Clutter", Advanced Robotics, 2019.
3. Sintov, A.; Morgan A.; Kimmel, A.; Dollar, A.; Bekris, K.E.; Boularias, A., "Learning a State Transition Model of an Underactuated Hand", IEEE RA-L and ICRA, 2019.
4. Calli, B.; Kimmel, A.; Hang, K.; Bekris, K.E.; Dollar, A., "Path Planning for Within-Hand Manipulation Over Learned Representation of Safe States", IEEE-RAS ISER, 2018.
5. Kimmel, A.; Shome, R.; Littlefield, Z.; Bekris, K. E., "Fast, Anytime Motion Planning for Prehensile Manipulation in Clutter", IEEE-RAS HUMANOIDS, 2018.
6. Zhu, S.; Kimmel, A.; Bekris, K.E.; Boularias, A., "Fast Model Identification Via Physics Engines For Data-Efficient Policy Search", International Joint Conference on Artificial Intelligence, 2018.
7. Kimmel, A.; Azizi, V.; Bekris, K.E.; Kapadia, M., "Geometric Reachability Analysis for Grasp Planning in Cluttered Scenes for Varying End-Effectors", IEEE-RAS CASE, 2017.
8. Littlefield, Z., Zhu, S., Kourtev, H., Psarakis, Z., Shome, R., Kimmel, A., Dobson, A., De Souza, A.F. and Bekris, K.E., "Evaluating end-effector modalities for warehouse picking: A vacuum gripper vs a 3-finger underactuated hand.", IEEE-RAS CASE, 2016.
9. Kimmel, A., Bekris, K. E., "Scheduling Pick-and-Place Tasks for Dual-arm Manipulators using Incremental Search on Coordination Diagrams", ICAPS-PlanRob, 2016.
10. Kimmel, A., Bekris, K. E., "Decentralized Multi-Agent Path Selection Using Minimal Information", IEEE Symposium on Distributed Autonomous Robotic Systems (DARS), 2014.
11. Krontiris, A., Shome, R., Dobson, A., Kimmel, A., Bekris, K. E., "Rearranging Similar Objects With A Manipulator Using Pebble Graphs", IEEE-RAS HUMANOIDS, 2014.
12. Littlefield, Z., Krontiris, A., Kimmel, A., Dobson, A., Shome, R., Bekris, K. E., "An Extensible Software Architecture For Composing Motion And Task Planners", SIMPAR, 2014.
13. Kimmel, A., Bekris, K. E., "Minimizing Conflicts Between Moving Agents over a Set of Non-Homotopic Paths Through Regret Minimization", AAAI-IRS, 2013.
14. Kimmel, A., Dobson, A., Littlefield, Z., Krontiris, A., Marble, J., Bekris, K. E., "PRACSYS: An Extensible Architecture for Composing Motion Controllers and Planners", SIMPAR, 2012.

15. Kimmel, A., Dobson, A., Bekris, K. E., “Maintaining Team Coherence under the Velocity Obstacle Framework”, AAMAS, 2012.

## **AWARDS AND DISTINCTIONS**

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- College of Science Dean’s List at University of Nevada, Reno. (2 time recipient)
- College of Engineering Dean’s List at University of Nevada, Reno. (3 time recipient)
- Member of Tau Beta Pi Engineering Honor Society
- Millennium Scholarship, Silver State Scholarship at University of Nevada, Reno. (2004-2009)
- Conference Travel Award from Rutgers University to attend DARS (2014), ICAPS (2016)
- NSF Scholarships to attend AAMAS (2012), CASE (2017), ISER(2018)
- Rizvi Graduate Fellowship Award (2018)

## **COMMUNICATION SKILLS**

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- Gave oral presentations at five international conferences, have had several poster sessions at various conferences and workshops. Organized workshop at CASE 2016.
- Mentored several students as part of an NSF program for undergraduates to participate in research. Created and taught workshops dealing with getting started with research in academia.
- Created and taught material in several A.I. and robotics courses.