Andrew Wells | Curriculum Vitae

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Ph.D. Student advised by Dr. Lydia Kavraki at Rice University. Research in Task and Motion Planning.

Research Experience

- **Rice University** — **Dr. Kavraki**
  Research Assistant — *August 2016–Present*
  As a Ph.D. student at Rice, I conduct research in robotics, specifically in task and motion planning using formal methods. Past research introduces learning to TMP to improve scalability. Current work looks at expanding this to multiple robots and providing formal guarantees.

- **LLVM/Linux** — **Jan-Simon Moller**
  Google Summer of Code — *May 2016–August 2016*
  Worked on the Clang static-analyzer for the Linux Kernel. The project was hosted under the linux foundation, the specific project being LLVMLinux. I implemented checkers for the linux kernel. (Exact contributions can be found for user andrewmw94 at `https://github.com/andrewmw94/llvm_clang_GSoC`)

- **Catholic University of America** — **Dr. Plaku**
  Research Assistant — *September 2013–May 2016*
  Motion Planning: Conducted research in robot motion planning with an emphasis on motion planning for high-dimensional systems with nonlinear dynamics. Discrete algorithms are combined with sampling-based motion planning algorithms to increase the performance. The work shows that it is possible to gain significant speedups over other state of the art methods (eg. RRT and SYCLOP) by incorporating feedback from the continuous space into the discrete space. This work is resulted in a publication. Linear Temporal Logic Multi-Robot Planning: Conducted research in motion planning involving multiple robots, multiple goals, and requirements for reaching the goals specified by a proposition of Linear Temporal Logic. The continuous planner is guided by a discrete planner that must both satisfy the proposition and find short trajectories for the robots while avoiding collisions between robots.

- **DIMACS, Rutgers University** — **Dr. Bekris**
  NSF REU — *May 2015–August 2015*
  Probabilistic Near-Optimality: Bekris and Dobson had proved finite time Probabilistic Near-Optimality of a planning algorithm similar to PRM; however, their proof did not include tree-based planners such as RRT. I extended the proof to include such planners. This work will be published as an addendum to their paper. Motion Planning using Homotopic Constraints: Conducted research in robotics motion planning for dynamic systems. This further explores the advantages to be gained by coupling discrete algorithms with continuous planners. The focus in this work is on finding shortest paths in different homotopic classes and using these to guide a sampling-based planner, by choosing a homotopic class and following the corresponding shortest path.

- **MLPACK** — **Dr. Curtin**
  Google Summer of Code — *May 2014–August 2014*
  Work on the MLPACK library for Machine Learning, specifically on structures and algorithms for nearest-neighbor searches. My contributions were implementing R-trees and variants as well as associated search algorithms. (Exact contributions can be found for user andrewmw94 at `https://github.com/mlpack/mlpack`)

- **Florida International University** **Dr. Sun**
  NSF REU *May 2013–August 2013*
  Research in Software Defined Networking. The work centered around the difficulties facing administrators of large networks and the possibility of adding a field to a packet header so that administration could be done easily and rules enforced efficiently. This work resulted in a publication.

Education

- **Rice University**
  Ph.D. student advised by Dr. Lydia Kavraki *August 2016–Present*
- **Catholic University of America**
  BS in Computer Science, Magna Cum Laude *2012–2016*
- **Catholic University of America**
  Ph.B. in Philosophy, Magna Cum Laude *2012–2016*

Awards

- 2017 NASA Space Technology Research Fellowship
- 2017 NSF Graduate Research Fellowship Program Honorable Mention
- TAROS 2015 Best Student Paper Award.
- CRA Outstanding Undergraduate Researcher. Honorable Mention 2016.
- Best Poster Presentation award Florida International University Computer Science REU program 2013.
- Winner of CUA Math Contest Fall 2012, Spring 2013, Fall 2013, Spring 2014, Fall 2014, Spring 2015, and Fall 2015

Publications

- Wells, Andrew M., Dantam, Neil T., Shrivastava, Anshumali and Kavraki, Lydia E. "Learning Feasibility for Task and Motion Planning in Tabletop Environments," IEEE Robotics and Automation Letters, 2019. To appear.
- He, Keliang, Wells, Andrew M., Kavraki, Lydia E. and Vardi, Moshe. Y. "Efficient Symbolic Reactive Synthesis for Finite-Horizon Tasks," in IEEE Intl. Conf. on Robotics and Automation, 2019. To appear.
- Wells, Andrew and Plaku, Erion. "Adaptive Sampling Based Motion Planning for Mobile Robots with Differential Constraints." Springer LNCS Towards Autonomous Robotic Systems, vol. 9287, pp. 283–295 `http://link.springer.com/chapter/10.1007%2F978-3-319-22416-9_32` (Best Student Paper Award)
- O'Neil, Michael, Wells, Andrew and Sun, Xin. "Towards a novel and efficient packet identifier design for SDN" HotSDN '14 Proceedings of the third workshop on Hot topics in software defined networking, pp. 223-224. `http://dl.acm.org/citation.cfm?id=2620728.2620775`

Talks

- "Adaptive Sampling Based Motion Planning for Mobile Robots with Differential Constraints." at 16th annual Towards Autonomous Robotic Systems conference, University of Liverpool, 2015.
- "Sampling Based Motion Planning with Kinodynamics" at Pracsys Laboratory, Computational Biomedicine Imaging and Modeling Center, Rutgers University, 2015.