# Andrew M. Wells

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I am a $5^{th}$ year Ph.D. Student at Rice University advised by Dr. Lydia Kavraki. I will graduate this May. In 2017, I recieved a NASA Space Technology Research Fellowship (now called Space Technology Research Grant) to conduct research in formal methods and robotics. I have applied my research at NASA; collaborating with the Robotics and Intelligence for Human Spacecraft (RIHS) team at the Lyndon B. Johnson Space Center (JSC) and with researchers at NASA Ames. I have also collaborated with researchers at other labs and universities throughout the world. I have experience leading two small projects of three or four researchers while mentoring a Ph.D. student at Rice University, including choosing high-level goals, assigning tasks, and scheduling subgoals to ensure our team meets deadlines.

## Education

2016–2021 **Ph.D. in Computer Science**, *Rice University, advisor Dr. Lydia E. Kavraki.*

2016–2019 **M.S. in Computer Science**, *Rice University, advisor Dr. Lydia E. Kavraki.*

2012–2016 **B.S. in Computer Science**, *Catholic University of America, Magna Cum Laude.*

2012–2016 **Ph.B. in Philosophy**, *Catholic University of America, Magna Cum Laude.*

## Experience

2017–2021 **Space Technology Research Fellow**, *NASA*, Dr. Julia Badger.
Work at NASA JSC for 10+ weeks each year. Integrate research with large (several million lines of code) C++ code base.
Apply research in task-motion planning and formal synthesis to Robonaut 2 and Astrobee (See [Kingston ICRA 2020])

2016–2021 **Graduate Research Assistant**, *Rice University*, Dr. Lydia E. Kavraki.
Apply Machine Learning to task-motion planning to improve scalability (See [Wells RAL 2020])
Develop finite probabilistic synthesis and applying the same to robot manipulation (See `https://github.com/andrewmw94/ltlf_prism` and [Wells EPTCS 2020])
Mentor graduate student's research in multi-robot planning and control as well as multi-robot task-motion planning (See [Pan IROS 2020])
Develop tool for stochastic games to model human-robot collaboration

Summer 2016 **Google Summer of Code**, *LLVM/Linux*, Jan-Simon Möller.
Implemented checkers using the Clang static-analyzer for the Linux Kernel
(See user andrewmw94 at `https://github.com/andrewmw94/llvm_clang_GSoC`)

2013–2016 **Research Assistant**, *Catholic University of America*, Dr. Erion Plaku.
Use discrete leads to motion plan for high-dimensional systems with nonlinear dynamics (See [Wells TAROS 2015])

Summer 2015 **NSF REU**, *DIMACS, Rutgers University*, Dr. Kostas Bekris.
Extended a proof of probabilistic near-optimality from $PRM^*$ to tree-based planners
Use shortest paths in different homotopic classes to guide kinodynamic motion planning

Summer 2014 **Google Summer of Code**, *MLPACK*, Dr. Ryan Curtin.
Implement R-Trees and variants for nearest-neighbor searches
(See user andrewmw94 at `https://github.com/mlpack/mlpack`)

Summer 2013 **NSF REU**, *Florida International University*, Dr. Xin Sun.
Add a field to a packet header in OpenFlow to make administration of Software Defined
Networks more easy and efficient (See [O'Neil HotSDN 2014])

## Awards

2019 ICRA Best Paper in Cognitive Robotics

2017 NASA Space Technology Research Fellowship

2017 NSF Graduate Research Fellowship Program Honorable Mention

2015 TAROS Best Student Paper Award

2016 CRA Outstanding Undergraduate Researcher Honorable Mention

2013 Best Poster Presentation award Florida International University Computer Science REU

Winner of CUA Math Contest Fall 2012 - Spring 2016

## Publications

T. Pan, A. M. Wells, R. Shome and L. E. Kavraki, "Multi-Robot Task and Motion Planning," IEEE Intl. Conf. on Robotics and Automation, 2021, under review

A. M. Wells, Z. Kingston, M. Lahijanian, L. E. Kavraki and M. Y. Vardi, "Probabilsitc synthesis for Robotic Manipulation," IEEE Intl. Conf. on Roboticts and Automation, 2021, under review

A. M. Wells, M. Lahijanian, L. E. Kavraki, and M. Y. Vardi, "LTLf Synthesis on Probabilistic Systems," Electronic Proceedings in Theoretical Computer Science, vol. 326, pp. 166–181, Sep. 2020.

T. Pan, C. K. Verginis, A. M. Wells, D.V. Dimarogonas and L. E. Kavraki, "Augmenting Control Policies with Motion Planning for Robust and Safe Multi-robot Navigation," in IEEE Intl. Conf. on Intelligent Robots and Systems, 2020. To appear.

Z. Kingston, A. M. Wells, M. Moll, and L. E. Kavraki, "Informing Multi-Modal Planning with Synergistic Discrete Leads," in IEEE Intl. Conf. on Robotics and Automation, 2020, pp. 3199–3205.

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. (**Best Paper in Cognitive Robotics**)

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. IEEE Robotics and Automation Letters, vol. 4, no. 2, pp. 285–292, Apr. 2019.

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`

## Invited Talks

"Reactive Synthesis for Robot Manipulation via Binary Decision Diagrams." Ann and H.J. Smead Aerospace Engineering Sciences, College of Engineering & Applied Science, University of Colorado Boulder 2019.

"Sampling Based Motion Planning with Kinodynamics" at Pracsys Laboratory, Computational Biomedicine Imaging and Modeling Center, Rutgers University, 2015.

## Service

I have reviewed articles for the following:

International Conference on Robotics and Automation (2020, 2021)

Intelligent Robots and Systems (2020)

Robotics and Automation Letters (2020, 2019, 2018)

Frontiers (2020)

I have also served on the Rice Computer Science Graduate Student Association as treasurer (1 year) and as public relations officer (2 years).

## Teaching

Teaching Assistant for 6 classes: "Introduction to Algorithmic Robotics," "Automata, Formal Languages and Computing," "Reasoning about Algorithms" and "Statistics, Computing and Data Science"

Taught a 2 semester highschool Computer Science class at University of Saint Thomas

Coach department-wide graduate student seminar on communication for wider audiences

## Mentoring

Mentor two undergraduates in research-for-credit class on robotics

Mentor Ph.D. student for two years