Wil Thomason

Contact Information

Rice University
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Current Position

Postdoctoral Research Fellow, Rice University, Houston, TX — Since January 2022

Research Interests

Robot autonomy: integrated task and motion planning, neuro-symbolic planning, planning under uncertainty, hardware accelerated planning, motion planning, ML for planning

Education

Cornell University, Ithaca, NY — August 2015 – December 2021
Ph.D. in Computer Science. Advisor: Hadas Kress-Gazit.

Cornell University, Ithaca, NY — August 2015 – June 2019
MS in Computer Science. Advisor: Ross A. Knepper.

University of Virginia, Charlottesville, VA — August 2012 – May 2015
BS (with high distinction) in Computer Science and Mathematics

Awards

Computing Innovation Postdoctoral Fellowship — August 2021
Computing Research Association (CRA) and National Science Foundation (NSF).
29% acceptance rate

RSS Pioneers — April 2020
Robotics: Science and Systems. 33.7% acceptance rate

Outstanding Teaching Assistant Award — May 2017
Cornell University Department of Computer Science

NDSEG Fellow — April 2017
American Society for Engineering Education

NSF GRFP Fellow — March 2017
The National Science Foundation

Outstanding Teaching Assistant Award — May 2016
Cornell University Department of Computer Science

NSF GRFP Honorable Mention — March 2016
The National Science Foundation

Louis T. Rader Outstanding Education Undergraduate Student — May 2015
University of Virginia Department of Computer Science

Rodman Scholar — January 2013
University of Virginia School of Engineering

Dean's List — 2012–2015
University of Virginia

Preprints under review

7. *Motions in Microseconds via Vectorized Sampling-Based Planning*. **Wil Thomason***, Zachary Kingston*, and Lydia E. Kavraki. ICRA 2024, under review. * signifies equal contribution.
6. *Stochastic Implicit Neural Signed Distance Functions for Safe Motion Planning under Sensing Uncertainty*. Carlos Quintero-Peña, **Wil Thomason**, Zachary Kingston, and Lydia E. Kavraki. ICRA 2024, under review.
5. *Accelerating Long-Horizon Planning with Affordance-Directed Dynamic Grounding of Abstract Skills*. Khen Elimelech, Zachary Kingston, **Wil Thomason**, Moshe Y. Vardi, and Lydia E. Kavraki. ICRA 2024, under review.

Peer-reviewed Conference Publications

4. *Object Reconfiguration with Simulation-Derived Feasible Actions*. Yiyuan Lee, **Wil Thomason**, Zachary Kingston, and Lydia E. Kavraki. ICRA 2023.
3. *A Unified Sampling-Based Approach to Integrated Task and Motion Planning*. **Wil Thomason** and Ross Knepper. ISRR 2019.
2. *Social Momentum: A Framework for Legible Navigation in Dynamic Multi-Agent Environments*. Christoforos Mavrogiannis, **Wil Thomason**, Ross Knepper. HRI 2018.
1. *Zero-Shot Learning for Unfamiliar Gesture Recognition*. **Wil Thomason** and Ross Knepper. ISER 2016.

Journal Publications

4. *Counterexample-Guided Repair for Symbolic-Geometric Action Abstractions*. **Wil Thomason** and Hadas Kress-Gazit. T-RO 2023.
3. *Task and Motion Informed Trees (TMIT*): Almost-Surely Asymptotically Optimal Integrated Task and Motion Planning*. **Wil Thomason**, Marlin P. Strub, Jonathan D. Gammell. IEEE RA-L 2022, also presented at IROS 2022.
2. *Social Momentum: Design and Evaluation of a Framework for Socially Competent Robot Navigation*. Christoforos Mavrogiannis, Patrícia Alves-Oliveira, **Wil Thomason**, Ross A. Knepper. T-HRI 2021.
1. *An Accurate Real-Time RFID-Based Location System*. Kirti Chawla, Christopher McFarland, Gabriel Robins, **Wil Thomason**. International Journal of Radio Frequency Identification Technology and Applications. July 2016, authors listed in alphabetical order.

Theses

1. *A novel perspective on efficient integrated task and motion planning via differentiable distance-based predicate representations*. **Wil Thomason**. PhD Thesis, Cornell University. 2021.

Technical Reports

1. *Ensuring Progress for Multiple Mobile Robots via Space Partitioning, Motion Rules, and Adaptively Centralized Conflict Resolution*. Claire Liang*, **Wil Thomason***, Andy Elliot Ricci, and Soham Sankaran. arXiv 2021.

Workshop Presentations

"Robust, Efficient, and Flexible Robot Planning." July 11, 2020. *RSS Pioneers 2020*

"A Flexible Sampling-Based Approach to Task and Motion Planning." June 23, 2019. *RSS 2019 Workshop on Robust Task and Motion Planning*

"Which comes first, the task plan or the motion plan?." June 30, 2018. *RSS 2018 Workshop on Exhibition and Benchmarking of Task and Motion Planners*. Joint with Ross A. Knepper.

"Exploiting Heterogeneity in Robot Teams Through a Formalism of Capabilities." July 15, 2017. *RSS 2018 Workshop on Heterogeneity and Diversity for Resilience in Multi-Robot Systems*

"Toward Contextual Grounding of Unfamiliar Gestures for Human-Robot Interaction." May 30, 2017. *FG 2017: First International Workshop on Adaptive Shot Learning for Gesture Understanding and Production*

"Recognizing Unfamiliar Gestures for Human-Robot Interaction through Zero-Shot Learning." June 19th, 2016. *2nd Workshop on Model Learning for Human-Robot Communication, RSS 2016*

Grants

NSF CCF #1646417: "Coordinated Action Among Independent Mobile Cyber-Physical Systems". Co-authored with Ross A. Knepper (PI), Greg Morrisett (co-PI), and Abhishek Anand. 2016–2022. Award amount: $799,995.

Invited Talks and Consortia

Interactive Robot Perception and Learning Lab 2023
Invited to present my work on vector-accelerated motion planning in the Interactive Robot Perception and Learning Lab.

Search Based Planning Lab 2020
Invited to present my work on integrated task and motion planning and automatic abstraction repair in the Search Based Planning Lab.

RSS Pioneers Workshop *(virtual due to COVID-19)* 2020
Selective annual workshop in conjunction with the Robotics: Science and Systems conference. Designed

to "bring together a cohort of the world's top early career researchers to foster creativity and collaborations surrounding challenges in all areas of robotics." (*33.7% acceptance rate*)

Teaching Experience

CS 4750 *(Foundations of Robotics)* *Cornell University*, Fall 2016 & Fall 2017
Graduate TA (course design, syllabus creation, course notes authoring, coding project design and implementation, grading, office hours, lecturing). Senior and graduate-level elective. Awarded "Outstanding Teaching Assistant".

CS 1110 *(Introduction to Computing Using Python)* *Cornell University*, Fall 2015
Head graduate TA (coordinating staff, giving review lectures, supervising lab sessions, grading, office hours). Introductory undergraduate CS course. Awarded "Outstanding Teaching Assistant".

ENG 1501 *(Introduction to Aerial Robotics)* *University of Virginia*, Fall 2014
Instructor of record. Designed and taught 1-credit special-topics undergraduate elective introducing core topics in robotics. Students built and programmed their own quadrotor robots and learned about basic kinematics, control, and perception.

CS 4610 *(Programming Languages)* *University of Virginia*, Spring 2015
Undergraduate TA (office hours, grading). Senior-level elective.

CS 4710 *(Artificial Intelligence)* *University of Virginia*, Spring 2015
Undergraduate TA (assignment design and implementation, office hours, grading). Senior-level elective.

CS 4414 *(Operating Systems)* *University of Virginia*, Spring 2014
Undergraduate TA (office hours, assignment design and implementation, grading). Senior-level core course.

CS 2150 *(Program and Data Representation)* *University of Virginia*, (Fall 2013 – Spring 2015).
Undergraduate TA (office hours, lab supervision, grading). Sophomore-level core course.

Research Supervision

PhD Students: Clayton Ramsey, Evan Dramko, Yiyuan Lee
Undergraduate Students: Stefan Bukorovic, Sofia Paola Medina-Chica, Priya Srikumar, Vineet Parikh

Outreach

Reviewer for Black in AI: Reviewed abstracts for BAI workshop. 2017–2021
Mentor for Black in AI: Advised mentee on Ph.D. application process. 2019–2020
Expanding Your Horizons: Workshop Organizer/Leader. Spring 2016, 2017, 2018
UVa HS Programming Contest: Organizer/volunteer. Spring 2014, 2015
UVa CS Education Week Ran intro CS workshop. Winter 2014, 2015

Service

Organizer: IROS 2022 Workshop on Evaluating Motion Planning Performance.
Faculty Chair: RSS Pioneers 2021 workshop.
Reviewer:

- AURO (2018)
- ICRA (2016, 2019–2023)
- IJCAI (2021)
- IJRR (2022–2023)
- IROS (2019, 2021–2023)
- MRS (2019)
- RA-L (2021–2023)
- RO-MAN (2016)
- RSS (2019)
- SIMPAR (2018)
- T-ASE (2020–2021)
- WAFR (2018)

Departmental Service:

- Student representative to Diversity and Inclusion Committee (2020–2021)
- Ph.D. Student Admissions Reviewer (2019)
- Head Colloquium Czar (2016–2019)
- Colloquium Czar (2016–2020)
- Ph.D. Mentor Czar (2016–2018)

Other Service:

- ACM@UVa Academic Chair (2014–2015)

Professional Experience

Postdoctoral Research Fellow *January 2022 – present*
Kavraki Lab, Department of Computer Science, Rice University.

Graduate Research Assistant *January 2020 – December 2021*
VRRG, Department of Computer Science, Cornell University.

Graduate Research Assistant *August 2015 – December 2019*
Robotic Personal Assistants Lab, Department of Computer Science, Cornell University.

Software Engineering Intern *May 2015 – August 2015*
Fluencia, Alexandria, VA. Worked on adding voice recognition for speech practice exercises.

Undergraduate Research Assistant *August 2014 – July 2015*
Department of Computer Science, The University of Virginia. Work with Professor Westley Weimer on automatic software functionality transplantation.

Software Development Engineer Intern *May 2014 – August 2014*
Accounts Client Team, Microsoft, Redmond, WA. Implemented cryptographic operations and network protocol for passwordless login feature in Microsoft Accounts Android app.

Software Development Engineer Intern *May 2013 – August 2013*
Xbox LIVE Cloud Security Team, Microsoft, Redmond, WA. Designed and implemented a service for real-time logging and auditing of security records in Xbox LIVE. Initiated and completed a rewrite of an internal library to improve performance and provide a better API.

Undergraduate Research Assistant *January 2013 – May 2014*
Department of Computer Science, The University of Virginia. Work with Professor Gabriel Robins on real-time localization of objects using passive RFID tags.

Technical Skills

Programming Languages: Python, C++, Julia, Rust, Lua, C, Bash, etc.
Technologies: Linux, ROS, OMPL, Jax, PyTorch, Git, CUDA, SIMD programming, numerical optimization, etc.