JORY DENNY

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EDUCATION

Doctor of Philosophy, Computer Science
Texas A&M University, College Station, TX   GPA 4.0   August 12, 2016
Ph.D. Thesis: *Collaborative Motion Planning*
Advisor: Dr. Nancy M. Amato

Bachelor of Science, Computer Science
Texas A&M University, College Station, TX   GPA 3.821   May 14, 2011
Magna Cum Laude
Honors Undergraduate Research Fellow
Honors B.S. Thesis: *Toggle PRM: A Simultaneous Mapping of $\mathcal{C}_{free}$ and $\mathcal{C}_{obstacle}$ for Use in Probabilistic Roadmap Methods*
Advisor: Dr. Nancy M. Amato

RESEARCH INTERESTS

Computer graphics, computational geometry, robotics, artificial intelligence, machine learning

PROFESSIONAL EXPERIENCE

Assistant Professor, University of Richmond, VA   August 2016-present
Research Assistant, Parasol Lab, Texas A&M University, College Station, TX   January 2009-August 2016
Graduate Assistant Lecturer, Texas A&M University, College Station, TX   August 2015-December 2015

HONORS

- Nominated for Virginia Foundation of Independent College's
  H. Hiter Harris III Excellence in Instructional Technology Award   2018, 2019
- Graduate Leadership Excellence Award, CSE Dept., Texas A&M University   2014, 2015
- Teaching Assistant Excellence Award, CSE Dept., Texas A&M University   2014
- Mentoring Excellence Award, CSE Dept., Texas A&M University   2013
- AFS (Assoc. Former Students) Merit Fellowship Recipient   2011-2012
- CRA (Comp. Research Assoc.) Outstanding Undergraduate Research Award Finalist   2011
- Undergraduate Research Excellence Award, CSE Dept., Texas A&M University   2011

- Black Belt of the Zen-Do-Kai Karate Association   Since October 2, 2006
- Eagle Scout of Boy Scouts of America Troop 828   December 25, 2005

TEACHING EXPERIENCE

Courses Taught at the University of Richmond

- CMSC 150 - Introduction to Computing
- CMSC 195 - Special Topic - Modern C++ Programming
- CMSC 221 - Data Structures
- CMSC 335 - Computer Graphics
- CMSC 395 - Special Topic - Game Development
- CMSC 340 - Independent Study - Advanced Game Development
- CMSC 340 - Independent Study - Basics of Building Robots
- CMSC 340 - Independent Study - Game Development with Unity
- CMSC 340 - Independent Study - Multi-Agent Systems
- CMSC 340 - Independent Study - Multi-Robot Systems
- CMSC 340 - Independent Study - Robotic Motion Planning

Courses Taught at Texas A&M University

- CSCE 221 - Data Structures and Algorithms (Instructor)
- CSCE 221H - Data Structures and Algorithms (Teaching Assistant)

Research Course Development   June 2012 - June 2016
Created a crash course on motion planning for incoming members to the research group. This course covers basic planning algorithms and an introduction to the research process. Over 50 students have participated in this crash course.

RESEARCH MENTORING

In total, I have (co)mentored over 75 students on various research projects since Fall 2009, including 58 undergraduate and/or summer researchers, 6 interns and visiting students, and 14 high school students. A majority (40) of these students were from underrepresented groups in computing: 10 African descent, 20 women, and 15 Hispanic. Seven students completed (or are working towards completing) undergraduate theses. Many students have attained high visibility internships or jobs, e.g., Google and Amazon, after participating in research opportunities (16).

At the University of Richmond
I have mentored 34 students on various research projects since Fall 2016, including 31 undergraduate and/or summer researchers, 1 interns and visiting students, and 2 high school students. Sixteen of these students were from underrepresented groups in computing: 2 African descent, 14 women, and 1 Hispanic. Two students completed (or are working towards completing) undergraduate theses. Many students have attained high visibility internships or jobs, e.g., Google and Amazon, after participating in research opportunities (9). Selected students are listed alphabetically below:

- Kaiwen (Kevin) Chen. Co-author on [5]. First position: Amazon.

- David Qin. Undergraduate thesis topic: Volume-Based Medial Axis Expansion of Rapidly-Exploring Random Trees.

- Hanglin (Jojo) Zhou. Undergraduate thesis topic: Fast Medial Axis Sampling for Use in Motion Planning. Co-author on [5]. Amazon Robotics Intern 2019.

At Texas A&M University

I (co)mentored 43 students on various research projects from Fall 2009 to Spring 2016, including 26 undergraduate and/or summer researchers, 6 interns and visiting students, and 12 high school students. Twenty-four of these students were from underrepresented groups in computing: 8 African descent, 6 women, and 14 Hispanic. Five students completed (or are working towards completing) undergraduate theses. Many students have attained high visibility internships or jobs, e.g., Google and Amazon, after participating in research opportunities (6). Selected students are listed alphabetically below:

- Juan Burgos. Undergraduate thesis topic: Improving Roadmap Quality through Connected Component Expansion. Co-author on [20, 22, 23]. First position: IBM.

- Evan Greco. Undergraduate thesis topic: Medial-Axis Biased RRT. Co-author on [10]. First position: National Instruments.

- Nicole Julian. Undergraduate thesis topic: Tools for User Modification of Optimal Roadmaps. Co-author on [9]. First position: Shoobx.

- Hongsen Qin. Co-author on [7] as a high school senior. First position: undergraduate at California Institute of Technology.

- Cesar Rodriguez. Undergraduate thesis topic: Blind RRT: a Probabilistically Complete, Distributed RRT. Co-author on [15].

- Kensen Shi. First Prize and a $100,000 college scholarship at the national 2012 Siemens Competition in Math, Science and Technology held in Washington, D.C. in December 2012. Placed 6th nationwide and won a $25,000 college scholarship in the Intel Science Talent Search. Co-author on [17, 12]. First position: undergraduate at Stanford University.

PROFESSIONAL AND SERVICE ACTIVITIES

Professional Societies

- Co-Chair, IEEE Robotics and Automation Society (RAS)
  Education Committee   Jan. 2018 – Present
  Responsibilities: soliciting education articles for Robotics and Automation Magazine (RAM) and review of summer school applications in RAS.

- Associate Editor for Int. Conf. on Robotics and Automation (ICRA)   2018

- Co-Chair, IEEE Robotics and Automation Society (RAS)
  Student Activities Committee   Jan. 2014 – Dec. 2016
  Responsibilities: promoting student involvement in IEEE RAS activities, organizing events at RAS sponsored conferences, and managing social networking sites for the RAS.

- President, Computer Science and Engineering Graduate Student Association   Nov. 2013 – Aug. 2015
  Responsibilities: student member on graduate advisory committee, running receptions for invited speakers, and promoting interdepartmental interactions.

- Co-organizer for "Becoming a Robot Guru", a workshop at the Int. Conf. on Robotics and Automation (ICRA) in 2015.

- Member, IEEE RAS   Since Jan. 2011

- Member, IEEE   Since Sep. 2010

- Member, Association for Computing Machinery (ACM)   Since Sep. 2010

- Reviewer for numerous robotics journals, conferences, and workshops   Since Aug. 2010

Department and University Service

- Computer Science Honors Coordinator, Computer Science Program, 2020.
- Participant in Richmond Scholars Review, University of Richmond, 2020.
- Chair Working Group on Capstone Experience, Computer Science Program, 2018–2019.
- Outreach and Communication Coordinator, Department of Math and Computer Science, 2018–2019.
- Chair Working Group on Broadening Participation, Computer Science Program, 2017–2018.
- Co-chair Colloquium Series, Department of Mathematics and Computer Science, 2017–2018.
- Member Working Group on Department Structure, Computer Science Program, 2017–2018.

Invited Talks

- "Collaborative Motion Planning," invited speaker, Robotics Algorithm and Computable Systems (RACS) Laboratory, University at Albany, SUNY, Oct. 10, 2019.
- "Collaborative Motion Planning," invited speaker, Ramapo College of New Jersey, Sept. 20, 2019.
- "Collaborative Motion Planning," invited speaker, Ramapo College of New Jersey, Oct. 16, 2017.
- "Collaborative Motion Planning," seminar speaker, GMU Autonomous Robotics Laboratory, George Mason University, Feb. 24, 2017.
- "Robotic Motion Planning and the Narrow Passage Problem," seminar speaker, STEAM-H Multidisciplinary Seminar Series, Virginia State University, Oct. 28, 2016.

Outreach

- Robot demonstration for K-12 students, Grace and Hope Academy, Petersburg, VA, Oct. 6, 2017.

PUBLICATIONS
Mentees denoted by: high-school students[‡] and undergraduate students[*].

Peer Reviewed Robotics Publications

1. Read Sandstöm, Jory Denny, and Nancy M. Amato, "Asymptotically-Optimal Topological Nearest-Neighbor Filtering," *IEEE Robotics and Automation Letters (RA-L)*, 2020, to appear. Presented at the *2020 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, Las Vegas, Nevada, USA, Oct 2020.

2. Read Sandstöm, Diane Uwacu, Jory Denny, and Nancy M. Amato, "Topology-guided Roadmap Construction with Dynamic Region Sampling," *IEEE Robotics and Automation Letters (RA-L)*, 2020, to appear. Presented at the *2020 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, Las Vegas, Nevada, USA, Oct 2020.

3. Jory Denny, Read Sandström, Andrew Bregger*, and Nancy M. Amato, "Dynamic Region-biased Rapidly-exploring Random Trees," *Algorithmic Foundations of Robotics XII, Proc. of the Twelfth Workshop on the Algorithmic Foundations of Robotics (WAFR)*, San Francisco, California, USA, Dec 2016, *Springer Proceedings in Advanced Robotics*, **13**, pp. 640–655, 2020. DOI: 10.1007/978-3-030-43089-4

4. Jory Denny and Benjamin T. Fine, "Topology-based Group Routing in Partially Known Environments," *In The 35th ACM/SIGAPP Symposium on Applied Computing (SAC '20)*, March 30-April 3, 2020, Brno, Czech Republic, ACM, New York, NY, USA, pp. 784–791. DOI: 10.1145/3341105.3373965

5. Jory Denny, Kaiwen Chen*, and Hanglin Zhou*, "A Topology-based Path Similarity Metric and Its Application to Sampling-based Motion Planning," *Proc. of the 2018 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, pp. 6498–6505, Madrid, Spain, Oct 2018.

6. Jory Denny, Read Sandström, and Nancy M. Amato, "A General Region-Based Framework for Collaborative Planning," *Robotics Research*, **2**, *Proc. of the Seventeenth Int. Symp. on Robotics Research (ISRR)*, Genova, Italy, Sept. 2015, *Springer Proc. in Advanced Robotics (SPAR)*, **3**, pp. 563–579, 2017. DOI: 10.1007/978-3-319-60916-4

7. Jory Denny, Jonathan Colbert*, Hongsen Qin‡, and Nancy M. Amato, "On the Theory of User-guided Planning," *Proc. of the 2016 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, pp. 4794–4801, Daejeon, Korea, Oct 2016.

8. Mukulika Ghosh, Daniel Tomkins, Jory Denny, Samuel Rodriguez, Marco Morales, and Nancy M. Amato, "Planning Motions for Shape-Memory Alloy Sheets," *Origami 6: II: Technology, Art, Education*, American Mathematical Society, pp. 501–511, 2016.

9. Jory Denny, Read Sandström, Nicole Julian*, Nancy M. Amato, "A Region-Based Strategy for Collaborative Roadmap Construction," *Algorithmic Foundations of Robotics XI*, *Proc. of the Eleventh Workshop on the Algorithmic Foundations of Robotics (WAFR)*, Istanbul, Turkey, Aug 2014, *Springer Tracts in Advanced Robotics*, **107**, pp. 125–141, 2015. DOI: 10.1007/978-3-319-16595-0

10. Jory Denny, Evan Greco*, Shawna Thomas, Nancy M. Amato, "MARRT: Medial Axis Biased Rapidly-Exploring Random Trees," *Proc. of the 2014 IEEE Int. Conf. on Robotics and Automation (ICRA)*, pp. 90–97, Hong Kong, China, May 2014.

11. Ali-akbar Agha Mohammadi, Saurav Agarwal, Aditya Mahadevan, Suman Chakravorty, Daniel Tomkins, Jory Denny, Nancy M. Amato, "Robust Online Belief Space Planning in Changing Environments: Application to Physical Mobile Robots," *Proc. of the 2014 IEEE Int. Conf. on Robotics and Automation (ICRA)*, pp. 149–156, Hong Kong, China, May 2014.

12. Kensen Shi‡, Jory Denny, Nancy M. Amato, "Spark PRM: Using RRTs Within PRMs to Efficiently Explore Narrow Passages," *Proc. of the 2014 IEEE Int. Conf. on Robotics and Automation (ICRA)*, pp. 4659–4666, Hong Kong, China, May 2014.

13. Hsin-Yi (Cindy) Yeh, Jory Denny, Aaron Lindsey, Shawna Thomas, Nancy M. Amato, "UMAPRM: Uniformly Sampling the Medial Axis," *Proc. of the 2014 IEEE Int. Conf. on Robotics and Automation (ICRA)*, pp. 5798–5803, Hong Kong, China, May 2014.

14. Jory Denny, Marco Morales, Samuel Rodriguez, Nancy M. Amato, "Adapting RRT Growth for Heterogeneous Environments," *Proc. of the 2013 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, pp. 1772–1778, Tokyo, Japan, Nov 2013.

15. Cesar Rodriguez*, Jory Denny, Sam Ade Jacobs, Shawna L. Thomas, Nancy M. Amato, "Blind RRT: A Probabilistically Complete Distributed RRT," *Proc. of the 2013 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, pp. 1758–1765, Tokyo, Japan, Nov 2013.

16. Jory Denny, Andrew Giese, Aditya Mahadevan, Arnaud Marfaing*, Rachel Glockenmeier*, Colton Revia*, Samuel Rodriguez, Nancy M. Amato, "Multi-Robot Caravanning," *Proc. of the 2013 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, pp. 5722–5729, Tokyo, Japan, Nov 2013.

17. Jory Denny, Kensen Shi‡, Nancy M. Amato, "Lazy Toggle PRM: A Single-Query Approach to Motion Planning," *Proc. of the 2013 IEEE Int. Conf. on Robotics and Automation (ICRA)*, pp. 2407–2414, Karlsruhe, Germany, May 2013.

18. Jory Denny, Nancy M. Amato, "Toggle PRM: A Coordinated Mapping of C-free and C-obstacle in Arbitrary Dimension," *Algorithmic Foundations of Robotics X*, *Proc. of the Tenth Workshop on the Algorithmic Foundations of Robotics (WAFR)*, Boston, Massachusetts, U.S.A., June 2012, *Springer Tracts in Advanced Robotics*, **86**, pg. 297–312, 2013. DOI: 10.1007/978-3-642-36279-8

19. Jory Denny, Nancy M. Amato, "The Toggle Local Planner for Probabilistic Motion Planning," *Proc. of the 2012 IEEE Int. Conf. on Robotics and Automation (ICRA)*, pp. 1779–1786, St. Paul, Minnesota, U.S.A., May 2012.

20. Sam Ade Jacobs, Juan Burgos*, Kasra Manavi, Jory Denny, Shawna Thomas, Nancy M. Amato, "A Scalable Method for Parallelizing Sampling-Based Motion Planning Algorithms," *Proc. of the 2012 IEEE Int. Conf. on Robotics and Automation (ICRA)*, pp. 2529–2536, St. Paul, Minnesota, U.S.A., May 2012.

21. Jory Denny, Nancy M. Amato, "Toggle PRM: Simultaneous Mapping of C-free and C-obstacle - A Study in 2D -," *Proc. of the 2011 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, pp. 2632–2639, San Francisco, California, U.S.A., Sep 2011.

22. Samuel Rodriguez, Jory Denny, Aditya Mahadevan, Jeremy Vu, Juan Burgos*, Takis Zourntos, Nancy M. Amato, "Roadmap-based Pursuit Evasion in 3D Structures," *Proc. of the 24th Int. Conf. on Computer Animation and Social Agents (CASA)*, Chengdu, China, May 2011.

23. Samuel Rodriquez, Jory Denny, Juan Burgos*, Aditya Mahadevan, Kasra Manavi, Luke Murray, Anton Kodochygov, Takis Zourntos, Nancy M. Amato, "Toward Realistic Pursuit-Evasion Using a Roadmap-Based Approach," *Proc. of the 2011 IEEE Int. Conf. on Robotics and Automation (ICRA)*, pp. 1738–1745, Shanghai, China, May 2011.

24. Samuel Rodriguez, Jory Denny, Takis Zourntos, Nancy M. Amato, "Toward Simulating Pursuit-Evasion Using a Roadmap-Based Approach," *Proc. of the 3rd Int. Conf. on Motion in Games (MIG)*, Zeist, Neth., Nov. 2010, *Lecture Notes in Computer Science (LNCS)*, vol. 6459, pp. 82–93, Nov. 2010.

Peer Reviewed Pedagogy Publications

25. Benjamin T. Fine, Jory Denny, Nate Dix*, and Ashley Frazier*, "Oh the Robots that You can Choose: A Technical Review of Mobile Robot Platforms," *Proc. of the Consortium for Computing Sciences in Colleges – Northeastern Region (CCSCNE)*, Apr. 2020, to appear.

Magazine Publications

26. Jory Denny and Benjamin T. Fine, "Robotics Pedagogy Is Falling Behind," *IEEE Robotics & Automation Magazine (RAM)*, vol. 27(1), Mar 2020. DOI: 10.1109/MRA.2020.2967006

27. Benjamin T. Fine and Jory Denny, "Narrow the Scope to Deepen the Study: A Recommendation for Undergraduate Robotics Courses," *IEEE Robotics & Automation Magazine (RAM)*, vol. 26(2), Jun 2019. DOI: 10.1109/MRA.2019.2891182

28. Jory Denny, Benjamin T. Fine, Lina Hao, and M. Ani Hsieh, "RAS Investment in Education," *IEEE Robotics & Auotmation Magazine (RAM)*, vol. 25(3), Sep 2018. DOI: 10.1109/MRA.2018.2853399

Non-peer Reviewed Publications and Presentations

29. Tuan A. P. Tran, Jory Denny, Chinwe Ekenna, "Predicting Sample Collision with Neural Networks," *ArXiv*, abs/2006.16868, Jun 2020.

30. Jory Denny, "A Generic Region-Based Collaborative Planner," PhD Forum, *2015 IEEE Int. Conf. on Robotics and Automation (ICRA)*, Seattle, Washington, May 2015.

31. Jory Denny, Read Sandström, Brennen Taylor*, and Nancy M. Amato, "A General Region-Based Framework for Collaborative Planning," Late Breaking Results, *2015 IEEE Int. Conf. on Robotics and Automation (ICRA)*, Seattle, Washington, May 2015.

32. Juan Burgos*, Jory Denny, Nancy M. Amato, "Improving Roadmap Quality through Connected Component Expansion," Technical Report, TR13-003, Parasol Lab, Department of Computer Science and Engineering, Texas A&M University, College Station, Texas, U.S.A., Apr 2013.

33. Chinwe Ekenna, Troy McMahon, Shuvra Nath, Jory Denny, Shawna Thomas, Nancy M. Amato, "A Hierarchical Neighbor Finding Strategy for Sampling-Based Motion Planning," Technical Report, TR12-006, Parasol Lab, Department of Computer Science and Engineering, Texas A&M University, College Station, Texas, U.S.A., Apr 2012.

34. Jory Denny, Anshul Agarwal*, Evan Greco*, Lydia Tapia, Nancy M. Amato, "Region Identification Methods for Efficient and Automated Motion Planning," Technical Report, TR10-002, Parasol Lab, Department of Computer Science and Engineering, Texas A&M University, College Station, Texas, U.S.A., Sep 2010.

GRANTS AND FELLOWSHIPS

External

- NSF Graduate Research Fellowship   2013-2016

Internal

- A&S Summer Research Fellowship, University of Richmond   2018, 2019, 2020
- A&S Faculty Travel Grant, University of Richmond   2016, 2018, 2020