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Status: PhD Candidate
Computer Science Department, University of Illinois at Urbana-Champaign
Advisor: Dr. Steve LaValle
Research: Dynamics, control and design of mobile robots, with an emphasis on characterizing tasks and their minimal sensing and computational requirements, and compliant approaches to designing robust underactuated robots.

EDUCATION

University of Illinois (UIUC) (Urbana-Champaign, IL)

Degree: PhD in Computer Science
Dates: Aug 2015 - present
GPA: 3.73

Colorado School of Mines (CSM) (Golden, CO)

Degree: B.S. in Engineering Physics
Minor in Computational and Applied Mathematics
Minor in Public Affairs, from McBride Honors Program
Dates: August 2011 to May 2015
GPA: 3.93

PEER REVIEWED CONFERENCE PAPERS

- A. Q. Nilles, A. Pervan, T. Berrueta, T. Murphey, S. M. LaValle. "Information Requirements of Collision-Based Micromanipulation," in the *14th Workshop on the Algorithmic Foundations of Robotics*, under review.
- A. Q. Nilles, J. Wasserman, A. Born, C. Horn, J. Born, S. M. LaValle. "A Hardware and Software Testbed for Underactuated Self-Assembling Robots," in the *IEEE International Symposium on Multi-Robot and Multi-Agent Systems,* 2019.
- A. Q. Nilles, Y. Ren, I. Becerra, S. M. LaValle. "A Visibility-Based Approach to Computing Nondeterministic Bouncing Strategies," in the *13th Annual Workshop on the Algorithmic Foundations of Robotics*, 2018.
- A. Q. Nilles, C. Gladish, M. Beckman, and A. LaViers. "Improv: Live Coding for Robot Motion Design," in *Proceedings of the 5th International Conference on Movement Computing*, ACM. 2018.
- A. Q. Nilles, I. Becerra, and S. M. LaValle. "Periodic Trajectories of Mobile Robots," in *IEEE Conference on Intelligent Robots and Systems (IROS)*, 2017.

JOURNAL ARTICLES

- A. Q. Nilles, Y. Ren, I. Becerra, S. M. LaValle. "A Visibility-Based Approach to Computing Nondeterministic Bouncing Strategies," in *The International Journal of Robotics Research*, expected 2020.
- A. LaViers, C. Cuan, C. Maguire, K. Bradley, K. B. Mata, A. Nilles, I. Vidrin, N. Chakraborty, M. Heimerdinger, U. Huzaifa, R. McNish, I. Pakrasi, and A. Zurawski. "Choreographic and Somatic Approaches for the Development of Expressive Robotic Systems," in *MDPI – Arts*, 2018.

INVITED TALKS

- "Towards Self-Assembly and Collective Manipulation with Extremely Underactuated Robots," NxR Group Meeting, Northwestern University. 1 March 2019.
- "Interesting Trajectories of Mobile Robots in Polygons," 2017 Midwest Robotics Workshop (MWRW). May 18 2017.

OTHER PUBLICATIONS

- A. Q. Nilles, S. M. LaValle. "Robust Combinatorial Planning over Simple Boundary Interactions," in *Workshop on Robust Task & Motion Planning* at RSS 2019.
- A. Q. Nilles, D. A. Shell, J. M. O'Kane. "Robot Design: Formalisms, Representations, and the Role of the Designer," in *Workshop on the Autonomous Design of Robots* at ICRA 2018.
- A. Q. Nilles, I. Becerra, and S. M. LaValle. "Controllable Billiards: Characterizing the Paths of Simple Mobile Robots," poster in *Dynamics Days*, 2018.
- "New Developments in Combinatorial Data Structures and Algorithms for Robotic Planning, Filtering and Design," UIUC Theory Seminar, October 3 2016.
- "Case Studies in Robotics Toolchains," UIUC Robotics Seminar, September 9 2016.
- A. Q. Nilles, "Partially Coherent Transport: Computational Analysis and Overcoming Anderson Localization," 2014 CSM Physics poster session.
- A. Q. Nilles, "Teaching the Smart Grid: Why Data Management is Essential to the Future of Electricity," WISE Journal of Engineering and Public Policy.

PROFESSIONAL ACTIVITIES

- President of Computer Science Graduate Students Organization (2017 - 2018).
  - Organized social events, communicated with department administration about graduate student needs, assisted in organizing annual prospective PhD student visit weekend.
- Reviewer for IROS '17, '18, '19, '20; ICRA '18, '19, '20; EAAI '17; CGTA '19
- Program Committee Member for MRS '19
- Co-organizer for 2017 Robotic Science and Systems (RSS) full day workshop, "Minimality and Trade-offs in Automated Robot Design." July 16 2017.
  - Recruited and communicated with speakers, helped develop materials (The Robot Design Game, http://robot-design.org/), facilitated workshop and discussions.
- Head of student committee organizing an internal Robotics@UIUC seminar (Fall 2016).
  - Recruited student speakers, advertised talks, maintained wiki with schedule and speaker slides.

AWARDS AND HONORS

- Leung Student Venture Fund Award, UIUC ECE Department 2019
- IEEE MRS (Multi-Robot Systems) Travel Grant 2019
- Workshop on Algorithmic Foundations of Robotics (WAFR) Robot Guru Travel Grant 2018
- Saburo Muroga Endowed Fellowship, UIUC CS Department 2015-2016
- Physics Faculty Distinguished Graduate Award, CSM May 2015
- Leo Borasio Outstanding Junior Award, McBride Honors Program, CSM May 2014
- President's Undergraduate Scholarship, CSM 2011-2015

OUTREACH AND DIVERSITY SERVICE

- 2019-2020: Mentor for Illinois Scholars Undergraduate Research (ISUR) Program. Supervised two undergraduate students building a robotic pen.
- 2019: WAFR Robot Guru Mentor - ongoing mentorship of undergraduates.
- 2014: Founding member of Equality Through Awareness (ETA) at CSM, a group promoting

diversity in STEM through discussion, mentoring, and invited speakers.
  - facilitated weekly group discussions on articles and topics relevant to underrepresented minorities
  - In 2018, ETA was awarded the Martin Luther King Jr. Recognition Award from CSM
- 2012-2015: Society of Physics Students - participated in outreach events such as interactive physics demonstrations at local elementary and middle schools.

PAST EMPLOYMENT

Petronics internship: Development of small, agile mobile robot

Description: Worked closely with engineers to develop hardware and software for their mobile platform. Configured a ROS server and added a wifi module to the robot to stream data through ROS. Analyzed the resulting data using Python, to compare streaming pose estimates from the robot with a ground truth from a motion capture system (also ROS-integrated). Analyzed how the robot slipped on different surfaces to help improve low-level controllers.

Dates: May 2016 - August 2016

Complexity Sciences Center, UC Davis: Implementing Predicted Information Gain Algorithms

Description: While working in Dr. Jim Crutchfield's group, I successfully implemented an information-theoretic learning algorithm for exploratory robots with limited sensing capabilities. I also researched ways to include more memory in the learning algorithm.

Dates: June - Aug 2014

Colorado School of Mines Math Learning Center

Description: Tutor five hours a week for all classes in Math department. Primarily calculus, differential equations, and linear algebra.

Dates: Jan 2015 - May 2015

North American Network of Science Labs Online (NANSLO)

Description: Developed, monitored, and troubleshot remote-controlled robotic physics, chemistry, and biology experiments for college students in online classes. Served as a TA and equipment technician while classes were running.

Dates: Feb 2012 - May 2014

Institute of Electrical and Electronics Engineers (IEEE)

Description: Washington Internships for Students of Engineering (WISE) program: researched smart grid data management and policy alternatives; published an overview and policy recommendation in the *WISE Journal of Engineering and Public Policy.*

Dates: June - Aug 2013

SKILLS

Programming: Skilled in Python, Haskell, C++, embedded programming (mBed, Arduino), MatLab, Mathematica, parallel computing, shell scripting. Comfortable learning new languages.

Experimental: Electronics prototype design and construction, using electronics lab equipment (oscilloscopes, multimeters, soldering, etc), safety and troubleshooting techniques. Experienced with collection and analysis of video, motion-capture, and IMU data.

Computing: Experience in Linux (several distributions, comfortable with the command line),

LaTeX, Git, Pandoc, and high performance computing clusters.

Teaching: Paid tutor at Colorado School of Mines math learning center. Volunteer tutor at Python, Linux, and high-performance computing help sessions. TA for ECE 470, Introduction to Robotics, at UIUC.