

Contact: nilles2@illinois.edu  
My website  
Status: PhD Candidate  
Computer Science Department, University of Illinois at Urbana-Champaign  
Advisor: Steve LaValle  
Research Interests: Dynamics, control and design of mobile robots, with an emphasis on characterizing minimal sensing, power and computational requirements, and using physical compliance to increase robustness of 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

## SKILLS

Programming: Skilled in Haskell, Python, 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), L<sup>A</sup>T<sub>E</sub>X, 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.

## PEER-REVIEWED PUBLICATIONS

- 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. 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.
- A. Q. Nilles, I. Becerra, and S. M. LaValle. “Periodic Trajectories of Mobile Robots,” in *IEEE Conference on Intelligent Robots and Systems (IROS)*, 2017.

## MISC PUBLICATIONS, INVITED TALKS AND POSTERS

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

- 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.
- President of Computer Science Graduate Students Organization (fall 2017 - present).
  - Organize social events, communicate with department administration about graduate student needs, assist in organizing annual prospective PhD student visit weekend.
- Reviewer for IROS '17, '18, ICRA '18, EAAI '17
- Head of student committee organizing an internal Robotics@UIUC seminar (Fall 2016 semester).
  - Recruited student speakers, advertised talks, maintained wiki with schedule and speaker slides.

## AWARDS AND HONORS

- Leung Student Venture Fund Award (\$1000 to support undergraduate researchers in the Motion Strategy Lab), UIUC ECE Department. I supervised these undergraduates and wrote majority of the grant application. 2019
- 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
- ECC Women’s Leadership Group Scholarship. 2011

## OUTREACH AND DIVERSITY SERVICE

- 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.
  - personally facilitated weekly group discussions on articles and topics relevant to underrepresented minorities
  - 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 travelling to local elementary/middle schools to do science demos and promote interest in physics

## PAST EMPLOYMENT

### **Petronics internship: Development of small, agile mobile robot**

Description: Over the summer, I worked with Petronics to develop hardware and software for their mobile platform. I helped add a wifi module to the robot which streamed data to a ROS server, which I also helped set up and configure. I wrote software for collecting and analyzing the resulting data. The goal was to compare streaming pose estimates from the robot with a ground truth from a motion capture system (also ROS-integrated), to analyze how the robot slipped on different surfaces and learn better 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