

ALEXANDRA (ALLI) NILLES

Contact: nilles2@illinois.edu
My website
Status: PhD Candidate
Computer Science Department, University of Illinois at Urbana-Champaign
Advisor: Steve LaValle
Research: Developing useful and mathematically sound abstractions for robot design and control. Applying
Interests: these abstractions, and new developments in programming languages and formal methods, to robotics software tools.

EDUCATION

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

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

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: Comfortable with electronics prototype design and construction. Familiar with electronics lab equipment (oscilloscopes, multimeters, soldering, etc), safety, and troubleshooting techniques. Experienced with collection and analysis of video and motion-capture data.
Computing: Experience in Linux (several distributions, comfortable with the command line), L^AT_EX, 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 in the physics department.

PREVIOUS POSITIONS

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

Dates: June - Aug 2013

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. [Website](http://robot-design.org/)
 - 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.
- 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

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| • 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

- 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
 - ETA has since won the Martin Luther King Jr. Recognition Award from CSM
- 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

PUBLICATIONS AND POSTERS

- 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, 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. Huzaira, 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. “Controllable Billiards: Characterizing the Paths of Simple Mobile Robots,” poster in *Dynamics Days*, 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.
- A. Q. Nilles, “Teaching the Smart Grid: Why Data Management is Essential to the Future of Electricity,” [WISE Journal of Engineering and Public Policy](http://www.wisejournal.org/).
- A. Q. Nilles, “Partially Coherent Transport: Computational Analysis and Overcoming Anderson Localization,” 2014 CSM Physics poster session.

TALKS

- “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.