

CURRENT POSITION

Postdoctoral Associate, Electrical and Computer Engineering, Cornell University
2021 - present

Supervisor: Assistant Prof. Kirstin Petersen, Electrical And Computer Engineering, Cornell University

Lab: [Collective Embodied Intelligence Lab](#)

EDUCATION

University of Illinois at Urbana-Champaign (UIUC) **2015 - 2020**

Degree: Ph.D. Computer Science. GPA 3.73/4.0

Thesis Title: *Designing Boundary Interactions for Simple Mobile Robots*

Advisor: [Dr. Steven M. LaValle](#)

Colorado School of Mines (CSM) **2011 - 2015**

Degree: B.S. in Engineering Physics. GPA 3.93/4.0

Minor in Computational and Applied Mathematics

Minor in Public Affairs, from McBride Honors Program

PEER REVIEWED CONFERENCE PAPERS

- S. Ceron, M. A. Kimmel, A. Nilles, and K. Petersen. “Soft Robotic Oscillators With Strain-Based Coordination,” in *IEEE Robotics and Automation Letters* 6, no. 4 (2021): 7557-7563.
- **A. 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*, 2021.
- M. Suomalainen, **A. Nilles**, S. M. LaValle. “Virtual Reality for Robots,” in *IEEE Conference on Intelligent Robots and Systems (IROS)*, 2020.
- **A. 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. 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. 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. 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. 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. Huzaiifa, R. McNish, I. Pakrasi, and A. Zurawski. “Choreographic and Somatic Approaches for the Development of Expressive Robotic Systems,” in *MDPI – Arts*, 2018.

INVITED TALKS

- “Is Less More? Characterizing resource trade-offs for simple mobile robots with embodied intelligence.” Autonomy Talks, Institute for Dynamic Systems and Control, ETH Zürich. 8 February 2021, recording available on ETH Zürich Frazzoli YouTube Channel.
- “Is Less More? Characterizing Resource Trade-offs When Designing Robot-Boundary Interactions.” Cornell Robotics Seminar, 12 May 2020, talk given via Zoom.
- “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.
- “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.

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.
- 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](#).

AWARDS AND HONORS

- Cornell Postdoc Leadership Program, Fall 2021
- Mentor Stipend (\$800), Illinois Scholars Undergraduate Research Program 2019
- Leung Student Venture Fund Award (\$1000), 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 (\$5740), 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

TEACHING EXPERIENCE

Teaching Assistant for Introduction to Robotics Fall 2019

- I was one of five teaching assistants for ECE 470: Introduction to Robotics, an upper level 90-student class with lecture and lab components, covering topics such as state estimation and filtering, forward and inverse kinematics, motion planning and controls.
- Supervised a 15-student lab section and gave two guest lectures for the full class.
- Developed homework and test problems using the online learning platform PrairieLearn.

Research Mentoring

- [Oluwami Dosunmu-Ogunbi](#)
 - mentored 2015-2016, worked on CAD, microcontrollers, IMU data collection and analysis
 - currently PhD student with Dr. Jessy Grizzle at University of Michigan

- Michael Zeng
 - collaborated on dynamical properties of bouncing robots in Fall 2016
 - currently software engineer at Assembled
- **Samara (Yingying) Ren**
 - co-author on one WAFR paper (and corresponding journal paper)
 - currently PhD student at EPFL with Dr. Mark Pauly
- **Justin Wasserman**
 - supervised senior thesis on “Controlling, Modeling, and Scaling Underactuated, Non-deterministic Robot Structures”
 - co-author on 2018 MRS paper
 - currently PhD student at UIUC with Dr. Girish Chowdary
- Austin Born, John Born, Chris Horn
 - From 2017-2019 I supervised this group of students on the design and control of weaselball-powered robot structures. Co-authors on 2018 MRS paper.
 - Chris and John are still at UIUC and Austin is a software developer at Omniex Holdings.
- Chase Gladish
 - supervised senior thesis on Improv, a live-coding platform for robot motion
 - co-author on 2018 MOCO paper
 - currently a Senior Software Engineer at Mastery Logistics
- Jordan Parker
 - worked with Jordan in 2018 on Improv when she was a freshman
 - connected Jordan with the RAD lab at UIUC where she continued robotics research
- Emily Hall and Max Altman
 - I supervised Emily and Max on their 2019-2020 ISUR undergraduate research project (a robotic pen) while they were sophomores

Colorado School of Mines Math Learning Center

Description: Tutored 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

PROFESSIONAL ACTIVITIES

- Head of student committee organizing an internal Robotics@UIUC seminar (Fall 2016).
 - Recruited student speakers, advertised talks, maintained wiki.
- 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.

- Co-organizer for 2021 ICRA full day workshop, “Compositional Robotics: Mathematics and Tools.” 31 May 2021.

OUTREACH AND DIVERSITY SERVICE

- 2019-2020: Mentor for Illinois Scholars Undergraduate Research (ISUR) Program. Supervised two URM undergraduate students building a robotic pen.
- 2019: WAFR Robot Guru Mentor - six month remote mentorship of undergraduates interested in robotics research
- 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.

OTHER 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

Description: NSF REU with Dr. Jim Crutchfield. 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

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

REFERENCES

- Professor Steven M. Lavalley
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