

NATHAN KENT

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EDUCATION

University of Rochester

Rochester, NY

Ph.D., Computer Science

Advisor: Dr. Thomas Howard

August 2016 – Current

University of Rochester

Rochester, NY

M.S., Computer Science

August 2016 – May 2019

Iowa State University

Ames, IA

B.S., Computer Engineering

August 2012 – May 2016

GPA 3.64 (Magna Cum Laude)

RESEARCH EXPERIENCE

University of Rochester: Robotics and Artificial Intelligence Laboratory

Graduate Research Assistant

August 2016 – Current

Rochester, NY

Previous research focused on the use of probabilistic graphical models (PGM) to infer optimal Central Pattern Generator (CPG) parameters to allow underactuated robots to locomote in unstructured environments. The framework, implemented in Rust, utilized a distributed genetic algorithm to create an offline library that pairs control information, environment descriptions, and kinematic information with the optimal CPG parameters. Neural networks were then utilized to approximate factors in a factor graph which could, in real-time, infer the ideal CPG parameters for use in a closed-loop controller.

Current research has two major focuses. The first focus is on being able to make stronger claims about both the stable-state behavior of inferred CPG parameters and the expressed behavior of the CPG parameters while running on the robot. The second is to improve the transition between sets of CPG parameters by utilizing reinforcement learning techniques to learn correct parameter interpolation while also replacing the genetic algorithm. These changes enable behaviors that are safer and more robust in addition to allowing expanded representations of the environment description and control information.

PROFESSIONAL EXPERIENCE

Microsoft

Software Development Intern

May – August 2015

Bellevue, WA

Worked on the *Satori* team to develop a system for finding relationships between entities within a comprehensive knowledge graph. Dealt with massive amounts of data in highly parallelized clusters using C# and Scope, a SQL-like language. *Satori* is Microsoft's knowledge engine powering Bing and Cortana.

EnSoft Corporation

Software Engineering Intern

May 2014 – February 2015 & August 2015 – August 2016

Ames, IA

Designed and developed a prototype for a C to Simulink conversion tool called *Modelify*. Designed and wrote the core logic of the application. Contributed to the design of the user interface. Worked on improving the Cobol version of *Atlas*, EnSoft's static analysis tool.

Intermec by Honeywell

Software Engineering Intern

May 2013 – January 2014

Cedar Rapids, IA

Assisted in the development, review, and delivery of the CN51 mobile computer. Developed and deployed enhancements to the *Coverity Static Code Analysis* implementation for Windows Mobile 6.5. Additionally, ran Microsoft's *Mean Time To Failure* analysis and participated in the team's Agile process which included, but was not limited to, fixing software bugs, creating utilities, and adding features to the product.

Contributed to the design, programming, and implementation of a system that allows for the understanding of molecular structure by the visually impaired. In addition, assisted the visually impaired with their education as needed.

TEACHING EXPERIENCE

University of Rochester Teaching Assistant
ECE 231: Robot Control (Spring 2021)
CSC 232/432: Autonomous Mobile Robots (Spring 2017, Spring 2018)
CSC 172: Data Structures and Algorithms (Fall 2017)

Iowa State University Teaching Assistant
CprE 281: Digital Logic (Fall 2014, Fall 2015)
CprE 575: Computational Perception (Spring 2015)

PUBLICATIONS

N. Kent, R. Bhirangi, M. Travers, and T. M. Howard, “Inferring task-space central pattern generator parameters for closed-loop control of underactuated robots,” IEEE International Conference on Robotics and Automation, May 2020.

R.A Chavali, **N. Kent**, M.E. Napoli, T.M. Howard, and M. Travers, “Inferring Distributions of Parameterized Controllers for Efficient Sampling-Based Locomotion of Underactuated Robots,” American Control Conference, July 2019.

SKILLS

Programming Languages

Proficient: Rust, C, C++, L^AT_EX, Python

Familiar: Bash, Matlab, Fish, GLSL

Used: C#, Elm, Java, Haskell, Javascript, Ruby, SQL, Scala, Simulink, VHDL, Verilog

Tools

Build systems: Cargo, CMake, Make, Bazel

Source control: Git, ClearCase

Code review / Issue trackers: Gitlab, Github, Fogbugz

Continuous integration: Gitlab

Frameworks and Libraries

Machine learning: PyTorch, TensorFlow, NumPy, OpenCV, Keras

Robotics / Simulation: Robot Operating System (ROS), Gazebo, PyBullet, nphysics

Graphics / GPU: Wgpu, Vulkan

Operating systems: Linux (Ubuntu, Arch)

HONORS AND AWARDS

National Science Foundation Research Traineeship

2016 – 2018

Dean’s List for the College of Engineering

Spring 2013, Spring 2014, Fall 2014, Spring 2015

Dean’s List for the College of Liberal Arts and Sciences

Spring 2013, Spring 2014, Fall 2014, Spring 2015

COMMUNITY OUTREACH

Instructor for Upward Bound Program

University of Rochester

Summers 2017–2019

Rochester, NY

Helped develop and teach a course on robotics to local high-school students. Students utilized a Raspberry Pi to control a simple mobile robot via basic H-bridge circuits. Students also used ROS and Python to develop a teleoperation program for Turtlebots.

First LEGO League Coach

Archangel School

Falls 2017–2019

Rochester, NY

Helped elementary and middle school aged children build and program robots to compete in the First LEGO League competition. Additionally, assisted in running a twice weekly practice involving programming, team development, and creating novel solutions to local issues.