Nathan Riopelle

Electrical and Computer Engineering,
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Research Interests

I study embedded systems and human computer interaction: creating devices that help computers learn more about the world around them and help humans use these computers for good in medical, productivity, and environmental sensing applications.

Areas: Embedded Systems, Human-Computer Interaction, Ubiquitous Computing, Medical Devices, Signal Processing

Education

09/2016 - Present
Ann Arbor, MI

University of Michigan,
Bachelors of Engineering in Computer Engineering,
GPA: 3.94/4.00.
Advisor: Alanson Sample

Professional Experience

09/2018 - Present
Ann Arbor, MI

Interactive Sensing and Computing Lab, *University of Michigan*, Undergraduate Researcher,
Advisor: Alanson Sample
Designing a wrist-worn device that can detect different ways a user interacts with objects or surfaces and determine their activity by measuring properties of the body and the environment. Completed assembly of an embedded device integrating capacitive and electromagnetic sensors. Performed successful demos of the individual sensing components demonstrating the ability to classify user actions (capacitive) and environmental conditions (EM) using machine learning.

06/2019 - 08/2019
Redmond, WA

Microsoft Corporation, *Azure Storage Media and Edge*, SWE Intern,
Mentor: Aniket Malatpure
Developed a root-cause analysis pipeline for Azure Stack in Python allowing for automatic filtering of potential root failures of failure during the build process staring from only a list of error events. Wrote a research paper describing the how the dependency graph algorithm I wrote could be applied to any private cloud system. Accepted for publication as first author at ISSRE 2020.

05/2018 - 08/2018 Bellevue, WA	**Microsoft Corporation**, *Azure Storage Media and Edge*, SWE Intern, Mentors: Aniket Malatpure, Suman Nath Integrated an instrumentation tool prototyped by Microsoft Research for discovering hard-to-find fault injection and thread-safety bugs earlier in development into product code for Azure Stack. Augmented the tool to simulate cloud computing faults by performing context analysis on previous bug logs and simulating similar root causes elsewhere in the code to expose new bugs. Promoted the tool to other teams in Azure where it has already begun to enter use and find bugs.
09/2017 - 05/2018 Ann Arbor, MI	**Robert Dick Group**, *University of Michigan*, Undergraduate Researcher, Advisor: Robert Dick Developed an embedded sensing and actuation device for aiding anesthesiologists in improving the accuracy and efficiency of epidural procedures. Aided in the process of using machine learning algorithms to correlate needle depth with sensor data to identify when the needle is approaching bone before the doctor makes contact.
05/2017 - 08/2017 Bedford, MA	**The MITRE Corporation**, *Electronic System Dev*, Embedded Software Intern, Mentors: Rachel Bainbridge, Chris Niessen Researched electromagnetic fault attacks on cryptographic algorithms implemented on FPGAs. Programmed embedded cores in Verilog and scripts for attack testing in Python. Created an automated demo to highlight the results of the attack that educated visiting sponsors. Led a team in an embedded capture the flag competition to design, build, and defend a secure ATM banking system in C and Python and attack opposing systems with cryptanalytic techniques to capture flags. Placed in the top 5 teams.
12/2016 - 05/2017 Ann Arbor, MI	**Lab11**, *University of Michigan*, Undergraduate Researcher, Advisors: Prabal Dutta, Branden Ghena Resolved errors in the preexisting implementation of a Bluetooth low-energy embedded audio sensor. Redesigned the device after performing power analytics to bring the project to an operational state.
06/2015 - 08/2015 Washington, D.C.	**U.S. Naval Research Laboratory**, *Laboratory for Autonomous Systems Research*, Robotics Intern, Mentor: Donald Sofge Worked on a project to use bat-like echolocation via an FPGA sensor platform to identify different terrains an autonomous robot encountered. Utilized MATLAB, LabVIEW, and Python scripts to extract echoes from an ultrasonic sensor and developed a support vector machine algorithm that successfully classified four terrain types. Published as first author at the International Joint Conference on Neural Networks (2018).

Publications

Conference Papers

C.02 **N. Riopelle**, A. Malatpure, S. Ashtekar, V. Raman, Dependency Graph-based Failure Analysis for Private Clouds, *In Proceedings of the International Symposium on Software Reliability Engineering*, **(ISSRE 2019)**

C.01 **N. Riopelle**, P. Caspers, D. Sofge, Terrain Classification for Autonomous Vehicles Using Bat-Inspired Echolocation, *In Proceedings of the International Joint Conference on Neural Networks*, **(IJCCN 2018)**

Posters

P.01 **N. Riopelle**, A. Sample, ActiMate: A Wrist-Based, Heterogeneous Sensor Platform for Recognizing User Activities and Routines, *University of Michigan Engineering Research Symposium*, November 8, 2019

Awards

03/2019	**EECS Department Outstanding Achievement Award**.
03/2019	**EECS Scholar Award**.
02/2019	**Henry Ford II Prize Nominee (from Computer Engineering)**.
03/2018, 03/2019	**James B. Angell Scholar**.
03/2017	**William J. Branstrom Freshman Prize**.
12/2016 - Present	**UM Dean's List**.
12/2016 - Present	**UM University Honors**.