Paul J Bonczek

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EDUCATION

University of Virginia   Charlottesville, VA
Ph.D., *Electrical Engineering*   *Expected Fall 2022*

Present Standing:	Passed the Ph.D. candidacy
Ph.D. Advisor:	Nicola Bezzo (bezzorobotics.com)
Dissertation Topic:	*Randomness-based Behavior Monitoring for Resilient Autonomous Systems Operations*

University of Virginia   Charlottesville, VA
M.E., *Electrical Engineering*   *May 2021*

State University of New York (SUNY) Polytechnic Institute   Utica, NY
B.S., *Electrical & Computer Engineering and Applied Mathematics* (Dual Major)   *May 2016*
    Cum Laude (GPA: 3.78/4.00)

Onondaga Community College, **SUNY**   Syracuse, NY
A.A.S., *Electrical Technology*   *May 2013*

RESEARCH EXPERIENCE

University of Virginia, School of Engineering and Applied Sciences   Charlottesville, VA
Graduate Research Assistant   *January 2018 – Present*

- Characterized various model-based randomness monitoring frameworks to detect stealthy sensor attacks on cyber-physical systems, namely the Cumulative Sign (CUSIGN) detector.
- Examined detection capabilities of CUSIGN in multi-agent robotic swarms under malicious sensor and communication attacks.
- Developed a multi-agent framework that is resilient to stealthy communication attacks that also can covertly relay safety-critical information through hidden signatures.
- Investigate cooperative motion in multi-agent systems to aid in recovery/re-localization of vehicles subject to on-board sensor attacks.

RESEARCH INTERESTS

♦ Cyber-Physical System Security   ♦ Runtime Monitoring and Detection   ♦ Autonomous Systems
♦ Resilient Multi-agent Systems ♦ Robotic Swarms ♦ Adaptive Systems ♦ Secure Control and Autonomy

PUBLICATIONS

[1] **P.J. Bonczek**, R. Peddi, S. Gao, N. Bezzo, "*Detection of Non-random Sign-based Behavior for Resilient Coordination of Robotic Swarms*", accepted for publication in the IEEE Transactions on Robotics (T-RO) Special Issue on Resilience in Networked Robotic Systems

[2] **P.J. Bonczek**, N. Bezzo, "*Detection and Inference of Randomness-based Behavior for Resilient Multi-vehicle Coordinated Operations,*" IEEE/RSJ International Conference on Intelligent Robotics and Systems (IROS), pp. 5844-5850, 2021.

[3] **P.J. Bonczek**, N. Bezzo, "*Detection of Hidden Attacks on Cyber-Physical Systems from Serial Magnitude and Sign Randomness Inconsistencies*," IEEE American Control Conference (ACC), pp. 3281-3287, 2021.

[4] **P.J. Bonczek**, N. Bezzo, "*Memoryless Cumulative Sign Detector for Stealthy CPS Sensor Attacks,*" 21st International Federation of Automatic Control (IFAC) World Congress, vol. 53, no. 2, pp. 838-844, 2020.

[5] **P.J. Bonczek**, S. Gao, N. Bezzo, "*Model-based Randomness Monitor for Stealthy Sensor Attacks*," IEEE American Control Conference (ACC), pp. 2036-2042, 2020.

In Preparation

[P1] **P.J. Bonczek**, N. Bezzo, "*A Cooperative Recovery Framework for Safe Multi-robot Operations: Exploiting Randomness*," in preparation for submission to IEEE Robotics and Automation Letters (RA-L).

PRESENTATIONS

UVA Link Lab Student Flash Talks	*2020*
University of Virginia Engineering Research Symposium (UVERS) Finalist	*2020*
UVA Link Lab Student Research Poster and Talk	*2019*
UVA ECE Student Research Poster Session	*2018*

TEACHING EXPERIENCE

University of Virginia, School of Engineering and Applied Sciences   Charlottesville, VA
Graduate Teaching Assistant

ECE Capstone (Advisement, Discussion, and Grading)	*Fall 2016, Fall 2017*

- Advised (~50 students) undergraduate students with senior capstone projects.

Fundamentals II (Grading)	*Spring 2017*
Fundamentals III (Grading)	*Spring 2017*
Electromagnetic Energy Conversion (Grading and Lab Instructor)	*Spring 2020*

PROFESSIONAL EXPERIENCE

Griffiss Institute at the Air Force Research Laboratory   Rome, NY
Engineering Intern   *Summer 2016*

- Worked with a team of interns to set up and test a photonic-based neuromorphic computer.
- Learned to wire-bond.

Griffiss Institute at the Air Force Research Laboratory   Rome, NY
Engineering Intern   *Summer 2015*

- Designed and built an analog PID controller for an inverted pendulum as a test case for adaptive abilities using memristors.

Griffiss Institute at the Air Force Research Laboratory   Rome, NY
Engineering Intern   *Summer 2014*

- Memristor testing to observe switching resistive properties.

IR Cameras, LLC   Utica, NY
Engineering Intern   *July 2013 – May 2014*
- Quality control testing for the packaging assembly of Infrared (IR) cameras.

PROFESSIONAL ACTIVITIES

Scientific Paper Reviewer
  IEEE American Control Conference (ACC) (3x)
  IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
  IEEE Transactions on Robotics (T-RO)
  International Conference on Cyber-Physical Systems (ICCPS)
  IEEE International Conference on Robotics and Automation (ICRA)
  International Federation of Automatic Control (IFAC) World Congress
  IEEE Conference on Decision and Control (CDC)
  IEEE Robotics and Automation Letters (RA-L)

Memberships
  Institute of Electrical and Electronics Engineers (IEEE), Student member   *2019 – Present*
  IEEE Societies: Young Professionals (YP), Robotics and Automation (RAS),
              Control Systems (CSS), Aerospace and Electronic Systems (AESS),
              Information Theory (ITSOC), Intelligent Transportation Systems (ITSS),
              Systems, Man, and Cybernetics (SMC)

AWARDS & CERTIFICATES

Academic Achievement Award   *2016*
SUNY Polytechnic Institute
-Highest GPA for Applied Mathematics courses upon graduation (4.0)

President's Honor List   *Fall 2014, Spring 2015, Fall 2015, Spring 2016*
SUNY Polytechnic Institute

Coursera Deep Learning Specialization   *2020*
ID: 58HLTKUBXRR2

RELEVANT COURSEWORK

- Autonomous Mobile Robotics
- Multivariable Robust Control Theory
- Probability and Stochastic Processes
- Reinforcement Learning
- Adaptive Control Theory

SKILLS & INTERESTS

Programming: Proficient in MATLAB, LaTeX, Python. Familiar with R, C++, Arduino
Tools: Microsoft Office and PowerPoint, GitHub, Simulink, iMovie
Interests: Cooking, Scuba diving, hiking, WWII history