NICOLA BEZZO

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Academic Positions

- **Assistant Professor (research focus: Resilient and Assured Autonomy)** — 01/2016–present
  Engineering Systems and Environment (Primary), Electrical and Computer Engineering (Secondary), Computer Science (Courtesy), University of Virginia, Charlottesville, VA USA.
- **Postdoctoral Researcher (research focus: CPS Security & Robotics Planning)** — 11/2012–12/2015
  Computer Sceince, University of Pennsylvania, Philadelphia, PA, USA.
- **Research Assistant in Electrical and Computer Engineering (research focus: Multi-Robots Coordination & Control Systems)** — 08/2008–10/2012
  Electrical and Computer Engineering, University of New Mexico, Albuquerque, NM, USA.
- **Research Assistant in Electrical Engineering (research focus: Automation & Electrical Measurements)** — 09/2007–07/2008
  Electrical Engineering, Politecnico di Milano, Milan, ITALY.

Education

- **Postdoc in Computer Science (Robotics & CPS)** — 11/2012-12/2015
  University of Pennsylvania, Philadelphia, PA, USA (Supervisor: Prof. Insup Lee).
- **Ph.D. in Electrical and Computer Engineering (Robotics & Control Systems)** — 08/2008-10/2012
  University of New Mexico, Albuquerque, NM, USA (Thesis Advisor: Prof. Rafael Fierro).
- **Master of Science in Electrical Engineering** — 08/2006-07/2008
  Politecnico di Milano, Milan, ITALY (Thesis Advisor: Prof. Roberto Ottoboni).
  - Degree with honor (summa cum laude).
- **Exchange Student 1^{st} year of Master in Electrical Engineering** — 08/2006-08/2007
  Oklahoma State University, Stillwater, OK, USA.
  - GPA: 3.9/4.0.
- **Bachelor of Science in Electrical Engineering** — 09/2003-07/2006
  Politecnico di Milano, Milan, ITALY (Thesis Advisor: Prof. Roberto Ottoboni).
  - Degree with honor (summa cum laude).

Honors & Awards

- Recipient of the IEEE Systems & Information Design Symposium (SIEDS) "Best Paper Award" (2018).
- Recipient of the IEEE Robotics & Automation Magazine (RAM) "Best Paper Award" (2016).
- Recipient of two DARPA HACMS outstanding service awards (2015, 2013).
- Recipient of the ACM/IEEE International Conference on Cyber Physical Systems (ICCPS), CPSWeek "Best Paper Award" (2014).
- Recipient of the "Outstanding Student Service Award" from the University of New Mexico (2011).

- Awarded the Gold Medal from the Politecnico School of Engineering, for best graduate student in Electrical Engineering (2010).
- N^{o} 2 degrees with honor (summa cum laude) from Politecnico di Milano (2008, 2006).
- Recipient of the "President Honor Roll for Outstanding Academic Performance" from Oklahoma State University (2007).
- Ranked 11^{th} among 30.000 applicants at Politecnico di Milano Entrance Exam (2003).

Student Advisee Awards

- Best Graduate Student Award (2021) – Esen Yel (ESE PhD 2016 - 2021)
- RSS Pioneer Award (2021) – Esen Yel (ESE PhD 2016 - 2021)
- NSF NRT Fellowship (2021) – Noelle Law (ECE BS 2018 - now)
- NSF NRT Fellowship (2021) – William Clark (ESE PhD 2021 - now)
- Link Lab Student Seminar Award for outstanding research (2020) - Esen Yel (ESE PhD 2016 - now)
- 1st place National Collegiate Cyber Defense Competition (CCDC'20) - Maggie Gates (CS MS'20)
- NSF NRT Fellowship (2020) - Jacob Higgins, Electrical Engineering (ECE PhD 2020 - now)
- Ruthie Oxford Memorial Award for most promising graduate student (2018) – Esen Yel (ESE PhD 2016 - 2021)
- 2nd place UVA ECE Welcome back Research Poster Award (2018) – Shijie Gao (ECE PhD 2018 - now)
- 2nd place UVA ECE Student Research Poster Award (2017) – Atiena Branch (ECE BS 2018)

Research Interests

- Robotics, Assured Autonomy, Motion Planning and Control, Runtime Monitoring, Reachability Analysis, CPS Cyber-security, Unmanned Aerial and Ground Vehicles, Multi-robot Systems

Publications

- **Peer reviewed Journals:**
  - R. Peddi, **N. Bezzo**. *An Interpretable Decision Tree-based Virtual Physics Method for Non-interfering Social Planning* In IEEE Robotics and Automation Letters (RA-L), 2022 – Impact = 3.74 (to appear)
  - P. Bonczek, R. Peddi, S. Gao, **N. Bezzo**. *Detection of Non-random Sign-based Behavior for Resilient Coordination of Robotic Swarms*. In 2022 Transactions on Robotics (TRO) – Impact = 9.7
  - J. Higgins, **N. Bezzo**, *Negotiating Visibility for Safe Autonomous Navigation in Occluding and Uncertain Environments*. In IEEE Robotics and Automation Letters (RA-L), 2021 – Impact = 3.764
  - C. Di Franco, **N. Bezzo**, *Interpretable Run-time Monitoring and Replanning for Safe Autonomous Systems Operations*. In IEEE Robotics and Automation Letters (RA-L), 2020 – Impact = 3.74
  - E. Yel, **N. Bezzo**, *Computation-Aware Adaptive Planning and Scheduling for Safe Unmanned Airborne Operations* . In Journal of Intelligent and Robotic Systems (JINT), 2020 – Impact = 3.0
  - E. Yel, T. Carpenter, R. Ivanov, C. Di Franco, J. Weimer, I. Lee, **N. Bezzo**, *Assured Run-time Monitoring and Planning: Towards Verification of Deep Neural Networks for Safe Autonomous Operations*. In IEEE Robotics and Automation Magazine (RAM), 2020 – Impact = 5.14
  - M. Pajic, J. Weimer, **N. Bezzo**, O. Sokolsky, G. J. Pappas, I. Lee, *Design and Implementation of Attack-Resilient Cyber-Physical Systems* . In IEEE Control Systems Magazine (CSM),. vol. 37, issue 2, pp. 66-81, 2017 – Impact = 5.3

- **N. Bezzo**, A. Mehta, C. D. Onal, M. T. Tolley, *Robot Makers: The Future of Digital Rapid Design and Fabrication of Robots* . In IEEE Robotics and Automation Magazine (RAM), vol. 22, pp. 27-36, 2015. (**Best Paper Award**) – Impact = 5.14
- **N. Bezzo**, P. Cruz, F. Sorrentino, and R. Fierro, *Decentralized identification and control of networks of coupled mobile platforms through adaptive synchronization of chaos*. In Elsevier Physica D, vol. 267, pp. 94-103, 2014 – Impact = 3.08
- **N. Bezzo**, B. Griffin, P. Cruz, J. Donahue, R. Fierro, and J. Wood, *A Cooperative Heterogeneous Mobile Wireless Mechatronic System* . In IEEE/ASME Transactions on Mechatronics (TMech), vol. 19, no. 1, pp. 20-31, 2014 – Impact = 5.33
- **N. Bezzo**, R. Fierro, A. Swingler, and S. Ferrari, *A Disjunctive Programming Approach for Motion Planning of Mobile Router Networks*. In International Journal of Robotics and Automation (Special Issue), vol. 26, no. 1, pp. 13-25, 2011 – Impact = 1.5

- **Peer reviewed Journals under Review:**
  - E. Yel, S. Gao, **N. Bezzo**. *Meta-Learning-based Proactive Planning for UAVs under Degraded Conditions*. In IEEE Robotics and Automation Letters (RA-L), (submitted)

- **Peer reviewed Conferences:**
  - J. Higgins, **N. Bezzo**, *A Model Predictive-based Motion Planning Method for Safe and Agile Traversal of Unknown and Occluding Environments*. In IEEE International Conference on Robotics and Automation (ICRA), Philadelphia, PA, May 23 - 27, 2022 (to appear).
  - C. Gall, **N. Bezzo**, *Gaussian Process-based Interpretable Runtime Adaptation for Safe Autonomous Systems Operations in Unstructured Environments*. In IEEE International Conference on Intelligent Robots and Systems (IROS), Prague, Czech Republic, Sept 27 - Oct. 1, 2021 – Acceptance Rate = 45%.
  - S. Gao, **N. Bezzo**, *A Conformal Mapping-based Framework for Robot-to-Robot and Sim-to-Real Transfer Learning*. In IEEE International Conference on Intelligent Robots and Systems (IROS), Prague, Czech Republic, Sept 27 - Oct. 1, 2021 – Acceptance Rate = 45%.
  - E. Yel, **N. Bezzo**, *A Meta-Learning-based Trajectory Tracking Framework for UAVs under Degraded Conditions*. In IEEE International Conference on Intelligent Robots and Systems (IROS), Prague, Czech Republic, Sept 27 - Oct. 1, 2021 – Acceptance Rate = 45%.
  - R. Peddi, **N. Bezzo**, *Interpretable Run-Time Prediction and Planning in Co-Robotic Environments*. In IEEE International Conference on Intelligent Robots and Systems (IROS), Prague, Czech Republic, Sept 27 - Oct. 1, 2021 – Acceptance Rate = 45%.
  - P. Bonczek, **N. Bezzo**, *Detection and Inference of Non-random Behavior for Resilient Multi-vehicle Coordinated Operations*. In IEEE International Conference on Intelligent Robots and Systems (IROS), Prague, Czech Republic, Sept 27 - Oct. 1, 2021 – Acceptance Rate = 45%.
  - J. Higgins, **N. Bezzo**, *Negotiating Visibility for Safe Autonomous Navigation in Occluding and Uncertain Environments*. In IEEE International Conference on Robotics and Automation (ICRA), Xi'An, China, May 30 - Jun. 5, 2021 – Acceptance Rate = 40%.
  - P. Bonczek, **N. Bezzo**, *Detection of Hidden Attacks on Cyber-Physical Systems from Serial Magnitude and Sign Randomness Inconsistencies*. In IEEE American Control Conference (ACC), New Orleans, May 26 - 28, 2021 – Acceptance Rate = 50%.
  - E. Yel, **N. Bezzo**, *GP-based Runtime Planning, Learning, and Recovery for Safe UAV Operations under Unforeseen Disturbances*. In IEEE International Conference on Intelligent Robots and Systems (IROS), Las Vegas, NV, Oct. 25 - 29, 2020 – Acceptance Rate = 45%.
  - R. Peddi, C. Di Franco, S. Gao, **N. Bezzo**, *A Data-driven Framework for Proactive Intention-Aware Motion Planning of a Robot in a Human Environment*. In IEEE International Conference on Intelligent Robots and Systems (IROS), Las Vegas, NV, Oct. 25 - 29, 2020 – Acceptance Rate = 45%.
  - C. Hilderbrandt, S. Elbaum, **N. Bezzo**, MB. Dwyer, *A Feasible and stressful trajectory generation for mobile robots*. In 29th ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA), Los Angeles, CA, Jul. 18 - 22, 2020 – Acceptance Rate = 15%.

- C. Di Franco, **N. Bezzo**, *Interpretable Run-time Monitoring and Replanning for Safe Autonomous Systems Operations*. In IEEE International Conference on Robotics and Automation (ICRA), 2020 – Acceptance Rate = 40%.
- C. Hilderbrandt, S. Elbaum, **N. Bezzo**, *Blending Kinematic and Software Models for Tighter Reachability Analysis*. In International Conference on Software Engineering (ICSE), 2020 – Acceptance Rate = 15%.
- P. Bonczek, **N. Bezzo**. *Model-based Randomness Monitor for Stealthy Sensor Attacks*. In 2020 American Control Conference (ACC) – Acceptance Rate = 60%
- P. Bonczek, **N. Bezzo**. *Memoryless Cumulative Sign Detector forStealthy CPS Sensor Attacks* In 2020 International Federation of Automatic Control (IFAC) – Acceptance Rate = 50%
- E. Yel, **N. Bezzo**, *Fast Run-time Monitoring, Replanning, and Recovery for Safe Autonomous System Operations*. In IEEE International Conference on Intelligent Robots and Systems (IROS), Macau, China, Nov. 4 - 8, 2019 – Acceptance Rate = 45%.
- R. Peddi, **N. Bezzo**, *Parameter-free Regression-based Autonomous Control of Off-the-shelf Quadrotor UAVs*. In IEEE International Conference on Unmanned Aerial Systems (ICUAS), Atlanta, GA, June 11 - 14, 2019 – Acceptance Rate = 60%.
- S. Gao, C. Di Franco, D. Carter, D. Quinn, **N. Bezzo**, *Exploiting Ground and Ceiling Effects on Autonomous UAV Motion Planning*. In IEEE International Conference on Unmanned Aerial Systems (ICUAS), Atlanta, GA, June 11 - 14, 2019 – Acceptance Rate = 60%.
- Z. Vatansever, M. Brandt-Pearce, **N. Bezzo**, *Localization in Optical Wireless Sensor Networks for IoT Applications*. In IEEE International Conference on Communications (ICC) May 20, 2019.
- E. Yel, T. Lin, **N. Bezzo**. *Self-triggered Adaptive Planning and Scheduling of UAV Operations*. In 2018 IEEE International Conference on Robotics and Automation (ICRA), Brisbane, Australia, May 21-25 2018, pp. 7518-7524 – Acceptance Rate = 40%.
- T. Lin, **N. Bezzo**. *Energy-aware Persistent Control of Heterogeneous Robotic Systems*. In 2018 American Control Conference (ACC), Milwaukee, WI, June 27-29 2018, pp. 2782-2787 – Acceptance Rate = 50%.
- M. Elnaggar, **N. Bezzo**. *An IRL Approach for Cyber-Physical Attack Intention Prediction and Recovery*. In 2018 American Control Conference (ACC), Milwaukee, WI, June 27-29 2018, pp. 222-227 – Acceptance Rate = 50%.
- E. Yel, T. Lin, **N. Bezzo**. *Reachability-based self-triggered scheduling and replanning of UAV operations*. In 2017 IEEE NASA/ESA Conference of Adaptive Hardware and Systems (AHS), Pasadena, CA, July 24-27 2017, pp. 221-228 – Acceptance Rate = 55%.
- M. Elnaggar, J. D. Hiser, T. Lin, A. Nguyen-Tuong, M. Co, J. W. Davidson, **N. Bezzo**. *Online control adaptation for safe and secure autonomous vehicle operations*. In 2017 NASA/ESA Conference of Adaptive Hardware and Systems (AHS), Pasadena, CA, July 24-27 2017, pp.101-108 – Acceptance Rate = 55%.
- E. Yel, T. Lin, **N. Bezzo**. *Reachability-based self-triggered UAV motion planning*. In 2017 International Symposium on Aerial Robotics, June 19-20 2017 – Acceptance Rate Unknown.
- **N. Bezzo**, K. Mohta, C. Nowzari, I. Lee, V. Kumar, G. Pappas, *Online Planning for Energy-efficient and Disturbance-aware UAV Operations*. In IEEE International Conference on Intelligent Robots and Systems (IROS), Daejeon, South Korea, October 9-14, 2016, pp. 5027-5033 – Acceptance Rate = 45%.
- **N. Bezzo**, J. Weimer, Y. Du, O. Sokolsky, S. H. Son, I. Lee, *A Stochastic Approach for Attack Resilient UAV Motion Planning*. In 2016 American Control Conference (ACC 2016), Boston (MA), July 6-8, 2016, pp. 1366-1372 – Acceptance Rate = 50%.
- Y. Shoukry, P. Nuzzo, **N. Bezzo**, A. L. Sangiovanni-Vincentelli, S. A. Seshia, P. Tabuada, *Secure State Reconstruction in Differentially Flat Systems Under Sensor Attacks Using Satisfiability Modulo Theory Solving*. In IEEE Control and Decision Conference (CDC), Osaka, Japan, Dec. 15 - 18, 2015, pp. 3804-3809 – Acceptance Rate = 56%.

- **N. Bezzo**, M.Piccoli, P. Gebhard, V. Kumar, M. Yim, I. Lee, *Rapid Co-design of electro-mechanical specifications for robotic systems*. In ASME 2015 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2015), Boston, MA, Aug. 2 - 5, 2015 – Acceptance Rate = 60%.
- **N. Bezzo**, J. Weimer, M. Pajic, O. Sokolsky, G. J. Pappas, I. Lee, *Attack Resilient State Estimation for Autonomous Robotic Systems*. In IEEE International Conference on Intelligent Robots and Systems (IROS), Chicago, IL, Sept. 14 - 18, 2014, pp. 3692-3698 – Acceptance Rate = 46%.
- J. Weimer, O. Sokolsky, **N. Bezzo**, and I. Lee, *Towards Assurance Cases for Resilient Control Systems*. In IEEE International Conference on Cyber-Physical Systems, Networks, and Application (CPSNA), Hong Kong, China, August 25 - 26, 2014, pp. 1-6. (*Invited Paper*) – Acceptance Rate Unknown.
- A. Mehta, **N. Bezzo**, P. Gebhard, B. An, V. Kumar, I. Lee, and D. Rus, *A Design Environment for the Rapid Specification and Fabrication of Printable Robots*. In International Symposium on Experimental Robotics (ISER), Marrakech/Essaouira, Morocco, June 15 - 18, 2014 – Acceptance Rate Unknown.
- M. Pajic, J. Weimer, **N. Bezzo**, P. Tabuada, O. Sokolsky, I. Lee, and G. J. Pappas, *Robustness of Attack-resilient State Estimators*. In ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), Berlin, Germany, April 14 - 17, 2014, pp. 163-174 (**Best Paper Award**) – Acceptance Rate = 25%.
- J. Weimer, **N. Bezzo**, M. Pajic, O. Sokolsky, and I. Lee, *Attack-Resilient Minimum Mean-Squared Error Estimation*. In 2014 American Control Conference (ACC 2014), Portland (OR), June 4-6, 2014, pp. 1366-1372 – Acceptance Rate = 50%.
- **N. Bezzo**, F. Sorrentino, and R. Fierro, *Decentralized Estimation of Topology Changes in Wireless Robotic Networks*. In American Control Conference (ACC), Washington D.C., June 17-19, 2013, pp. 5899-5904 – Acceptance Rate = 50%.
- **N. Bezzo**, M. Anderson, and R. Fierro, *A Real World Coordination Framework for Connected Heterogeneous Robotic Systems*. International Symposium on Distributed Autonomous Robotic Systems (DARS), Baltimore, MD, November 8-11, 2012 – Acceptance Rate = 40%.
- **N. Bezzo**, and R. Fierro, *Decentralized Connectivity and User Localization Via Wireless Robotic Networks*. In IEEE Global Communications Conference (GLOBECOM), Wi-UAV, Houston, TX, December 5, 2011, pp. 1285-1290 – Acceptance Rate = 36%.
- **N. Bezzo**, Y. Yuan, R. Fierro, and Y. Mostofi, *A Decentralized Connectivity Strategy for Mobile Router Swarms*. In the 18^{th} World Congress of the International Federation of Automatic Control (IFAC), Milan, Italy, August 30, 2011 – Acceptance Rate = 55%.
- **N. Bezzo**, and R. Fierro, *Swarming of Mobile Router Networks*. In American Control Conference (ACC), San Francisco, CA, July 1, 2011, pp. 4685-4690 – Acceptance Rate = 60%.
- **N. Bezzo**, and R. Fierro, *Tethering of Mobile Router Networks*. In American Control Conference (ACC), Baltimore, MD, June 30, 2010, pp. 6828-6833 – Acceptance Rate = 60%.

- **Book Chapters:**
  - A. Mehta, **N. Bezzo**, P. Gebhard, B. An, V. Kumar, I. Lee, and D. Rus, *A Design Environment for the Rapid Specification and Fabrication of Printable Robots*. Book Chapter in Springer STAR series in Robotics, 2015.
  - **N. Bezzo**, and R. Fierro, *A Real World Coordination Framework for Connected Heterogeneous Robotic Systems*. Book Chapter in "Distributed Autonomous Robotic Systems", Springer STAR series in Robotics, vol. 104, pp.75-89, 2014.
  - **N. Bezzo**, R. A. Cortez, and R. Fierro, *Exploiting Heterogeneity in Robotic Networks*. Book Chapter in Springer "Redundancy in Robot Manipulators and Multi-Robot Systems" vol. 57, pp. 53-75, 2013.

- **Miscellaneous Other Conferences:**
  - G. Glaubit, K. Kleeman, N. Law, J. Thomas, S. Gao, R. Peddi, E. Yel, **N. Bezzo**, *Fast, Safe, and Proactive Runtime Planning and Control of Autonomous Ground Vehicles in Changing Environments* In IEEE Systems and Information Engineering Design Symposium (SIEDS), pp. 1-6, 2021
  - S. Wang, N. Anselmo, M. Garrett, R. Remias, M. Trivett, A. Christoffersen, **N. Bezzo**, *Fly-Crash-Recover: A Sensor-based Reactive Framework for Online Collision Recovery of UAVs* In IEEE Systems and Information Engineering Design Symposium (SIEDS), pp. 1-6, 2020
  - J. Benko, W. Clark, C. Craig, G. Culver, P. Mahan, A. Patel, D. Voce, **N. Bezzo**, G. Lewin. *Security and Resiliency of Coordinated Autonomous Vehicles*. In IEEE Systems and Information Engineering Design Symposium (SIEDS), pp. 1-6, 2019.
  - H. Finegan, S. Jaffe, A. Leon, K. Lytle, E. Morgan, C. Greene, A. Meyer, B. Brinkman, S. De Wekker, H. Yochum, **N. Bezzo**. *Development of an Autonomous Agricultural Vehicle to Measure Soil Respiration*. In Systems and Information Engineering Design Symposium (SIEDS), pp. 1-6. 2019.
  - V. Marquis, R. Ho, W. Rainey, M. Kimpel, J. Ghiorzi, W. Cricchi, **N. Bezzo**, *Toward attack-resilient state estimation and control of autonomous cyber-physical systems*. In IEEE Systems and Information Engineering Design Symposium (SIEDS), pp. 70-75, 2018 (**Best Paper Award**).
  - R. D. Rosenfeld, M. G. Restrepo, W. H. Gerard, W. E. Bruce, A. A. Branch, G. C. Lewin, **N. Bezzo**, *Unsupervised surface classification to enhance the control performance of a UGV*. In IEEE Systems and Information Engineering Design Symposium (SIEDS), pp. 225-230, 2018.
  - C.A. Wolf, R.P. Hardis, S.D. Woodrum, R.S. Galan, H.S. Wichelt, M.C. Metzger, **N. Bezzo**, G. C. Lewin, S.F.J. de Wekker, *Wind data collection techniques on a multi-rotor platform*. In IEEE Systems and Information Engineering Design Symposium (SIEDS), pp. 32-37, 2017.
  - Z. Calhoun, P. Maribojoc, N. Selzer, L. Procopi, **N. Bezzo**, C. Fleming, *Analysis of Identity and Access Management alternatives for a multinational information-sharing environment*. In IEEE Systems and Information Engineering Design Symposium (SIEDS), pp. 208-213, 2017.
  - M. Pajic, **N. Bezzo**, I. Lee, *Design and Implementation of Attack–Resilient Cyber-Physical Systems*, In High-Confidence Software and Systems Conference (HCSS), Annapolis, MD, May 2016.
  - **N. Bezzo**, K. Mohta, V. Kumar, I. Lee, *A Run time Monitoring Framework for Safe Coordination of Unmanned Aerial Vehicles* In Safe and Secure Systems and Software Symposium (S5) , Dayton, OH, 10 June 2015

- **Workshops:**
  - E. Yel, **N. Bezzo**. *Reachability-based Adaptive UAV Scheduling and Planning in Cluttered and Dynamic Environments*. In 2018 Workshop on Informative Path Planning and Adaptive Sampling within IEEE International Conference on Robotics and Automation (ICRA), Brisbane, Australia, May 21-25 2018.
  - **N. Bezzo**, Y. Du, O. Sokolsky, and I. Lee, *A Markovian Approach for Attack Resilient Control of Mobile Robotic Systems*. In Second International Workshop on Robotic Sensor Networks (RSN), Seattle, Washington, April 13, 2015.
  - O. Sokolsky, M. Pajic, **N. Bezzo**, and I. Lee, *Architecture-Centric Software Development for Cyber-Physical Systems*. In First Workshop on Cyber-Physical System Architectures and Design Methodologies (CPSArch), New Delhi, India, October 17, 2014.
  - L. Feng, A. L. King, S. Chen, A. Ayoub, J. Park, **N. Bezzo**, O. Sokolsky, and I. Lee *A Safety Argument Strategy for PCA Closed-Loop Systems: A Preliminary Proposal*. In Medical Cyber Physical Systems Workshop (MedicalCPS), Berlin, Germany, April 14, 2014.
  - J. Weimer, **N. Bezzo**, M. Pajic, G. J. Pappas, O. Sokolsky, and I. Lee, *Resilient Parameter-Invariant Control with Application to Vehicle Cruise Control*. In Workshop on Control of Cyber-Physical Systems, Johns Hopkins University, Baltimore, MD, March 2013.
  - **N. Bezzo**, and R. Fierro, *Mobile Robotic Routers Networks*. In Workshop on Frontiers of Real-World Multi-Robot Systems: Challenges and Opportunities, Duke University, Durham, NC, October 10-11, 2011

- **N. Bezzo**, P. Cruz, I. Palunko, T. Appel, D. Galarowicz, and R. Fierro, *The MARHES heterogeneous multi robot test bed* . In 1st Southwest Workshop on Cyber-Physical Systems, University of Arizona, Tucson, AZ, March 10-11 2011.

- **Demos and Abstracts:**
  - **N. Bezzo**, J. Park, A. King, P. Gebhard, R. Ivanov, I. Lee, *Demo Abstract: ROSLab – A Modular Programming Environment for Robotic Applications*. Demonstration at the 5th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS, CPSWEEK 2014), Berlin, Germany, April 2014, pp. 214-214.
  - M. Pajic, **N. Bezzo**, J. Weimer, O. Sokolsky, N. Michael, G. J. Pappas, P. Tabuada, and I. Lee, *Demo Abstract: Synthesis of Platform-aware Attack-Resilient Vehicular Systems*. Demonstration at the 4th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS, CPSWEEK 2013), Philadelphia, Pennsylvania, April 2013, pp. 251-251.
  - M. Pajic, **N. Bezzo**, J. Weimer, R. Alur, R. Mangharam, N. Michael, G. J. Pappas, P. Tabuada, and I. Lee, *Towards synthesis of platform-aware attack-resilient control systems*. Work-in-Progress Abstract at the 4th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS, CPSWEEK 2013), Philadelphia, Pennsylvania, April 2013.

- **Posters:**
  - J. Higgins, **N. Bezzo** *Negotiating Visibility for Safe Autonomous Navigation in Occluding and Uncertain Environments*. University of Virginia Research Symposium, UVA, April 2021.
  - P. Bonczek, **N. Bezzo** *Cumulative Sign Detector for Stealthy Attacks on Mobile Robotic Swarms*. University of Virginia Research Symposium, UVA, April 7 2020.
  - S. Gao, C. Di Franco, **N. Bezzo** *Exploiting Ground and Ceiling Effects on Autonomous UAV Motion Planning*. ECE Welcome back Research Poster Award, UVA, September 4 2018 (**Best poster award).**
  - E. Yel, **N. Bezzo** *Reachability-based Self-triggered Scheduling and Replanning of UAV Operations*. Student Research Poster Session, UVA, August 21 2017.
  - A. Branch, H. Dean, **N. Bezzo** *Toward Assisted Robotics Perimeter & Surface Mapping*. Student Research Poster Session, UVA, August 21 2017 (**Best poster award).**
  - V. Saraiya, **N. Bezzo** *Toward Disturbance Rejection Control of Autonomous Aerial Vehicles*. Student Research Poster Session, UVA, August 21 2017.

- **Thesis and Technical Reports**
  - M. Gates, **N. Bezzo** *Towards Trustworthy Swarming of Autonomous Vehicles*. MS Thesis, October 2020
  - T. Lin, **N. Bezzo** *Robust Robotic Operations in the Presence of Uncertainties*. MS Thesis, April 2018
  - **N. Bezzo** *Coordination Strategies for Connected Robotic Networks*. PhD Thesis, October 2012
  - **N. Bezzo**, J. Piovesan, R. Fierro, *Path Planning of Mobile Routers via Antenna Diversity*, SBIR Report, Marhes Laboratory, School of Electrical Computer Engineering, University of New Mexico, August 2011
  - **N. Bezzo** *Low-Cost CMOS Non-Contact Profilometer*. MS Thesis, July 2008
  - **N. Bezzo** *A Sensors Array for the Measurement of Electrical Currents (in italian – Array di Sensori per la Misura di Correnti Elettriche)*. BS Thesis, July 2006

- **Software Artifacts**
  - **N. Bezzo**, P. Gebhard, J. Park, I. Lee, *ROSLab:* a high-level programming environment for robotic applications `http://precise.github.io/ROSLab/`
  - **N. Bezzo**, P. Gebhard, M. Piccoli, I. Lee, *EMLab:* a high-level co-design environment for PCB electro-mechanical specifications.

Citation Count, H-index and i10-index

- **Google Scholar as of February 01, 2022:**
  - citation count = 922
  - h-index = 14
  - i10-index = 20

Graduate Students

- **Current PhD Students:**
  - Rahul Peddi (SIE) – Projected Defense in 2022
  - Paul Bonczek (ECE) – Projected Defense in 2022
  - Shijie Gao (ECE) – Projected Defense in 2024
  - Jacob Higgins (ECE) – Projected Defense in 2024
  - William Clark (ESE) – Projected Defense in 2025
  - Lauren Bramblett (ESE) – Projected Defense in 2024

- **Current MS Students:**
  - Nick Mohammad (CS) – Projected Defense in 2022
  - Pravardhan Nagireddy (CS) – Projected Defense in 2022
  - Tianhao Wu (CS) – Projected Defense in 2023
  - Garret Moore (CS) – Projected Defense in 2022

- **Former Graduate Students:**
  - Esen Yel (Ph.D. ESE 2021) – Now Postdoc at Stanford
  - Phillip Seaton (M.S. ECE 2021)
  - Christian Gall (M.S. ECE 2021) – Exchange student from TUM
  - Mary Margaret Gates (M.S. CS 2020)
  - Tony Lin (M.S. ECE 2018) – Now PhD student at Georgia Tech
  - Vishaal Saraiya (M.S. MAE 2017) – Now Robotics Engineer at Apellix
  - Bradley Hallier (M.S. ECE 2016 -2017)
  - Rahul Vasist (UPenn PRECISE Center, M.S. CS 2015) – Now Firmware Engineer at Oracle
  - Yanwei Du (UPenn GRASP Lab, M.S. ME 2015) – Now PhD student at Georgia Tech

Undergraduate Students

- **Current Undergraduate Students:**
  - Prithvi Kinariwala (B.S. CS 2022)

- **Former Undergraduate Students:**
  - Noelle Law (B.S. ECE 2021) – Now PhD at NYU
  - Katie Kleeman (B.S. ESE 2021)
  - Grace Glaubit (B.S. ESE/CS 2021) – Now Systems Engineer at Amazon
  - Jeremiah Thomas (B.S. ESE 2021) – Now PhD at UC Santa Barbara
  - Nikilesh Subramaniam (ECE 2021) – Now Electrical Engineer at Amazon
  - Nicholas Anselmo (B.S. ESE 2020)
  - Miller Garrett (B.S. ESE 2020)
  - Shirley Wang (B.S. ECE 2020)

- Ryan Remias (B.S. ECE 2020)
- Matthew Trivett (B.S. ESE 2020)
- Anders Christoffersen (B.S. ECE 2020)
- Rohan Raval (B.S. CS 2019) – Now Software Engineer at UBER Robotics
- William Clark (B.S. MAE 2019)
- Grace Culver (B.S. CS 2019)
- Daniel Voce (B.S. ECE 2019)
- Jennavive Benko (B.S. ECE 2019)
- Candace Craig (B.S. SIE 2019)
- Patrick Mahan (B.S. ECE 2019)
- Ajay Patel (B.S. CS 2019)
- Atiena Branch (B.S. ECE 2018) – Now Software Engineer at Naval Research Lab
- Hazen Dean (B.S. SIE 2018)
- Victoria Marquis (B.S. SIE 2018)
- Rebecca Ho (B.S. SIE 2018)
- William Rainey (B.S. SIE 2018)
- Matthew Kimpel (B.S. SIE 2018)
- Joeseph Ghiorzi (B.S. ECE 2018)
- William Cricchi (B.S. ECE 2018)
- Ryan D. Rosenfeld (B.S. CS 2018)
- Mark G. Restrepo (B.S. SIE 2018)
- William H. Gerard (B.S. MAE 2018)
- Walter E. Bruce (B.S. ECE 2018)
- Tahiya Salam (B.S. CS 2017) – Now PhD at UPenn
- Neeraj Gandhi (B.S. ECE 2017) – Now PhD at UPenn

Postdoctoral Researchers

- Carmelo Di Franco (2019 - 2020) – Now at AiTronik, Italy

External Funding

- **Awarded (Total = $2,679,000):**
  - *Autonomous Building Condition Detection and Evaluation (ABCDE)* Sponsor: CoStar Group; Amount: $1,000,000; Duration: 01/01/2022 – 01/01/2024; Role: PI
  - *Reverse Engineering Methodology for Resilient and Reconfigurable Autonomous CPS*; Sponsor: NSF CHEST; Amount: $100,000; Duration: 08/01/2021 – 07/31/2022; Role: PI
  - *Self-Assurance Modules for Autonomous Systems (SAMAS)*; Sponsor: AFRL; Amount: $50,000; Duration: 03/01/2021 – 05/30/2021; Role: PI
  - *Fly-Crash-Recover: Safe Recovery of Faulty UAVs*; Sponsor: MITRE; Amount: $ 10,000; Duration: 09/01/2019 – 05/31/2020; Role: PI
  - *SaTC: CORE: Small: Online Malicious Intent Inference for Safe CPS Operations under Cyber-attacks*; Sponsor: NSF; Amount: $ 290,642; Duration: 09/01/2018 – 08/31/2021; Role: PI
  - *CRI:II-New: The Living Link Lab: Infrastructure for Enhancing Occupant Experience and Building Operations*; Sponsor: NSF; Amount: $ 188,000 (Grant total: $754,568); Duration: 09/01/2018 – 08/31/2021; Role: Co-PI
  - *Integrated Static and Dynamic Approaches to High-Assurance for Learning-Enabled Cyber-Physical Systems*; Sponsor: DARPA Assured Autonomy Program; Amount: $ 500,000 (Grant total: $5,000,000); Duration: 01/01/2018 – 03/31/2022; Role: Co-PI

- *Assured Planning and Control of Heterogeneous Robotics Systems*; Sponsor: LEIDOS; Amount: $ 100,000 ; Duration: 09/01/2018 – 08/31/2021; Role: PI
- *FPV autonomous drone flight*; Sponsor: MITRE; Amount: $ 50,000 ; Duration: 09/01/2018 – 12/31/2018; Role: PI
- *Development of Risk-based Attack Resilient State Estimation and Control of CPS* Sponsor: Booz Hallen Hamilton; Amount: $ 10,000; Duration: 08/21/2017 – 05/30/2018; Role: PI
- *Development of Control-Aware Cyber Techniques for Attack-Resilient Industrial Control & Combat Systems* Sponsor: ONR BAA: N00014-16-R-BA04; Amount: $ 320,000 (Grant total:$2,700,000); Duration:10/01/2016 – 09/30/2020; Role: Co-PI
- *CRitical Information and Infrastructure Identity and access Management Evaluation (CRII-IME)* Sponsor: MITRE; Amount: $ 10,000; Duration: 09/01/2016 – 05/30/2017; Role: PI
- *Attack-Resilient Autonomous Vehicles* Sponsor: DARPA FA8750-12-2-0247 High-Assurance Cyber Military Systems (HACMS) Program; Amount:$ 50,000; Duration: 01/01/2016 – 02/28/2017; Role: Co-PI

Internal Funding

- **Awarded (Total = $525,000):**
  - *Assessing and enabling effective COVID-19 mitigation strategies to reduce indoor airborne exposures* UVA Internal Engineering in Medicine Award; Duration: 10/1/2020 – 9/30/2021; Amount: $ 100,000
  - *Towards Learning Enabled Autonomous Infrastructure Inspection* UVA Internal Research Innovation Award; Duration: 7/1/2019 – 6/30/2020; Amount: $ 60,000
  - *Enabling Robotic Operations in the Real World: A Cloud-based Visible Light Communication Approach* UVA Internal Research Innovation Award; Duration: 6/1/2017 – 8/30/2018; Amount: $ 75,000
  - *Using flow models to improve quadrotors control and motion-planning* UVA Internal Research Innovation Award; Duration: 6/1/2017 – 8/30/2018; Amount: $ 50,000
  - *Fully Autonomous Secure and Safe Transport (FASST)* UVA Internal Cyber-security Initiative Award; Duration: 08/29/2016 – 05/15/2017; Amount: $ 100,000
  - *Cybersecurity Analysis - Cooperative Adaptive Cruise Control* UVA Internal Cyber-security Initiative Award; 08/29/2016 – 05/15/2017; Amount: $ 60,000
  - *Graduate Curriculum in Robotics and Society* UVA Internal Education Innovation Award; 06/09/2016 – 05/15/2017; Amount: $ 80,000

Presentations

- Keynote Presentation at 2021 Galois Balloween Workshop, *Safe and Agile Robot Motion Planing* , Virtual, 28 October 2021
- Presentation at DARPA PI Meeting, *Safe and Fast Planning and Control in Dynamic Environments* , Virtual, 14 October 2021
- Presentation at ICRA *Workshop on Security and Privacy for Robotics*, Paris, France, 27 May 2020
- Presentation at DARPA PI Meeting, University of Minnesota, *DNN-based Verified Fast Run-Time Monitoring of Autonomous Systems* , Minneapolis, MN, 16 March 2019
- Presentation at Galois, *Toward Resilient & Assured Autonomous CPS*, Portlan, OR, 19 December 2018
- Presentation at DARPA PI Meeting, UC Berkeley, *Fast Run-Time Monitoring of Autonomous Systems* , Berkeley, CA, 28 November 2018
- Presentation at 2 Accelerated Master's Program in Systems Engineering Seminars, *Toward Resilient & Assured Autonomous CPS*, Darden School, UVA, Charlottesville, VA, 21 September 2018 and 18 October 2019

- Presentation and Tutorial on CPS-cybersecurity to the Defense Intelligence Agency (DIA), UVA, Charlottesville, VA, 06 September 2017
- Presentation at the 2016 Jacobs Technology Days and the Hampton Roads Unmanned Systems Opportunity Exchange *Unmanned Systems Workforce*, Hampton, VA, 22 April 2016
- Presentation at the 2015 Safe and Secure Systems and Software Symposium (S5) *A Run time Monitoring Framework for Safe Coordination of Unmanned Aerial Vehicles*, Dayton, OH, 10 June 2015
- Invited speaker at NASA Jet Propulsion Laboratory, Pasadena, CA, 12 April 2012.
- Invited speaker at USC Robotics Research Lab, Los Angeles, CA, 13 April 2012.

Teaching

- SYS-6581/ECE-6501/CS-6501 "Autonomous Mobile Robots" – Fall '16 '17 '18 '19 '20 '21
- SYS-3062 "Simulation Modeling" – Spring '17 '18 '19 '20 '21
- SYS-4053 "System Design Capstone" – Fall/Spring '17 '18 '19 '20 '21

Internal Service

- **School Level:**
  - Member of the Link Lab, 2017 - present
  - Member of the Cyber-Security Search Committee, 2021, 2018, 2017
  - Member of the Link Lab CPS Search Committee, 2018, 2016
  - Co-organizer of the Link Lab Opening Ceremony, 2018 (Presentation on CPS Autonomy, Demonstrations, and Drone Ribbon-Cutting)
  - Panelist at Undergraduate Research Network's Research Fair, 2018
  - Demonstrations to Industry and Government visitors, 2016 - present
  - Judge for URN Research Symposium, 2016
  - PhD Committee Member:
    - Varundev Sukhil, CS, 2021
    - Trey Woodlief, CS, 2020
    - Carl Hildebrandt, CS, 2020
    - Trent Weiss, CS, 2019
    - Steven Hauser, ESE, 2019
    - Yu Sheng, ECE, 2018
    - Dawei Fan, ECE, 2018
    - Masoud Bashiri, SIE, 2017
    - Jihanyu Su, SIE, 2017
    - Xiaomin Lin, SIE, 2017
- **Department Level:**
  - Head of the ESE "System Assurance and Resilience" Committee, 2020 - present
  - Member of the Systems & Information Engineering Graduate Studies Committee, 2016 - present
  - Member of the Computer Engineering Graduate Studies Committee, 2019 - present
  - Open-House Lab demonstrations, 2016 - present

Professional Service

- **Journals, Conferences, and Workshops Organization:**
  - Organizing Committee member and Website Chair for 2022 International Conference on Robotics and Automation (ICRA) – 2020 - present
  - Associate Editor for Robotics and Automation Letters (RA-L) – 2020 - present
  - Area Chair for Conference on Robot Learning (CoRL) – 2020
  - Program Committee Member of International Conference on Cyber-Physical Systems – 2020, 2019, 2018, 2017
  - Program Committee Member of International Conference on Intelligent Robots and Systems (IROS) – 2021l, 2020, 2019
  - Session Chair at the International Conference on Intelligent Robots and Systems (IROS) – 2019.
  - Guest Editor of IEEE Computer Special Issue on Resiliency in Cyber-Physical Systems – 2019, 2018
  - Session Chair at the International Conference on Cyber-Physical Systems (ICCPS) – 2018.
  - Program Committee Member American Control Conference – 2018
  - Session Chair at the American Control Conference (ACC) – 2018, 2016.
  - Organizer of the "Robot Makers: The future of digital rapid design and fabrication of robots" (RoMa) workshop within the Robotics: Science and Systems (RSS) Conference – 2016, 2014
  - Session Chair at the Adaptive Hardware and Systems Conference (AHS) – 2017.
  - Session Chair at the International Design Engineering Technical Conferences & Computer & Information in Engineering Conference (IDETC/SIE) – 2015.
  - Session Chair of International Symposium of Experimental Robotics (ISER) - Mechanisms Session – 2014.

- **Government Activities**
  - NSF Proposal Panels: SaTC 2019, 2020 and NRI 2021

- **Reviewer for:**
  - IEEE Robotics and Automation Magazine;
  - IEEE Transactions on Robotics;
  - IEEE Transactions on Automation Science and Engineering;
  - IEEE/ASME Transactions on Mechatronics;
  - IEEE Control Systems Magazine;
  - IEEE Robotics and Automation Letters;
  - Cambridge Robotica;
  - International Conference on Robotics and Automation (ICRA);
  - International Conference on Intelligent Robots and Systems (IROS);
  - Conference on Robot Learning (CoRL);
  - American Control Conference (ACC);
  - Conference on Decision and Control (CDC)
  - Internationa Conference of Cyber-Physical Systems (ICCPS)

- **Member of:**
  - IEEE (Control Systems Society, Robotics and Automation Society (RAS)) – 2007 - present
  - IEEE RAS Technical Committee (TC) on Multi-Robot Systems (MRS) – 2017 - present

Media/News Coverage

- *AMR Spot featured in Dean West SEAS Vision Campaign*, by Elizabeth Mather
  https://www.youtube.com/watch?v=PGSLZZDtT_E
- *UVA welcomes Spot the Robot*, by Christopher Tyree and in CBS News
  https://engineering.virginia.edu/news/2021/04/see-spot
  https://www.cbs19news.com/story/43688379/uva-welcomes-spot-the-robot
- SYS-6581/ECE-6501/CS-6501 "Autonomous Mobile Robots" course's competition featured in UVA News Article *UVA Engineering Professor Outmaneuvers the Pandemic to Build a Better Competition*, https://news.virginia.edu/content/navigating-obstacles-engineering-students-compete-robot-challenge-virtually
- *Two AMR quadrotors were featured in the ribbon cutting ceremony of the Link Lab*, Link Lab Opening Ceremony, https://www.wvtf.org/post/new-uva-lab-aims-combine-teaching-research-and-emerging-technology#stream/0
- *The Autonomous Mobile Robots Lab at UVA*, by Mitchell Powers, UVA Today Video, https://news.virginia.edu/video/UVAs-mobile-autonomous-robots-lab
- *With the Rise of Autonomous Vehicles, Hackers Pose a Serious New Threat*, by Matt Kelly, UVA Today, https://news.virginia.edu/content/rise-autonomous-vehicles-hackers-pose-serious-new-threat
- *Robot, take the wheel: In University lab, engineers teach autonomous vehicles to navigate an unpredictable world*, by Caroline Kettlewell, VIRGINIA Magazine, https://UVAmagazine.org/articles/robot_take_the_wheel
- *Robot makers: The future of digital rapid design and fabrication of robots*, in RoboHub, https://robohub.org/robot-makers-the-future-of-digital-rapid-design-and-fabrication-of-robots/
- *UVA Professor, Students Use Robot to Help Restore Claudius Crozet Blue Ridge Tunnel*, by Taylor Gleason, NBC29
- *Into the Darkness: UVA Robot Maps Historic Tunnel*, by Matt Kelly, UVA Today, https://news.virginia.edu/content/darkness-UVA-robot-maps-historic-tunnel
- *Two exciting breakthroughs in autonomous vehicle cybersecurity, though questions remain*, in TechRepublic, https://www.techrepublic.com/article/two-breakthroughs-in-autonomous-vehicle-cybersecurity-though-questions-remain/
- *UVA Engineering Lab Brings Students, Professors Together for Collaboration*, by Pete DeLuca, NBC29.
- *Robot mapping news and Lab featured in the wikipedia page for the Blue Ridge Tunnel*, In Wikipedia, https://en.wikipedia.org/wiki/Blue_Ridge_Tunnel.
- *University of Virginia Maps Historic Tunnel Using Jackal UGV*, In Robotics Tomorrow and in Clearpath Robotics News, https://www.roboticstomorrow.com/article/2018/01/university-of-virginia-maps-historic-tunnel-using-jackal-ugv/11206.