

# Rahul Peddi

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## EDUCATION

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### University of Virginia

Ph.D., Systems Engineering - Robotics

Advisor: Nicola Bezzo (bezzorobotics.com)

Charlottesville, VA

Expected December 2022

### Virginia Commonwealth University

B.S., Mechanical and Nuclear Engineering

Minors: Mathematics, Economics

Richmond, VA

May 2017

## RESEARCH INTERESTS

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Human-Robot Interaction   Motion Planning   Interpretable ML/ Explainable AI  
Runtime Monitoring and Detection   Coordinated Multi-Robot Swarms  
Fault Tolerant Control and Planning   Active Learning   Learning from Experience

## SKILLS

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Matlab   ROS   Python   TensorFlow   C/C++   Simulink   LaTeX   GitHub   VBA

## RESEARCH EXPERIENCE

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### University of Virginia

*Graduate Research Assistant, Robotics*

Charlottesville, VA

August 2017 – Present

- Developed a method to augment interpretable monitoring by incorporating **runtime updating** and probabilistic, **priority aware social navigation**
- Designed an **interpretable** decision tree-based monitor to **improve and simplify social planning** around multiple agents
- Developed a Hidden Markov Model based **prediction and planning** approach for **proactive social navigation**, while **updating the model at runtime**
- Designed and performed experiments for **resilient multi-vehicle swarms** to withstand **sensor/communication attacks** and **coordinate exploration with sparse connectivity**
- Augmented and improved off-the-shelf **SLAM algorithms** to fuse **multiple 3d Lidar sensors** to autonomously build maps of unknown environments
- Devised a technique via **learning from demonstration** to **enable autonomous flight** on an off-the-shelf **quadrotor UAV**
- Leveraged **recurrent neural networks** to invoke **attention** for robot navigation in **dense crowds**
- Formulated a new **perturbation-based active learning** method within the scope of interpretable monitoring for **fault tolerant control and planning**

## PUBLICATIONS

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- **R. Peddi**, N. Bezzo, "An Interpretable Decision Tree-based Virtual Physics Method for Non-interfering Social Planning", *Robotics and Automation Letters (RA-L)*, 2022
- **R. Peddi**, N. Bezzo, "Interpretable Run-Time Prediction and Planning in Co-Robotic Environments", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2021
- P. Bonczek, **R. Peddi**, S. Gao, N. Bezzo, "Detection of Non-random Sign-based Behavior for Resilient Coordination of Robotic Swarms", *IEEE Transactions on Robotics*, 2021
- 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", *Systems and Information Engineering Design Symposium (SIEDS)*, 2021
- **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", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2020
- **R. Peddi**, N. Bezzo, "Parameter-free Regression-based Autonomous Control of Off-the-shelf Quadrotor UAVs", *IEEE International Conference on Unmanned Aircraft Systems (ICUAS)*, 2019
- L. Bramblett, **R. Peddi**, N. Bezzo, "Coordinated Multi-Agent Exploration & Exploitation of Unknown Environments with Limited Connectivity" (in preparation)

## PRESENTATIONS

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International Conference on Robotics and Automation	2022
IEEE/RSJ International Conference on Intelligent Robots and Systems	2021
UVA Link Lab Student Flash Talks	2021
IEEE/RSJ International Conference on Intelligent Robots and Systems	2020
University of Virginia Engineering Research Symposium	2019
International Conference on Unmanned Aircraft Systems	2019

## TEACHING EXPERIENCE

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<b>University of Virginia</b>	Charlottesville, VA
<i>Graduate Teaching Assistant, Systems Engineering</i>	August 2017 - Present
Autonomous Mobile Robots (Design, Instruction)	
<ul style="list-style-type: none"><li>• Lectured lab portion of graduate-level robotics course</li><li>• Assisted students in using ROS, Python, and C++ with real hardware</li></ul>	
Accelerated Master's Program – Robotics Day (Design, Instruction)	
<ul style="list-style-type: none"><li>• Introduced students to basic robotics principles, ROS, and hardware</li></ul>	
Simulation Modeling (Design, Instruction, Grading)	
<ul style="list-style-type: none"><li>• Designed and lectured lab portion of undergraduate Systems Engineering course</li><li>• Familiarized students to using Matlab and Simulink as effective simulation tools</li></ul>	

## PROFESSIONAL EXPERIENCE

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### **Dominion Energy**

Richmond, VA

#### *Energy Operations Analyst (Internship)*

May-August, 2016-2017

- Developed a new predictive cost function to optimize hourly power output
- Designed a new XML query and upload tool to save 3 hours of manual labor each day
- Determined the reliability and feasibility of renewable resources (wind and solar) via predictive risk analysis

#### *Nuclear Engineer (Internship)*

May-August, 2015

- Developed a simulation to forecast the reliability of Reactor Temperature Detectors
- Developing a faster procedure for testing the reliability of Safety Injection System
- Researched, specified, and supervised the installation of primary-grade flow meters