VENKATRAMAN RENGANATHAN

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Ole Romers Vag 1, SE 223 62, Lund, Sweden

Professional Experience

Postdoctoral Research Fellow
Department of Automatic Control, LTH - Lund University, Sweden *August 2021 - Present*
Mentor: Dr. Anders Rantzer

Graduate Research Assistant
Department of Mechanical Engineering - UT Dallas, USA *August 2016 - August 2021*
Advisor: Dr. Tyler Holt Summers

Graduate Student Researcher
Department of Electrical Engineering - Arizona State University, USA *May 2014 - July 2016*
Advisor: Dr. Armando Antonio Rodriguez

Software Engineer
Aspire Systems - India Private Limited, Chennai - India *June 2011 - September 2012*

Education

PhD, Mechanical Engineering (Dynamics & Controls), **CGPA: 3.95/4.0** *June 2021*
Thesis Advisor: Dr. Tyler Holt Summers
The University of Texas at Dallas, Richardson, TX, USA

Master of Science, Electrical Engineering (Control Systems), **CGPA: 3.76/4.0** *July 2016*
Thesis Advisor: Dr. Armando Antonio Rodriguez
Arizona State University, Tempe, AZ, USA

Bachelor of Engineering, Electrical & Electronics Engineering, **CGPA: 9.12/10.0** *May 2011*
Project Advisor: Dr. V. Prasanna Moorthy
Government College of Technology - Anna University, Coimbatore, TN, India

Awards

- DAAD AI-Net for CPS Postdoc Networking Fellowship, October 2022.
- Travel Fellowship from Lund University - Faculty of Engineering LTH, 2022-2023.
- Louis Beecherl Jr. Fellowships from UT Dallas for the academic years 2019-2020 & 2020-2021.
- GCT Alumni Association Scholarship for Academic Excellency during the year 2010.

Preprints Submitted & in Preparation

- A. Banse, **V. Renganathan**, R. Jungers, "A Cantor-Kantorovich Metric Between Markov Decision Processes", *Manuscript Submitted for MTNS*, 2024.
- **V. Renganathan**, , N. Hashemi, J. V. Deshmukh, "Data-driven Anomaly Detection Using Conformal Prediction", *Manuscript In Preparation for IEEE CDC*, 2024.
- **V. Renganathan**, A. Nyström, M. Cantoni, "Understanding Probabilistic Uncertainties Using ν-Gap", *Manuscript In Preparation for IEEE CDC*, 2024.
- A. Nyström, **V. Renganathan**, M. Cantoni, "Stereographic Projection of Probabilistic Uncertainties", *Manuscript in Preparation for IEEE TAC*, 2024.
- M. Pfefferkorn, **V. Renganathan**, R. Findeisen, "Regret & Sub-optimality of Distributionally Robust Stochastic MPC", *Manuscript in Preparation for IEEE TAC*, 2024.
- **V. Renganathan**, M. Jeeninga, "A Novel Anticipatory Distributed Consensus Protocol for Multi-agent Systems", *Manuscript In Preparation for IEEE LCSS*, 2024.
- W. Wang, **V. Renganathan**, A. Halder, "Deterministic Set Invariance for Controlled Diffusion", *Journal Manuscript in Preparation*, 2024.

- **V. Renganathan**, A. Nyström, I. Shames, M. Cantoni, "Measuring Regret Using ν-Gap Metric", *Journal Manuscript in Preparation*, 2024.
- **V. Renganathan**, "Distributionally Robust Risk Allocation for Optimal Sampling Based Motion Planning Under Uncertainty", *Journal Manuscript In Preparation*, 2024.

Journal Publications

1. **V. Renganathan**, S. Safaoui, A. M. Kothari, B. Gravell, I. Shames, T. Summers, "Risk Bounded Nonlinear Motion Planning With Integrated Perception & Control", *Special Issue on "Risk-aware Autonomous Systems: Theory and Practice", Artificial Intelligence*, 2023.
2. **V. Renganathan**, B. Gravell, J.Ruths, T. Summers, "Anomaly Detection Under Multiplicative Noise Model Uncertainty", *IEEE Letters to Control Systems Society*, 2022.
3. **V. Renganathan**, N. Hashemi, J. Ruths, T. Summers, "Higher-Order Moment-Based Anomaly Detection", *IEEE Letters to Control Systems Society*, 2022.
4. **V. Renganathan**, K. Fathian, S. Safaoui, T. Summers, "Spoof resilient coordination in distributed & robust robotic networks", *IEEE Transaction on Control Systems Technology*, 2021.

Conference Publications

1. **V. Renganathan**, A. Rantzer, O. Kjellqvist, "Distributed Minimax Adaptive Control For Uncertain Networks", *Accepted for European Control Conference*, Stockholm, 2024.
2. M. Pfefferkorn, **V. Renganathan**, R. Findeisen, "Regret & Conservatism of Stochastic MPC", *Accepted for IEEE ACC*, 2024.
3. **V. Renganathan**, A. Iannelli, A. Rantzer, "Online Learning Analysis for Minimax Adaptive Control", *Accepted for IEEE CDC*, 2023.
4. C. Alptürk, **V. Renganathan**, "Risk Averse Path Planning Using Lipschitz Approximated Wasserstein Distributionally Robust Deep Q-learning", *ECC*, Bucharest, Romania, 2023.
5. **V. Renganathan, A. Cervin**, et.al, "Learning-based Control and Estimation for Attitude Regulation of a Reusable Launcher for Landing Scenario", *Accepted to the ESA-GNC & ICATT Conference*, Sopot, Poland, 2023.
6. **V. Renganathan**, J. Pilipovsky, P. Tsoitras, "Distributionally Robust Covariance Steering With Optimal Risk Allocation", *Accepted to IEEE ACC*, 2023.
7. K. Ekenberg, **V. Renganathan**, B. Olofsson, "Distributionally Robust RRT with Risk Allocation", *Accepted to IEEE ICRA*, 2023.
8. T. Jouini, Z. Sun, **V. Renganathan**, Veit Hagenmeyer, "Input and state constrained inverse optimal control with application to power networks", *IFAC World Congress*, 2023.
9. **V. Renganathan**, B. Gravell, J.Ruths, T. Summers, "Anomaly Detection Under Multiplicative Noise Model Uncertainty", *IEEE American Control Conference*, Atlanta, USA 2022.
10. S. Safaoui, B. Gravell, **V. Renganathan**, T. Summers, "Risk-Averse RRT* Planning with Nonlinear Steering and Tracking Controllers for Nonlinear Robotic Systems Under Uncertainty", *IEEE IROS*, 2021.
11. **V. Renganathan**, I. Shames, T. Summers, "Towards Integrated Perception and Motion Planning with Distributionally Robust Risk Constraints", *IFAC World Congress*, 2020.
12. **V. Renganathan**, N. Hashemi, J. Ruths, T. Summers, "Distributionally Robust Tuning of Anomaly Detectors in Cyber-Physical Systems with Stealthy Attacks", *IEEE American Control Conference*, 2020.
13. V. Raghuraman, **V. Renganathan**, T. Summers, J. Koeln, "Hierarchical MPC with Coordinating Terminal Costs", *IEEE American Control Conference*, 2020.

14. **V. Renganathan**, T. Summers, "Spoof Resilient Coordination for Distributed Multi-Robot Systems", *Proceedings of The International Symposium on Multi-Robot and Multi-Agent Systems(MRS)*, Los Angeles, USA, Dec 4-5, 2017.

Books & Theses

1. **V. Renganathan**, "Learn & Control Systems With Data", *Graduate Textbook (In Preparation)*, Lund University, 2023.
2. **V. Renganathan**, "Robust, resilient, and risk-aware optimization and controls for Cyber-physical systems", *PhD (ME) Thesis*, The University of Texas at Dallas, 2021.
3. **V. Renganathan**, "Kill Zone Analysis for a Bank-to-Turn Missile-Target Engagement", *MS(EE) Thesis*, Arizona State University, 2016.
4. **V. Renganathan et al.**, "PLC Logic Implementation for Controlling Tube-Bending Machine Operation", *BE(EEE) Thesis Project*, BHEL Trichy and Government College of Technology, Coimbatore, India, 2011.

Invited Talks

1. **Distributed Implementation of Minimax Adaptive Controller for Finite Set of Linear Systems**, Department of Process Engineering, TU Berlin, Germany, February 16, 2023. *Host:* Dr. Steffi Knorn.
2. **Distributionally Robust Covariance Steering with Optimal Risk Allocation**, Institute for Systems Theory and Automatic Control (IST), University of Stuttgart, Germany, February 14, 2023. *Host:* Dr. Andrea Iannelli & Dr. Frank Allgower.
3. **Anomaly Detection for Cyber-physical Systems**, Institute of Industrial Automation and Software Engineering (IAS), University of Stuttgart, Germany, February 13, 2023. *Host:* Dr. Andrey Morozov.
4. **Motion Planning Under Uncertainty With Risk Allocation**, Control and Cyber-Physical Systems Laboratory (CCPS), TU Darmstadt, Germany, February 07, 2023. *Host:* Dr. Rolf Findeisen.
5. **Distributionally Robust Covariance Steering with Optimal Risk Allocation**, Department of Electrical Engineering, IIT Madras, India, January 18, 2023. *Host:* Dr. Puduru Viswanadha Reddy.

Students Mentored

Role: Masters Thesis Supervisor

1. **Anton Nyström** - Lund University, Sweden - Spring 2024.
   Thesis Topic: Understanding Probabilistic Uncertainties Using ν-Gap. (Ongoing Thesis).
2. **Cem Alptürk** - Lund University, Sweden - Spring 2022.
   Thesis Topic: Risk Averse Path Planning Using Distributionally Robust Deep Reinforcement Learning. (Research Paper Accepted to ECC 2023).
3. **Kajsa Ekenberg** - Lund University, Sweden - Spring 2022.
   Thesis Topic: Distributionally Robust Risk Bounded Path Planning Through Iterative Spatio-temporal Risk Allocation. (Research Paper Accepted to ICRA 2023).

Role: PhD Co-Supervisor

1. **Olle Kjellqvist** - Lund University, Sweden. (Main Supervisor: Dr. Anders Rantzer)
   Thesis Topic: On Control and Estimation of Large and Uncertain Systems.

Role: Mentor

1. **Aadi M Kothari** - Bachelor Student Researcher at UT Dallas, USA.
   Current Position: Pursuing Masters in Mechanical Engineering at MIT, Boston, USA.

Reviewing Activities

Journals

- IFAC Automatica
- IEEE Transaction on Automatic Control
- IEEE Transaction on Control of Network Systems
- IEEE Letters to Control Systems Society
- Control Engineering Practice
- IEEE Signal Processing Letters
- IEEE Robotics & Automation Magazine

Conferences

- IEEE ACC
- IEEE CDC
- IFAC World Congress
- L4DC
- IEEE CCTA
- IROS
- ICRA
- RAL
- ASME DSCC

Teaching Experience

Department of Automatic Control, Lund University, Lund, Sweden
Role: Course Instructor

PhD Course on Linear Systems	Spring 2022

Role: Teaching Assistant

Course on Learning Based Control	Spring 2022

School of Mechanical Engineering, UT Dallas - TX, USA
Role: Graduate Teaching Assistant

MECH 4310 - Systems and Controls	Spring 2020

Department of Mathematics & Statistics - ASU, AZ - USA
Role: Grader

MAT 265 - Calculus for Engineers - I	Fall 2013
MAT 267 - Calculus for Engineers - III	Spring 2014
MAT 265 - Elementary Linear Algebra	Summer 2014
MAT 210 - Brief Calculus	Fall 2014
MAT 265 - Calculus for Engineers - I	Spring 2015
MAT 265 - Calculus for Engineers - I	Spring 2016
MAT 211 - Math for Business Analysis	Spring 2016
MAT 210 - Brief Calculus	Spring 2016

Role: Instructional Aide

MAT 265 - Calculus for Engineers - I	Summer 2014
MAT 170 - Pre-Calculus	Summer 2014
MAT 142 - College Mathematics	Summer 2015
MAT 170 - Pre-Calculus	Fall 2015
MAT 142 - College Mathematics	Summer 2016

School of Mechanical, Aerospace, Chemical & Materials Engg., ASU - AZ, USA
Role: Grader for Dr. Daniel Rivera

CHE 461 - Process Dynamics and Controls	Fall 2014
CHE 494/598 - System Identification	Spring 2015

References

Dr. Anders Rantzer: *Postdoctoral Mentor* Email: anders.rantzer@control.lth.se
Professor & Head of the Department of Automatic Control,
Lund University, Lund - Sweden.

Dr. Tyler H. Summers: *PhD Advisor* Email: tyler.summers@utdallas.edu
Associate Professor in Mechanical Engineering,
University of Texas at Dallas, Richardson, TX - USA.

Dr. Iman Shames: *Research Collaborator* Email: Iman.Shames@anu.edu.au
Professor of Mechatronics - School of Engineering,
Australian National University, Acton, Australia.

Dr. Justin Ruths: *PhD Committee Member* Email: jruths@utdallas.edu
Assistant Professor in Mechanical Engineering
The University of Texas at Dallas, Richardson, TX - USA.

Dr. Mark W. Spong: *PhD Committee Member* Email: mspong@utdallas.edu
Professor in Systems Engineering,
The University of Texas at Dallas, Richardson, TX - USA.

Dr. Bjorn Olofsson: *Research Collaborator* Email: bjorn.olofsson@control.lth.se
Associate Professor in Department of Automatic Control,
Lund University, Lund - Sweden.

Personal Details

- **Nationality:** Indian
- **Languages:** English, Tamil, Hindi
- **Spouse Name:** Reshma Renganathan (Married: 2019)
- **Child Name:** Vishruth Venkatraman (Born: 2022)