Harsh Anand

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EDUCATION

University of Virginia, Virginia, USA

- Doctor of Philosophy in Systems Engineering, GPA: **4/4** May'2021 – (Expected) Aug'2024
  (Data Science and Operations Research concentration)

- Topic: *Data-driven Strategies for Enhanced Community Resilience Against Hurricanes*

- Committee: Negin Alemazkoor (Co-Advisor), Majid Shafiee-Jood (Co-Advisor), James H. Lambert (Chair), Samarth Swarup, Mani Rouhi Rad

The Pennsylvania State University, Pennsylvania, USA

- Master of Science in Data Science and Analytics, GPA: **4/4** 2019 – 2021

- Thesis: *Energy Infrastructure Resilience and Economic Impacts: Modeling, Data Analytics, and Metrics*

- Committee: Mohamad Darayi (Advisor), Colin J. Neill (Chair), Raghvinder S. Sangwan, Satish M. Srinivasan, and Ashkan Negahban

Manipal University, Karnataka, India

- Bachelor of Technology in Information Technology, GPA: **3.67/4** 2011 – 2015
  (Computer Science concentration)

RESEARCH INTEREST

- **Methodological domains**: machine learning, deep learning, reinforcement learning, system modeling and simulation, data-driven decision making, mathematical modeling and optimization

- **Application domains**: energy systems, interdependent infrastructure systems, healthcare, computational sustainability, freight transportation, climate change

RESEARCH EXPERIENCE

Doctoral Researcher - **University of Virginia**, VA, USA	May'2021 – Present
Graduate Researcher - **The Pennsylvania State University**, PA, USA	Nov'2019 – May'2021
Research Assistant – **Dept. of Information Technology, MIT, Manipal**, India	2013 – 2015
Research Intern – **Indian Institute of Technology (IIT), Guwahati**, India	Summer 2013

PROFESSIONAL EXPERIENCE

Data Science Intern - **Swiss Re**, New York, NY, USA	Jun'2020 – Aug'2020
Senior Data Scientist - **Kearney**, Mumbai, India	Jan'2017 – May'2021
Machine Learning Engineer - **A.I. Research Lab, TCS**, Kochi, India	Aug'2015 – Nov'2016
Data Science Intern, Semantic Search - **DataWeave Inc.**, Bangalore, India	Jan'2015 – Jun'2015

TEACHING EXPERIENCE

Co-instructor - School of Data Science (DS 4002: Data Science Projects)	Ongoing
Co-instructor and TA - School of Data Science (DS 4002: Data Science Projects)	Fall 2023
Teaching Assistant - School of Data Science (DS 6030: Statistical Learning)	Spring 2023
Teaching Assistant - School of Data Science (DS 4002: Data Science Projects)	Fall 2022
Teaching Assistant - School of Data Science (DS 6030: Statistical Learning)	Summer 2022
Teaching Assistant - School of Data Science (DS 6030: Statistical Learning)	Spring 2022
Academic Assistant and Tutor - Manipal University (Data Structures and Algorithms)	Spring 2014

TECHNICAL SKILLS	• *Advanced Data Science*: Machine Learning, Deep Learning, Reinforcement Learning, Uncertainty Quantification, Meta-Learning, Transfer Learning
	• *Data Analytics*: Data Mining, Predictive and Prescriptive Modeling, Quantitative Analysis, Parametric & Non-Parametric Statistical Modeling, Causal and Bayesian methods, Time-series forecasting, Design of Experiments, A/B Testing, ANOVA, Bootstrapping, Data Structures and Algorithms
	• *Programming Languages*: Python, R, SQL, Java
	• *Development*: TensorFlow, PyTorch, Spark (PySpark, Spark SQL), Hadoop, MapReduce, Graph DB, HBase, Neo4j, CI/CD Jenkins
	• *Project Management*: Project Planning, Agile Development, Leadership, Problem Solving
	• *Visualization/Others*: Power BI, Tableau, Elastic Search, Excel (Advanced), AIIMS, Minitab, KNIME, Alteryx, AWS, IBM Bluemix, Palantir Foundry

PEER-REVIEWED PUBLICATIONS

10. **Anand, Harsh**, Negin Alemazkoor, and Majid Shafiee-Jood. "HEvOD: a database of hurricane evacuation orders in the United States." *Nature Scientific data* 11.1 (2024): 270.

9. Ma, Xiaoyuan, Pierce, Eric, **Anand, Harsh**, Aviles, Natalie, Kunk, Paul and Alemazkoor, Negin (2023), "Early Prediction of Response to Palliative Chemotherapy in Patients with Stage-IV Gastric and Esophageal Cancer," *Nature BMC Cancer* 23, 910

8. **Anand, Harsh**, Nateghi, Roshanak and Alemazkoor, Negin (2023), "Bottom-up Forecasting: Applications and Limitations in Load Forecasting using Smart Meter Data," *Data-Centric Engineering*, 4, e14

7. **Anand, Harsh**, Shafiee-Jood, Majid, and Alemazkoor, Negin (2023). "Perspicuity of Evacuation Behavior in Communities During Hurricanes Using Large-Scale Mobility Patterns and Communal Characteristics," *2023 57th Annual Conference on Information Sciences and Systems (CISS)*, Baltimore, MD, USA, 2023, pp. 1-6

6. Sharma, Rahul*, **Anand, Harsh***, Badr, Youakim and Qiu, Robin (2021). "Time-to-Event Prediction using Survival Analysis for Alzheimer's Disease Progression," *Alzheimer's & Dementia: Translational Research & Clinical Interventions*, 7:e12229 (*Equal contribution)

5. **Anand, Harsh** and Darayi, Mohamad (2021). "A Probabilistic Approach to Modeling Power Network Component Importance Considering Economic Impacts," *Proceedings of the 2021 IISE Annual Conference*, 1010-1015

4. **Anand, Harsh** and Darayi, Mohamad (2021). "Power Network Component Vulnerability Analysis: A Machine Learning Approach," *Procedia Computer Science*, 185, 73-80

3. Jaiswal, Devendra, **Anand, Harsh**, Srinivasan, Satish and Darayi, Mohamad (2021). "A Data-Driven Model to Generate Disruptive Scenarios for Infrastructure Resilience Studies," *Procedia Computer Science*, 185, 248-255

2. Saxena, Akshay, **Anand, Harsh**, Pradhan, Tribikram and Mishra, S. R. (2015). "A Hybrid Chaining Model with AVL and Binary Search Tree to Enhance Search Speed in Hashing." *International Journal of Hybrid Information Technology*, 8(3), 185–194

1. Pradhan, Tribikram, **Anand, Harsh** and Goyal, Akul (2014). "THA - A Hybrid Approach for Rule Induction System using Rough Set Theory, Genetic Algorithm and Boolean Algebra." *Global Journal of Researches in Engineering: Numerical Methods*, 14(1), 11

UNDER REVIEW

4. Khayambashi, Kamiar, **Anand, Harsh**, Taghizadeh, Mehdi, and Alemazkoor, Negin, "Leveraging Spatio-temporal Predictive Models for Optimal Data Transmission and Storage Reduction in Wireless Sensor Networks," submitted to *Internet of Things Journal*

3. **Anand, Harsh**, Shafiee-Jood, Majid, Rouhi Rad, Mani, and Alemazkoor, Negin, "Evaluating the Effectiveness of Hurricane Evacuation Orders by Leveraging Large-scale Human Mobility Patterns," submitted to *Nature Scientific Report*

2. Gollapalli, Madhuri, **Anand, Harsh**, Srinivasan, Satish M., "Characterizing Diseases using Genetic and Clinical Variables: A Data Analytics Approach," presented at *International Conference on Intelligent Biology and Medicine* and accepted for publication at *Quantitative Biology*

1. **Anand, Harsh** and Darayi, Mohamad, "Modeling and Analyzing Energy Infrastructure Resilience considering Economic Impact," submitted to *Energies*

In preparation Manuscripts	7. Hasnat, Md Abul, **Anand, Harsh**, Tootkaboni, Mazdak, Alemazkoor, Negin, "Spatio-temporal Graph Neural Network-based Detection of FDIA and Energy Theft from Smart Meter Power Consumption Data at Geographical Hierarchical Levels," draft in preparation for submission to *Applied Energy*
	6. **Anand, Harsh**, Alemazkoor, Negin, and Shafiee-Jood, Majid, "Evaluating Income and Race Disparities across multiple Atlantic Hurricanes," analysis and draft in preparation for submission to *Nature Communication*
	5. **Anand, Harsh**, Watson, Walker, and Alemazkoor, Negin, "Evaluating Energy Utilization Patterns for Policy Development Towards Equity," analysis and draft in preparation for submission to *Natures Scientific Report*
	4. **Anand, Harsh** and Darayi, Mohamad, "Infrastructure Systems Resilience using Machine Learning Techniques: A Literature Review," draft in preparation for submission to *Sustainability*
	3. Mohellebi, Elias, **Anand, Harsh**, Darayi, Mohamad, Negahban, Ashkan, "Developing and Evaluating an Integrated Mobility and Epidemic Vulnerability Index via Network Analysis," draft in preparation for submission to *PLOS One*
	2. **Anand, Harsh**, "Multi-Fidelity Deep Q-Learning with Action Probing," experiments and draft in preparation
	1. **Anand, Harsh**, Alemazkoor, Negin, and Shafiee-Jood, Majid, "Evaluating Evacuation Effectiveness and Community Behavior in Successive Similar Trajectory Hurricanes via Mobility Data," analysis and draft in preparation for submission to *Nature Scientific Report*
Book Chapter	1. **Anand, Harsh**, and Alemazkoor, Negin, "Long-term impact of climate change on power grids." In Advancing the Resilience of the Power Grid under a Changing Climate, chapter draft in preparation for book publishing under IEEE and Wiley
Technical Presentations	7. **Anand, Harsh**, Shafiee-Jood, Majid, and Alemazkoor, Negin, "Evaluating the Effectiveness of Hurricane Evacuation Orders by Leveraging Large-Scale Human Mobility Patterns," Technical Presentation in the session *Response and Recovery to Disasters and Disruptions*, INFORMS 2023 Annual Meeting, Phoenix, October 2023
	6. **Anand, Harsh**, Shafiee-Jood, Majid, and Alemazkoor, Negin, "Perspicuity of Evacuation Behavior in Communities During Hurricanes Using Large-Scale Mobility Patterns and Communal Characteristics," Technical Presentation in the session *Applied Machine Learning*, 2023 57th Annual Conference on Information Sciences and Systems (CISS), Baltimore, March 2023
	5. **Anand, Harsh**, Shafiee-Jood, Majid, Rouhi Rad, Mani, and Alemazkoor, Negin, "Evacuation Order Effectiveness And Community Behavior: Enabling Strategic Data-driven Decision Making Through Big Data," Technical Presentation in the session *Machine Learning Applications and Data-centric AI*, INFORMS 2022 Annual Meeting, Indianapolis, October 2022
	4. **Anand, Harsh**, Shafiee-Jood, Majid and Alemazkoor, Negin, "Enabling Causal Study of Evacuation Orders Effectiveness through Big Data," Presentation in the *2022 Environmental Futures Forum*, Energy Resilience Institute, Charlottesville, October 2022
	3. **Anand, Harsh** and Darayi, Mohamad, "A Review On Energy Infrastructure Resilience: Modeling, Metrics And Data Analytics," Technical Presentation in the session *Energy Infrastructure Resilience and Economic Impacts*, INFORMS 2021 Annual Meeting, October 2021
	2. **Anand, Harsh** and Darayi, Mohamad, "A Probabilistic Approach to Modeling Power Network Component Importance Considering Economic Impacts," Technical Presentation in the session *Data and System Analytics Application II*, IISE 2021 Annual Meeting, May 2021
	1. **Anand, Harsh** and Darayi, Mohamad, "Modeling and Analyzing Energy Infrastructure Resilience considering Economic Impact," Technical Presentation in the session *Equilibrium Modeling of the Environmental and Institutional Aspects of Interregional Electricity Trade*, INFORMS 2020 Annual Meeting, November 2020

POSTER PRE-SENTATIONS	6. **Anand, Harsh**, Shafiee-Jood, Majid, and Alemazkoor, Negin (2023). "Evacuation Order Effectiveness and Community Behavior: Enabling Strategic Data-Driven Decision Making through Big Data," U.S. Environmental Protection Agency International Decontamination Research and Development Conference, Charleston, December 2023 *(Best Poster Winner Award)*
	5. **Anand, Harsh** and Alemazkoor, Negin (2022). "Enabling Causal Study of Evacuation Orders Effectiveness through Big Data," Link Lab - UVA Engineering Poster and Flash Talk, Charlottesville, February 2022
	4. **Anand, Harsh** and Darayi, Mohamad (2021). "Modeling and Analyzing Energy Infrastructure Resilience considering Economic Impact," IISE QCRE/DAIS Best Student Poster Session
	3. **Anand, Harsh**, Sharma, Rahul and Mungee, Atharva (2020). "Projecting Patterns with Causal Influences in a Dynamic Ecosystem for Retail Sales Forecasting," Penn State Poster Competition, Malvern, PA *(Runners Up Award)*
	2. Mani, Alakesh, **Anand, Harsh** and Venkat, Akula (2020). "A Qualitative Study of Multi-Channel Marketing Campaigns using Market Mix Modeling," Penn State Poster Competition, Malvern, PA
	1. **Anand, Harsh** (2020). "Modeling and Analyzing Energy Infrastructure Resilience considering Economic Impact," Penn State Poster Competition, Malvern, PA

AWARDS AND FELLOWSHIPS		
	Raven Award (*Highest honor that the Raven Society can bestow*)	2024
	Nominee (top 5% among 800+ TAs across UVA) for Graduate Teaching Award	2023, 2024
	Olsen Graduate Fellowship (*Endowed Fellowship*)	2023
	Louis T. Rader Outstanding Graduate Service Award	2023
	Pete Cone Memorial Scholarship	2023
	International Student Citizen Leaders Fellowship	2022 – 2023
	Link Lab Flash Talk Award	2022
	INFORMS ORMS Tomorrow Conference and Travel Award	2021, 2022
	Outstanding Student Award in Data Analytics, Penn State University	2021
	Penn State Valedictorian, Class of 2021	2021
	The Web Conference 2021 Student Scholarship	2021
	Warren V. Musser Fellowship in Entrepreneurial Studies	2020 – 2021
	Penn State Chancellor's Scholarship (*Merit Award*)	2019 – 2020
	AICTE Scholarship (*Tuition Waiver*), Manipal University	2011 – 2015

COMPETITIONS		
	Winner – Best Poster Award Competition @ 2023 U.S. EPA Decon Conference	2023
	Winner – Freestyle O.R. Supreme Case Competition @ 2022 INFORMS	2022
	Finalist – Duke-UNC-TMC Consulting Case Competition	2022
	Winner – Freestyle O.R. Supreme Case Competition @ 2021 INFORMS	2021
	Finalist – Mentor and Participant - 2021 Nittany AI Challenge	2021
	Third Place – Innovation Design Competition @ 2021 IISE	2021
	Best Student Pitch - Lion Cage: Annual competition for early-stage entrepreneurs	2021, 2020
	Winner – Freestyle O.R. Supreme Case Competition @ 2020 INFORMS	2020
	Judge and moderator - Smart India Hackathon - Sentiment Analysis of Code-Mixed Languages	2020
	Placed in top 10% for prototyping Video-To-Text Summarizer - 2020 Nittany AI Challenge	2020
	Runner's Up - Penn State Poster Competition - Retail Sales Forecasting	2020
	Winner of Wawa - HCL Hackathon: Sales forecasting for Wawa using LSTM and Prophet	2019

Ranked top 1% in 4th International Math Olympiad and 13th National Science Olympiad

LEADERSHIP	Chair - Graduate Engineering Student Council, University of Virginia	2023 – Present
	Chair - Systems Engineering Student Advocacy Committee, University of Virginia	2023 – Present
	Treasurer and Livability Chair - Link Lab, University of Virginia	2023 – Present
	Selection Chair - Engineering School, Raven Society	2023 – Present
	Senior Advisor - Graduate Consulting Club, University of Virginia	2023 – Present
	VP of Projects - Graduate Consulting Club, University of Virginia	2021 – 2023
	Chair (Interim) - Graduate Engineering Student Council, University of Virginia	2022 – May 2023
	Vice-Chair - Graduate Engineering Student Council, University of Virginia	2022 – 2022
	Livability Liaison - Link Lab, University of Virginia	2022 – 2023
	International Student Chair (ESE Graduate Student Council), University of Virginia	2021 – 2023
	Student Senator, School of Graduate Professional Studies, Penn State University	2019 – 2021
	Global Programs Senate Committee, Penn State University	2020 – 2021
	Student Council and Curriculum Change Committee, Manipal University	2012 – 2015
	Class Representative, Manipal University	2012 – 2015
	Educator for Non-profit, Chala Janjatiya Vikas Sanstha	2009 – 2019

PROFESSIONAL SERVICES	Program Committee Member and Reviewer - Manuscript and Posters, **US-RSE Conference**	2023
	Professional Studies Advocacy (through promo videos) for US Dept. of State, **EducationUSA**	2023
	Editorial Board Member - **OR/MS Tomorrow, INFORMS**	2023 – Present
	Writer, eNews Daily and OR/MS Today Coverage - **INFORMS 2022 Annual Meeting**	2022
	Webmaster - **OR/MS Tomorrow, INFORMS**	2021 – 2022
	Facilitator, Energy & Infrastructure - **INFORMS 2021 Annual Meeting**	2021

Reviewer

International Journal of Medical Informatics
Transportation Research Board (TRB)
Digital Transformation and Society
US Research Software Engineer Association
IEEE Intelligent Transportation Systems Society

Session Chair

2023 INFORMS Annual Conference	2023
TA16. Response and Recovery to Disasters and Disruptions	
2021 Complex Adaptive Systems Conference	2021
Session 4: System Analysis	
Session 7: Applications of AI	
Session 11: Data Science and Analytics	

Judge

HooHacks - University of Virginia Computer Science Hackathon	2024
Smart India Hackathon - Sentiment Analysis of Code-Mixed Languages	2020

OTHER SERVICES	Core Member - Student Health Advisory Committee, University of Virginia	2023 – Present
	Waste Action Planning Committee, University of Virginia	2023
	Honor and Academic Integrity Committee, University of Virginia	2022
	Faculty Search Committee, ESE Dept., University of Virginia	2022
	K-12 Outreach - **Starr Hill Pathways Program**, UVA Equity Center	Summer 2022

AFFILIATIONS   Transportation Research Board (TRB)
Institute for Operations Research and the Management Sciences (INFORMS)
Institute of Industrial and Systems Engineers (IISE)
The Honor Society of Phi Kappa Phi
Complex Adaptive Systems Conference
The Raven Society - The oldest and most prestigious honorary society at UVA

REFERENCES   Dr. **Negin Alemazkoor**
Assistant Professor, Civil and Systems Engineering
The University of Virginia
E-mail: na7fp@virginia.edu

Dr. **Majid Shafiee-Jood**
Research Assistant Professor, Civil and Systems Engineering
The University of Virginia
E-mail: ms2dm@virginia.edu

Dr. **Mohamad Darayi**
Assistant Professor, Systems Engineering
The Pennsylvania State University
E-mail: mud415@psu.edu

Industry references are available upon request.