Nadia Tanzeem

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Education

Ph.D. in Industrial and System Engineering
Coral Gables, FL 33124, USA

University of Miami, USA — *Aug 2021 - May 2025*

- *Dissertation: "A Deep Variational Bayesian Approach for Sensor-Driven Modeling & Monitoring of Dynamic Degrading Systems"*

B.Sc in Industrial and Production Engineering
Rajshahi, Bangladesh

Rajshahi University of Eng. and Technology — *March 2010 - Dec 2014*

- *Thesis: "Solving a linear programming transportation cost minimization problem for a perishable product."*

Teaching Experiences

Teaching Assistant, *Industrial and System Engineering, University of Miami*
Aug 2021 - Dec 2022

- Assisted in teaching the Deterministic Models in Operations Research, providing support with lectures, assignments, and student inquiries to facilitate understanding of **optimization techniques**.

Senior Lecturer, *Military Institute of Science and Technology, Bangladesh*
January 2017 - December 2020

- Courses Conducted: **Operations Research, Probability and Statistics, Quality Control**, Numerical Analysis, Measurement and Instrumentation, Product Design, Business Communication.
- Co-supervised final-year thesis projects; published outcomes in conference proceedings [Link] and journal articles [Link].

Lecturer, *World University of Bangladesh(WUB), Bangladesh*
August 2015 - December 2016

- Courses Conducted: **Supply Chain Management**, Measurement and Control, Introduction on Computer Programming, Material Handling and Maintenance, Introduction to Robotics. .
- Contributed to ABET accreditation efforts and assisted in the development and preparation of new course materials.

Professional Experiences

Research Assitant, *University of Miami, USA*
August 2021 - April 2025

- Developed a Deep State-Space Modeling (DSSM) framework that integrates **Bayesian variational inference** and **stochastic recurrent neural networks** (LSTM) to model latent degradation dynamics in complex sensor-monitored systems.
- Introduced a flexible probabilistic structure using **variational autoencoders (VAEs)** with both **continuous and discrete latent states**, enabling robust **time-to-event (RUL)** prediction without relying on distributional or parametric assumptions.
- Applied the model to real-world sensor data, including a wind turbine case study, demonstrating 94% predictive accuracy for early fault detection and showcasing the potential of generative deep learning in advancing **statistical reliability modeling**.

Lead Analyst, Industrial Assessment Center, *University of Miami, USA*
January 2023 - December 2024

- In a U.S. DOE-funded project to improve industrial energy use, **led a team of 20 to conduct 25+ audits** across small to mid-sized manufacturers; identified inefficiencies using historical data, resulting in optimized energy performance. [Link]
- Built predictive models to forecast energy consumption; communicated technical findings using **statistical analysis** to clients and DOE leadership, supporting data-driven decisions and enabling $1.7M in projected savings over 5 years.

Intern, *Philips, Dhaka, Bangladesh*
January 2015 - June 2015

- Applied **network flow analysis** to redesign the production line layout, reducing material handling time and layout inefficiencies by 15%. Improved node connectivity and flow efficiency, enhancing throughput in the packaging section.

Selected Publications and Conference Presentation

A Deep Neural Network-based Variational Bayesian Approach for Sensor-Driven Modeling of Dynamic Degrading Systems

Primary Author

- Quality and Reliability Engineering International Journal (Willy Publication)

A Deep Variational Bayesian Approach for Sensor-Driven Modeling and Monitoring of Dynamic Degrading Systems

Presenting Author

- INFORMS Annual Meeting 2024, Seattle, Washington, USA

A Deep Generative State Space Model with Recurrent Layers: Application to Non-linear Dynamic System Monitoring

Presenting Author

- IISE Annual Meeting and Conference Expo 2023, New Orleans, Lousiana, USA

Design of Experiment (DoE): Implementation in Determining Optimum Design Parameters of Portable Workstation

Second Author

- SCIRP Journal(Engineering), Vol.12 No.1, 2020

A Portable Workstation: Implementing Techniques of Product Design Process

First Author

- Proceedings of IEOM Conference, Pilsen, Czech Republic, 2019

Projects

- **Health Data Analytics: Evaluating COVID-19 Interventions in R** — End-to-end data analysis using R, data visualization, residual diagnostics, regression modeling, and stepwise selection.
- **Predicting Diabetes Patient Readmissions Using Machine Learning** — Data preprocessing, feature engineering, and applied Logistic Regression, Decision Trees, SVM, Naive Bayes, Random Forest, K-means clustering, and Neural Networks.
- **Job Scheduling via Mixed Integer Programming using GUROBI** — Added subcontracting variables, constraints, and penalty costs; solved optimization trade-offs using GUROBI.
- **Improved Facility Location Algorithm with Cost Optimization Using Pyomo** — Developed a facility location optimization model in Python using Pyomo, integrating variable and fixed costs with capacity constraints; achieved significant cost reduction and enhanced solution quality.

Skills

- **Data Analysis & Visualization:** Python (Pandas, NumPy, Seaborn), R (tidyverse, ggplot2), SQL, Tableau, Power BI
- **Machine Learning & AI:** Scikit-learn, TensorFlow, PyTorch, Keras, Hugging Face Transformers, modAL, MLflow, Docker
- **Big Data & Distributed Computing:** PySpark, Spark
- **Optimization & Simulation:** CPLEX, Pyomo, Scipy, AMPL, Gurobi, JuliaOpt (Ipopt), MATLAB, Simulink
- **Interpersonal Skills:** Team leadership, cross-functional collaboration, project management, effective communication, technical presentations, mentorship, problem-solving

Certifications and Awards

- Best Poster Award at COE Research Symposium, University of Miami,November 2024
- Certificate of Achievement in Energy Analytics by Miami Dade County, May 2024
- Best Poster Award(3rd),Rothberg Catalyzer AI Summit poster session 2024, February 2024
- Certificate of Achievement by Department of Energy's Industrial Assessment Center Program, May 2023
- Best Track paper award, Product Design module, IEOM, Pilsen, Czech Republic, July 2019

Poster Presentation

- CoE Research Symposium, University of Miami, November 2024
- Poster Session, IMFORMS Annual Meeting, Seattle, October 2024
- Rothberg Catalyzer AI Summit of the Americas, University of Miami, February 2024
- Computing Day, IDSC, University of Miami, April 2024
- Sixth Annual Graduate + Postdoctoral Research Symposium, University of Miami, March 2024
- Engineering Research Day, University of Miami, March 2024
- Computing Day, IDSC, University of Miami, March 2023

References

Dr. Ramin Moghaddass, Associate Prof. of ISE
University of Miami, USA
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Dr. Murat Erkoc, Graduate Program Director of ISE
University of Miami, USA
Email: merkoc@miami.edu