Email: sreelekha.guggilam@gmail.com
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Sreelekha Guggilam

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Github: github.com/sreelekh

Professional Experience

Texas A&M Corpus Christi Corpus Christi, TX August 2024 - Present
Assistant Professor in Data Science
Research interests: Time-series databases, anomaly detection, quantum computing, foundation models

Oak Ridge National Laboratory Oak Ridge, TN Mar 2022 - July 2024
Research and Development Scientist in Machine Learning
National Security Sciences Directorate, Geo-spatial Science and Human Dynamics Division
Focus of study: Human mobility and pattern of life, disease outbreak prediction, EM signals analysis, time-series databases, anomaly detection, spatio-temporal analysis, quantum computing, foundation models, signals data

1. **Department of Energy (DOE) Early Career LDRD awardee** for research in Quantum computing for spatiotemporal modeling. Principal Investigator on developing novel quantum computing approaches for spatiotemporal classification and anomaly detection. Amongst the 8 selected awardees at ORNL in 2023.
2. **Lead on modeling and algorithm development (invention disclosure submitted)** for work on extended Large deviations Anomaly Detection modeling for anomaly detection in indoor pattern of life and human mobility.
3. Active contributor to multiple **Generative AI foundation model** projects using multimodal data.
4. **Awarded 4 research grants** as Principle Investigator and co-Principle Investigator.
5. Lead statistician on developing outbreak prediction models using alternate data sources.

University at Buffalo Buffalo, NY Sept 2019 - Feb 2022
Research Assistant - Anomaly Detection in Streaming High-Dimensional Time Series Database
Institute of Computational Data Science and Department of Computer Science & Engineering
Mentors: Dr. Abani Patra (UB ACM2E Lab, Tufts University), Dr. Varun Chandola (UB Data Science Research Group)
Solved outstanding problems in anomaly detection in evolving data and collections of multivariate time series.

1. Integrated Clustering and Anomaly Detection (INCAD):
   - Conceptualized and published an integrated clustering and anomaly detection algorithm (INCAD) for non-parametric, unsupervised anomaly detection in streaming data using extreme value theory
   - Formulated mathematical framework for extending Generalized Pareto Distribution for high dimensional data
2. Large Deviations Anomaly Detection (LAD):
   - Designed a large deviations theory inspired fast anomaly detection model (LAD) in high-dimensional multivariate time-series database
   - Investigated the impact of local and global policy implementation on COVID-19 trends using LAD
3. LAD Inspired Iterative Training (LIIT):
   - Developed novel low shot training inspired fast training algorithm for artificial neural networks using LAD.

University at Buffalo Buffalo, NY Sept 2017 - Sept 2019
Teaching Assistant
Institute of Computational Data Science

- Led and coordinated a team of teaching assistants for graduate courses in data science.
- Collaborated on developing exams and assignments and lead recitation sessions.

American Express, World Financial Center NY, NY Nov 2015 - Jun 2016
Risk Manager
Global Corporate Portfolios
Risk And Data Analytics for Corporate Credit Portfolios

1. Quantified the change in spending trends in cross-sold clients prior to and post the on-boarding process.
2. Developed and improved risk margins for corporate clients in Global Corporate Payments.
3. Responsible for identifying trends in risk-based industries and states to enable risk control actions on the portfolios.

Grant Support

- **DOE-ORNL Early Career Development Research Award**: Awarded $300k for 2 Years.
  Title: Quantum Variational Inference for Anomaly Detection in Spatiotemporal Data
  Role: PI (Share - 100%)
  Team: Sreelekha Guggilam
  Duration: Mar, 2023 to Feb, 2025.
- **ORNL Laboratory Directors R&D SEED Funds**: Awarded $190k for 2 Years.
  Title: Artificial Intelligence Models for Land Cover Forecasting
  Role: Contributor
  Team: Christa Brelsford (PI), Philipe Ambrozio Dias (Co-PI), Soumendra Bhnaja (Contributor), Ethan Coon (Contributor), Dalton Lunga (Contributor)
  Duration: Feb, 2023 to Jan, 2025.
- **ORNL Laboratory Directors R&D Funds**: Awarded $930k for 2 Years.
  Title: Environmental Anomaly Detection for Biopreparedness
  Role: Co-Principal Investigator
  Team: Assaf Anyamba (PI), Heidi Tubbs (Co-PI)
  Duration: Feb, 2023 to Jan, 2025.
- **ORNL Laboratory Directors R&D Funds**: Awarded $780k for 2 Years.
  Title: Pattern of Life for Nuclear Non-proliferation
  Role: Co-Principal Investigator
  Team: Debraj De (PI), Chatika Gunaratne (co-PI)
  Duration: October, 2022 to September, 2024.

Selected Publications

[1] P. A. Dias, T. Kobayashi-Carvalhaes, S. Walters, T. Frazier, C. Woody, **S. Guggilam**, D. Adams, A. Potnis, and D. Lunga, "Geoai for humanitarian assistance", in *Handbook of Geospatial Artificial Intelligence*, CRC Press, 2024, pp. 260–286.

[2] **S. Guggilam** and D. De, "Modeling indoor pattern of life for secure environments for real-time monitoring", *(Under Preparation)*, 2024.

[3] **S. Guggilam**, H. Tubbs, and A. Anyamba, "Predicting ideal climate conditions for rift-valley fever outbreaks in africa for biopreparedness", *AGU24 Annual Meeting (Under Review)*, 2024.

[4] M. Mohan, K. Jetti, **S. Guggilam**, M. Smith, M. Kidder, and J. C. Smith, "High-throughput screening and accurate prediction of ionic liquids viscosity using the interpretable machine learning", *ACS Sustainable Chemistry & Engineering*, 2024.

[5] M. Mood and **S. Guggilam**, "Natural language processing for the prediction of molecular properties of organic compounds", *Nature (Under Preparation)*, 2024.

[6] R. Singh and **S. Guggilam**, "Iterative misclassification error training (imet): An optimized neural network training technique for medical image classification", *Association for the Advancement of Artificial Intelligence (AAAI) (Under Preparation)*, 2024.

[7] P. Dias, A. Potnis, **S. Guggilam**, L. Yang, A. Tsaris, H. Medeiros, and D. Lunga, "An agenda for multimodal foundation models for earth observation", in *IGARSS 2023-2023 IEEE International Geoscience and Remote Sensing Symposium*, IEEE, 2023, pp. 1237–1240.

[8] **S. Guggilam**, V. Chandola, and A. K. Patra, "Large deviations anomaly detection (lad) for collection of multivariate time series data: Applications to covid-19 data", *Journal of Computational Science*, vol. 72, p. 102 101, 2023.

[9] B. Smith, V. Lonjou, R. Berkheimer, M. Cole, and **S. Guggilam**, "Earth system digital twins: Prototypes and federations i oral", in *AGU23*, AGU, 2023.

[10] V. Tombs, J. Wohlgemuth, A. K. Patra, D. Lu, and **S. Guggilam**, "Ai/ml assurance: Applications in geospatial sciences", in *AGU23*, AGU, 2023.

[11] S. Gaikwad, S. Iyer, D. Lunga, T. Yabe, X. Liang, B. Ananthabhotla, N. Behari, **S. Guggilam**, and G. Chi, "Data-driven humanitarian mapping and policymaking: Toward planetary-scale resilience, equity, and sustainability", in *Proceedings of the 28th ACM SIGKDD Conference on Knowledge Discovery and Data Mining*, 2022, pp. 4872–4873.

[12] **S. Guggilam**, "Non-parametric probabilistic anomaly detection in evolving data: Applications to time series", Ph.D. dissertation, State University of New York at Buffalo, 2022.

[13] **S. Guggilam**, V. Chandola, and A. Patra, "Tracking clusters and anomalies in evolving data streams", *Statistical Analysis and Data Mining: The ASA Data Science Journal*, vol. 15, no. 2, pp. 156–178, 2022.

[14] **S. Guggilam**, V. Chandola, and A. K. Patra, "Classifying anomalous members in a collection of multivariate time series data using large deviations principle: An application to covid-19 data", in *International Conference on Computational Science*, Springer, 2022, pp. 133–149.

[15] A. K. Patra and **S. Guggilam**, "Uncertainty, error and anomalies in ml models of remote sensing data", in *AGU Fall Meeting Abstracts*, vol. 2022, 2022, IN33A–06.

[16] **S. Guggilam**, V. Chandola, and A. Patra, "Anomaly detection for high-dimensional data using large deviations principle (preprint)", 2021.

[17] **S. Guggilam**, S. Zaidi, V. Chandola, and A. Patra, "Bayesian anomaly detection using extreme value theory", *arXiv preprint arXiv:1905.12150*, 2019.

[18] **S. Guggilam**, S. M. A. Zaidi, V. Chandola, and A. K. Patra, "Integrated clustering and anomaly detection (incad) for streaming data", in *Computational Science–ICCS 2019: 19th International Conference, Faro, Portugal, June 12–14, 2019, Proceedings, Part IV 19*, Springer, 2019, pp. 45–59.

[19] **S. Guggilam**, *Statistical Assessment of TCGA Ovarian Cancer Sequencing Dataset for Prognostic Utility*. State University of New York at Buffalo, 2015.

Teaching

- *DASC-5390* - Artificial Intelligence and Deep Learning — Spring 2025
  Texas A&M Corpus Christi
  Lecturer
- *EAS 501* - Introduction to Numerical Mathematics for Computing and Data Science — Fall 2017, Fall 2018
  University at Buffalo
  Teaching Assistant and Recitation
- *EAS 502* - Introduction to Probability Theory for Data Science — Fall 2017, Fall 2018
  University at Buffalo
  Teaching Assistant and Recitation
- *EAS 503* - Programming and Database Fundamentals for Data Scientists — Fall 2017, Fall 2018
  University at Buffalo
  Teaching Assistant and Recitation
- *EAS 504* - Applications of Data Science: Industry Overview — Summer 2017, Summer 2018
  University at Buffalo
  Teaching Assistant and Recitation
- *EAS 508* - Statistical Learning and Data Mining I — Fall 2017, Fall 2018
  University at Buffalo
  Teaching Assistant and Recitation

Talks & Presentations

- Anomaly Detection in Spatio-temporal Data, Oak Ridge National Laboratory Early Career Development Program — 2023
- Quantum Variational Inference for Spatiotemporal Anomaly Detection, Oak Ridge Scientific Advisory Board — 2023
- Quantum computing for spatiotemporal analysis, National Security Sciences Week — 2023
- Large Deviations for Accelerating Neural Networks Training, Conference on Data Analysis (CoDA 2023), Santa Fe, NM — 2023
- Uncertainty, error and anomalies in ml models of remote sensing data, AGU Fall Meeting 2022 — 2022

- Classifying anomalous members in a collection of multivariate time series data using large deviations principle: An application to covid-19 data, International Conference on Computational Science (ICCS) 2022
- Classifying Collection of Multivariate Time Series Data: An Application to COVID-19 Data, American Statistical Association UP-STAT Conference Buffalo NY 2022
- Identifying anomalous COVID-19 trends and impact of policies using large deviations on time series databases, STEM for Everyone: Women in STEM Cooperative (WiSC) 2021
- Integrated clustering and anomaly detection (INCAD) for streaming data, International Conference on Computational Science (ICCS) 2019
- Integrating clustering and anomaly detection, CDSE Days, Institute of Computational Data Science, SUNY Buffalo, NY. 2019
- National Program on Differential Equations (NPDE) Workshop in IIT Madras 2013

Awards and Scholarships

- Top Downloaded Author in Wiley Journal of Statistical Analysis and Data Mining 2023
- Oak Ridge National Lab Early Career LDRD Competition Winner 2023
- Runner up: STEM for Everyone: Women in STEM Cooperative (WiSC) 2021
- Travel Support: UB Navigate Project for women in STEM 2018
- Travel Support: SAMSI for the workshop on Model Uncertainty: Mathematical and Statistical (MUMS) 2018
- Travel Support: SAMSI for the workshop on Precision Medicine (PMED) 2018
- Honors degree in Mathematics from Indian Statistical Institute 2014
- Full student scholarship (merit-based) throughout the completion of the degree at Indian Statistical Institute 2011–2014

Organising Committees

- AGU 2023 Fall Meeting Session on IN021-I. Earth System Digital Twins: Prototypes and Federations 2023
- AGU 2022 Fall Meeting Session on AI/ML Assurance: Applications in Geospatial Science 2022
- KDD Workshop on Data-driven Humanitarian Mapping 2022
- CDSE Days, Institute of Computational Data Science, SUNY Buffalo 2019
- CDSE Days, Institute of Computational Data Science, SUNY Buffalo 2018

Referee Service

- Data Mining and Knowledge Discovery, Information Systems, Journal of Computational Science, Journal of Hydrology, IEEE Geoscience and Remote Sensing Letters, Frontiers in Earth, Information Sciences, Neural Networks

Panel Judge

- Judge for SCUDEM VII 2022 - Modeling with Differential Equations
- Albert Einstein Distinguished Educator Fellowship (AEF) Program 2022
- Judge for the IGNITE Talks 2023
- Judge for SCUDEM VII 2023 - Modeling with Differential Equations

Mentorship

- **PhD Advisees**
  - Nene Coulibaly (Texas A&M University, Corpus Christi) 2024-Present
- **Masters Advisees**
  - Carlos Montes (University of Texas, Rio Grande Valley) 2024-Present
  - Yejin Hwang (Texas A&M Corpus Christi) 2024-Present

– Nikitha Gugulothu (First Appointment: Oak Ridge National Laboratory) 2022-2023

- **Undergrad Advisees**
  - Tri Do (Frist appointment: Ph.D at Oden Institute for Computational Engg. & Sci., University of Texas, Austin) 2023
  - Mikolaj Jakowski (University of Tennessee, Knoxville) 2023
- **High School Advisees**
  - Ruhaan Singh (Farragut High School) 2022-2024

Memberships and Outreach Activities

- Committee member at ORNL Diversity Equity and Inclusion GSHS division committee, Mentor at ORNL early-career development program, Member at Delta Omega Honorary Society in Public Health, Member at IEEE, Member at ACM , Member at AGU, Member at SIAM, Student Member at Association for Women in Mathematics (AWM), Student Member at Women in STEM Cooperative (WiSC), SMIODE

Education

University at Buffalo, The State University of New York Buffalo, NY
Ph.D. in Computational Data Science (CDSE) Aug 2017 - Feb 2022

University at Buffalo, The State University of New York Buffalo, NY
Masters in Civil Engineering (Transportation Statistics) Aug 2016 - Sept 2017

University at Buffalo and Roswell Park Cancer Institute (RPCI) Buffalo, NY
Masters in Biostatistics-Bioinformatics Aug 2014 - Sept 2015

Indian Statistical Institute (ISI) Bangalore, India
Bachelors in Mathematics (B.Math), Honors Jul 2011 - May 2014