

## EDUCATION

### **Ph.D. in Electrical and Computer Engineering**

[May 2021]

Department of Electrical and Computer Engineering (ECE)  
Kansas State University (K-State), Manhattan, KS

- Thesis: "Computational models and tools for analysis, prediction, and control of infectious diseases"
- Supervisor: Dr. Caterina Scoglio, ECE, K-State

### **B.Sc. in Electrical and Electronic Engineering**

[Feb 2013]

Department of Electrical and Electronic Engineering (EEE)  
Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh

- Thesis: "Design of a honeycomb all solid photonic bandgap fiber for a wide visible region"
- Supervisor: Dr. Md. Shah Alam, EEE, BUET

## INTERESTS

Machine Learning / AI, High Performance Computing, Network Science, Software Systems

## EXPERIENCES

### **Postdoctoral Research Associate at University of Virginia (UVA)**

[Aug 2021 – Current]

- Developed an explainable AI (XAI) framework for geospatial data using Shapley analysis in combination with supervised (random forest) and unsupervised (k-means clustering) learning. The framework was used to evaluate the impact of climate change on water availability and crop yield in the Western United States.
- Designed and deployed a high performance computing pipeline for automated preprocessing, batch job submission, monitoring, and postprocessing of VIC-CropSyst simulation in UVA's Rivanna HPC clusters.
- Mentored an undergraduate student to model financial contagions using the Eisenberg-Noe framework to evaluate the impact of bailout strategies in reducing cascading failures in bank networks.
- Mentored a graduate student to develop an Asymmetric Nash Bargaining framework to model the negotiations among California, Arizona, and Nevada to curtail the usage of Colorado River's water.
- Developed an integer linear programming (ILP) optimizer using Gurobi for matching buyers and sellers in bipartite networks representing river water rights markets.
- Developed graph analytics tools capable of large-scale ( $\sim 10^6$  nodes/edges) computations in a software as a service (SaaS) architecture using high performance computing (HPC).

### **Graduate Research/Teaching Assistant at Kansas State University (K-State)**

[Aug 2016 – May 2021]

- Developed a feature selection framework to improve the performance of recurrent neural networks (Long Short-Term Memory and Gated Recurrent Units) by about 33% in predicting weekly dengue fever cases.
- Designed and developed a web-based data analytics and epidemic forecasting dashboard to perform on-demand computations, visualize raster/vector datasets on interactive maps, and plot time series data.
- Developed network-based epidemic-spreading models for Zika and African swine fever viruses to study the impacts of pathogen behavior, host movements, and disease control measures.
- Conceptualized and developed a blockchain-based distributed data management framework for the US beef cattle industry using Ethereum smart contracts.
- Designed and developed models for network generation from aggregate and incomplete data. The graphs were used to simulate virus-spreading processes.
- Designed and co-taught the course 'Introduction to Blockchains' as a part of the graduate course curriculum.

### **Senior Software Engineer at Samsung R&D Institute Bangladesh (SRBD)**

[Apr 2013 – Jul 2016]

- Led and managed a team of 5 to provide software quality assurance (SQA) for IoT applications in an Agile workflow. Deliverables included source code analysis, review, and unit/integration/compliance tests.
- Developed an IoTivity-compliant client by expanding a Constrained Application Protocol (CoAP) framework to test protocol compliance of the IoTivity framework.
- Implemented and maintained a TURN-based NAT traversal solution to establish peer to peer connections using relay servers to connect hosts to enable remote access and control of devices.
- Developed test frameworks for unit and integration testing of Tizen mobile OS APIs.

- Conducted workshops on embedded systems as a teaching assistant. Prepared teaching materials on FPGA, Verilog, and Microcontrollers.

### TECHNICAL SKILLS

Languages	C++/C, Python, R, Java, MATLAB, SQL, JavaScript
Parallel Computing	SLURM, Rapids cuGraph, Dask
Environments	AWS, Unix, Node.js, Arduino
Libraries	Pandas, Numpy, TensorFlow, PyTorch, scikit-learn, PostGIS, Leaflet.js
Tools	Conda, Jupyter, Git, Overleaf, Visual Studio, GNU Make, Bash Shell, Jira

### ACADEMIC EXPERIENCE

Relevant Courses	Machine Learning and Pattern Recognition, Network Theory, Mathematics of Data and Networks, Analysis of Algorithms, Agent-Based Game Theory, Multivariate Statistical Methods
Teaching Responsibilities	Introduction to Blockchain (Co-Taught), Applied Scientific Computing, Introduction to Computer Engineering, Linear Systems

### RESEARCH PUBLICATIONS

Google Scholar Profile: <https://scholar.google.com/citations?user=tEofsW0AAAAJ>

- **Ferdousi, Tanvir**, Liu Mingliang, Kirti Rajagopalan, Jennifer Adam, Abhijin Adiga, Mandy Wilson, S. S. Ravi, Anil Vullikanti, Madhav V. Marathe, and Samarth Swarup. 2023. "A Machine Learning Framework to Explain Complex Geospatial Simulations: A Climate Change Case Study." *In 2023 Winter Simulation Conference (WSC)*, IEEE, 2023. [\[Paper\]](#)
- Adiga, Abhijin, Yohai Trabelsi, S. S. Ravi, Samarth Swarup, Anil Vullikanti, Mandy Wilson, **Tanvir Ferdousi**, et al., "Value-based Resource Matching with Fairness Criteria: Application to Agricultural Water Trading." *In 2024 International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)* [\[Paper\]](#).
- Moon, Sifat A., Rituparna Datta, **Tanvir Ferdousi**, Hannah Baek, Abhijin Adiga, Achla Marathe, and Anil Vullikanti. "A Graph Based Deep Learning Framework for Predicting Spatio-Temporal Vaccine Hesitancy." *Preprint*, 2023. [\[Paper\]](#)
- Yi, Chunlin, Aram Vajdi, **Tanvir Ferdousi**, Lee W. Cohnstaedt, and Caterina Scoglio. "PICTUREE—Aedes: A Web Application for Dengue Data Visualization and Case Prediction." *Pathogens* 12, no. 6 (2023): 771. [\[Paper\]](#)
- Li, Harry and **Tanvir Ferdousi**. "Evaluating the Impact of Bailout Strategies on Financial Networks." *In Computing for Global Challenges (C4GC) Symposium*, Biocomplexity Institute and Initiative, University of Virginia, 2023. [\[Poster\]](#)
- **Ferdousi, Tanvir**, Aparna Kishore, Lucas Machi, Dustin Machi, Chris J. Kuhlman, and S. S. Ravi. "A Web-Based System for Contagion Simulations on Networked Populations." *In 2022 IEEE 18th International Conference on e-Science (e-Science)*, pp. 306-315. IEEE, 2022. [\[Paper\]](#)
- **Ferdousi, Tanvir**, Lee W. Cohnstaedt, and Caterina M. Scoglio. "A windowed correlation-based feature selection method to improve time series prediction of dengue fever cases." *IEEE Access* 9 (2021): 141210-141222. [\[Paper\]](#)
- **Ferdousi, Tanvir**. "Computational models and tools for analysis, prediction, and control of infectious diseases." *PhD Dissertation* (2021), Kansas State University. [\[Dissertation\]](#)
- **Ferdousi, Tanvir**, Don Gruenbacher, and Caterina M. Scoglio. "A Permissioned Distributed Ledger for the US Beef Cattle Supply Chain." *IEEE Access* 8 (2020): 154833-154847. [\[Paper\]](#)
- **Ferdousi, Tanvir**, Sifat Afroj Moon, Adrian Self, and Caterina M. Scoglio. "Generation of swine movement network and analysis of efficient mitigation strategies for African swine fever virus." *PLOS ONE* 14, no. 12 (2019): e0225785. [\[Paper\]](#), [Code](#)
- **Ferdousi, Tanvir**, Lee W. Cohnstaedt, D. Scott McVey, and Caterina M. Scoglio. "Understanding the survival of Zika virus in a vector interconnected sexual contact network." *Scientific Reports* 9, no. 1 (2019): 7253. [\[Paper\]](#), [Code](#)
- Moon, Sifat A., **Tanvir Ferdousi**, Adrian Self, and Caterina M. Scoglio. "Estimation of swine movement network at farm level in the US from the Census of Agriculture data." *Scientific Reports* 9, no. 1 (2019): 6237.
- Shahtori, Narges Montazeri, **Tanvir Ferdousi**, Caterina M. Scoglio, and Faryad Darabi Sahneh. "Quantifying the impact of early-stage contact tracing on controlling Ebola diffusion." *Mathematical Biosciences & Engineering* 15, no. 5 (2018): 1165-1180.

### **VOLUNTARY CONTRIBUTIONS**

- Served as a reviewer for the following journals: IEEE Transactions on Network Science and Engineering, IEEE Access, IEEE Networking Letters, Elsevier Preventive Veterinary Medicine, PLOS One, and PeerJ.
- Served as a Program Committee Member for the 2023 Winter Simulation Conference (WSC) and the 2022 IEEE/ACM Conference on Advances in Social Network Analysis and Mining (ASONAM).
- Served as a mentor for the Virginia Junior Academy of Science (VJAS).

### **AWARDS & HONORS**

- “Advanced Level” in the Software Certification Test at Samsung (2016).
- “Grade 1” in annual performance evaluation at Samsung (2014).
- 1<sup>st</sup> place in the Solution Lab of Samsung R&D Institute Bangladesh in the Software Capability Test (2013).
- Dean’s List Award from Bangladesh University of Engineering and Technology (2010).
- Merit scholarships for being ranked 1<sup>st</sup> out of 84 enrolled students in the Cisco Networking Academy Program (CNAP) at BUET (2010-2011) in the CCNA Exploration 4.0 course.
- Government scholarships for excellence in Primary (1999), Secondary (2005), and Higher Secondary (2007) school exams.

### **COMMUNITY ACTIVITIES**

- An alumnus of the Leadership Development Program at the Staley School of Leadership Studies, K-State.
- Served as the President of Bangladeshi Students’ Association (2019) at K-State.
- Served as a volunteer of the American Red Cross Club (ARCC) at K-State.