Sefat E Rahman

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Summary of Qualification

• Research experience in the field of **Interactive Data Visualization**, **Topological Data Analysis**, **Uncertainity Visualization**, **Machine Learning**.
• Teaching experience of Computer Science courses: Lecturer/Instructor (Undergrad) + TA (Graduate and Undergrad)
• Led supervision of undergraduate theses and capstone projects and advised students on course selection to enhance academic progression.

Education

The University of Utah — Salt Lake City, UT
Doctor of Philosophy, Computer Science and Engineering — *Jan. 2023 – Dec 2026 exp.*

University of South Florida — Tampa, FL
Master's of Science, Computer Science and Engineering — *Jan. 2021 – Dec. 2022*

Khulna University of Engineering & Technology — Khulna, Bangladesh
Bachelor of Science, Computer Science and Engineering — *Dec. 2013 – Feb. 2018*

Experience

Graduate Research Assistant — Jan 2023 – Present
The University of Utah — *Salt Lake City, UT*

- Developing methods for visualizing **scientific data** and **data uncertainty** using Topological Data Analysis (TDA) tool such as **Reeb graph**.
- Studying methods for preserving and comparing data properties during transformations using TDA tools, such as **Persistent Homology**, in relation to statistical property preservation.

Graduate Teaching Assistant
The University of Utah — *Aug - Dec 2023, Aug - Dec 2025*

- Supported the **Visualization for Data Science** course through grading and student assistance.
- Delivered a guest lecture on **Text Visualization** for graduate and undergraduate students.

University of South Florida — *Jan 2021 – Dec 2022*

- Led laboratory sessions for **Computer Architecture Lab** and **Computer Design Lab**.
- Assisted in grading and course management for **Computer Design**, **System Integration and Architecture for IT**, **Cloud Computing**, and **Programming Concepts** courses.

Lecturer — Jul. 2018 – Dec 2020
Eastern University — *Dhaka, Bangladesh*

- Served as the primary instructor for undergraduate courses, including **Database Management Systems (DBMS)**, **Compiler Design**, **Theory of Computation**, and **Machine Learning**.
- Supervised undergraduate thesis and capstone projects, providing academic and technical guidance.
- Advised students on course selection and academic program planning.

Peer Reviewed Publication and Poster

Sefat E Rahman, Tushar Athawale, Paul Rosen, "GASP: A Gradient-Aware Shortest Path Algorithm for Boundary-Confined Visualization of 2-Manifold Reeb Graphs", 2025, Topological Data Analysis and Visualization.

Sefat E Rahman, Tushar Athawale, Paul Rosen, "GASP: A Gradient-Aware Shortest Path Algorithm for Boundary-Confined Visualization of 3D Reeb Graphs", 2024, IEEE VIS Poster Proceedings.

Sefat E Rahman, Shofi Ullah, "Email Spam Detection using Bidirectional Long Short Term Memory with Convolutional Neural Network", 2020, IEEE Region 10 Symposium (TENSYMP).

Research Projects

GASP: Gradient-Aware Shortest-Path for Reeb Graph Visualization Jan. 2023 – Jun. 2025

- Developed an algorithm that ensures faithful Reeb graph visualization, improving accuracy in applications such as **medical imaging**, **scientific simulation**, and **shape analysis**.
- Benchmarked against standard methods (TTK), released as open-source, and published at **TopoInVis 2025**.

Topology-Preserving Data Transformation and Visualization May. 2023 – Present

- Developing TDA-based methods (**Persistent Homology**, **Persistence Diagrams**, **Bottleneck**, and **Wasserstein** distances) for dataset transformation, visualization, and privacy preservation.
- Contributing novel approaches to ensure smooth transitions, scalable visualizations, and privacy-conscious analysis with preserved data fidelity.

Uncertainty-Aware Visualization of Reeb Graphs Jan. 2025 – Present

- Developing methods to visualize uncertain Reeb graphs from noisy scalar fields using Reeb graph visualization and edge bundling techniques.
- Contributing approaches to reduce visual clutter and improve the interpretability of topological structures under uncertainty.

Technical Skills

Languages: Python, C/C++, JavaScript, Node.js, SQL, HTML/CSS
Developer Tools: Git, VS Code, QEMU
Machine Learning and Data Analysis Tools: Scikit-learn, Tensorflow, MATLAB, D3.js

Awards

- Dean's award 2015-16 and 2016-17 session. (KUET, Khulna)
- Intra-University Programming contest (Position-5th) (KUET, Khulna)