Kazi Shahrukh Omar

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EDUCATION

University of Illinois Chicago (UIC) — ***Chicago, IL***
Doctor of Philosophy, Computer Science, GPA(Current): 4.00/4.00 — *Aug 2021 - May 2026 (Expected)*
Advised by Prof. Fabio Miranda

Military Institute of Science and Technology (MIST) — ***Dhaka, Bangladesh***
Bachelor of Science, Computer Science and Engineering (CSE), GPA: 3.71/4.00 — *Feb 2015 - Aug 2019*

WORK EXPERIENCE

Electronic Visualization Laboratory (EVL), University of Illinois Chicago (UIC) — ***Chicago, IL***
Research Assistant (Advisor: Prof. Fabio Miranda) — *Aug 2021 - Present*

- Research on visualization & visual analytics, big data analysis, and applied machine learning.
- Developing visual analytics systems for urban and healthcare domains.
- Client requirement gathering, prototyping and design, development, evaluation.

Department of Computer Science, University of Illinois Chicago (UIC) — ***Chicago, IL***
Teaching Assistant — *Jan 2022 - Present*

- CS 422: User Interface Design and Programming [Instructor: Prof. Andruid Kerne].
- CS 424: Visualization and Visual Analytics [Instructor: Prof. Fabio Miranda].
- CS 425: Computer Graphics [Instructor: Prof. Fabio Miranda].

Department of Computer Science, Uttara University — ***Dhaka, Bangladesh***
Lecturer — *Jul 2019 – Jun 2021*

- Courses Taught: Discrete Mathematics - Computer Peripheral, Interfacing and Maintenance - Digital Logic Design - Computer Graphics - Object Oriented Programming - Design and Analysis of Algorithms - Data Structures

Solution Arts Ltd — ***Dhaka, Bangladesh***
Software Development Intern — *Nov 2017 - Dec 2017*

- Designed database schema for a hotel management system.
- Frontend development of the system.

TECHNICAL SKILLS

- **Programming Languages**: Python, C/C++, JavaScript, TypeScript, Java, R, MATLAB, Shell Scripting, Cython.
- **Web:** React, Angular, Flask, HTML, CSS, Bootstrap.
- **Mobile App Development:** React Native, Android Studio.
- **Data Visualization:** d3.js, three.js, Vega-lite, WebGL, Matplotlib, Seaborn, Plotly, Shiny.
- **Data Processing:** NumPy, Pandas, Dask, SciPy.
- **Geodata Processing:** Geopandas, Osmium, Overpass, PlotOptiX, Pyrosm, Shapely, Spatialpandas, Rasterio.
- **Machine Learning:** scikit-learn, TensorFlow, Keras, PyTorch, nltk.
- **Other Skills:** Version control - Git, Latex/Overleaf.

PUBLICATIONS

K.S. Omar, S. Wang, R. Kungumaraju, T. Bhatt and F. Miranda, “VIGMA: The Visual Gait and Motion Analytics Framework”, *IEEE Transactions on Visualization and Computer Graphics,* 2024. [**Under Review**]

S. Wang, **K.S. Omar,** F. Miranda and T. Bhatt, “Automatic gait event detection in older adults during perturbed walking”, *Journal of NeuroEngineering and Rehabilitation,* 2024. [**Under Review**]

K.S. Omar, G. Moreira, D. Hodczak, M. Hosseini, M. Lage and F. Miranda, “Deep Umbra: A Global-Scale Conditional Generative Adversarial Approach for Sunlight Access and Shadow Accumulation in Urban Spaces”, *IEEE Transactions on Big Data*, 2024. [pdf]

K.S. Omar, G Moreira, D Hodczak, M Hosseini and F Miranda, “Crowdsourcing and Sidewalk Data: A Preliminary Study on the Trustworthiness of OpenStreetMap Data in the US”, *ASSETS’22 UrbanAccess Workshop,* 2024. [pdf]

K.S. Omar, M.N. Islam, and N.S. Khan, “Exploring Tree-Based Machine Learning Methods to Predict Autism Spectrum Disorder”, *Neural Engineering Techniques for Autism Spectrum Disorder, vol (1), pp 165–183. Academic Press*, 2021.

K.S. Omar, A. Anjum, T. Oannahary, R.K. Rizvi, D. Shahrin, T.T. Anannya, S.N. Tumpa, M.M. Karim, M.N. Islam and F. Rabbi, “An Intelligent Assistive Tool for Alzheimer’s Patient”, *The 1st International Conference on Advances in Science, Engineering and Robotics Technology (ICASERT)*, 2019. [pdf]

K.S. Omar, P. Mondal, N.S. Khan, M.R.K. Rizvi, M.N. Islam, “A machine learning approach to predict autism spectrum disorder”, *International Conference on Electrical, Computer and Communication Engineering (ECCE)*, 2019. [pdf]

PROJECTS

Decision Support Tools for Sustainable Urban Planning & Public Health *Aug 2024 - Present*
Graduate Research Project, UIC
- Developing a visualization tool for urban planning, transportation, and public health.
- Designing a flexible framework adaptable to diverse scenarios.

Visual Gait and Motion Analysis *Jan 2023 - Jul 2024*
Graduate Research Project, UIC
- Developed VIGMA, an open-access visual analytics system for gait and motion analysis.
- Validated analytical tool through usage scenarios performed with experts.

Bi-GRU Model for Automatic Gait Event Detection *Jul 2023 - Jun 2024*
Graduate Research Project, UIC
- Developed a Bi-GRU model for automatic gait event detection using marker, angle, and GRF data.
- Illustrated kinematic methods are more effective than traditional GRF based methods.

Navigating Large Dining Hall Spaces Considering Dietary Restrictions *Aug 2023 - Dec 2023*
HCI Class Group Project, UIC
- Built a React Native app for students with dietary restrictions at UIC.
- Received positive feedback from user testing and developed further improvements.

Generative Model for Global Sunlight Access and Shadows *May 2022 - Aug 2023*
Graduate Research Project, UIC
- Developed Deep Umbra, a generative adversarial network to quantify shadows.
- A method 6x faster compared to the state-of-the-art shadow computation techniques.
- A dataset for 100+ cities, showing the model's low RMSE across urban contexts.

Trustworthiness of OpenStreetMap (OSM) Sidewalk Data in US *Jul 2022 - Sep 2022*
Graduate Research Project, UIC
- Conducted a preliminary study on the availability and trustworthiness of sidewalk data in US cities.
- Developed a trustworthiness index using historical OSM data.

COVID-19 Impact Analysis in Chicago Neighborhoods *Jan 2022 - May 2022*
Data Science Class Group Project, UIC
- Modeled COVID-19 impact in Chicago neighborhoods using socioeconomic data.
- Built a Random Forest model predicting COVID-19 death rates.
- Training error rate of 0.29 and a test error rate of 0.78 deaths per thousand people.

Chicago Taxi Ridership Visualization Tool *Jan 2022 - May 2022*
Visual Analytics Class Group Project, UIC
- Developed a tool to visualize 2019 Chicago taxi ridership trends.
- Optimized for large screens at UIC's EVL lab.
- Filtering options by area, taxi company, and time, revealing ridership patterns.

Mobility-Flow Query Approximation using NeuralCubes *Aug 2021 - Dec 2021*
Graduate Research Project, UIC

- Developed in-memory model to accurately approximate mobility-flow queries.
- Achieved under 2% error in approximation with a minimal memory footprint of 114 KB.

Autism Spectrum Disorder Prediction Model and Mobile Application *Mar 2018 - Feb 2019*

Bachelor's Thesis, MIST

- Developed a novel random forest model to classify autism traits across all ages.
- Achieved 92%+ accuracy with the AQ-10 dataset and developed a mobile app.
- Evaluated the model on both AQ-10 and real-world datasets.

IoT-based Assistive Tool for Alzheimer's Patients *Feb 2018 - July 2018*

Bachelor's Research Project, MIST

- Proposed an assistive tool and mobile app for Alzheimer's patients and caregivers.
- Supports health monitoring, medication reminders, item tracking, and location monitoring.
- Conducted a study with 15 participants, showing the system's effectiveness and usability.

TALKS & PRESENTATIONS

- **Crowdsourcing and Sidewalk Data: A Preliminary Study on the Trustworthiness of OpenStreetMap Data in the US,** *Sep 2022*
  Paper presented at ASSETS'22 Workshop on The Future of Urban Accessibility.
- **Visual Analytics Approaches for Facilitating Explainability of Graph Neural Network,** *Feb 2023*
  Ph.D. Qualifier Exam.

SERVICES

- Paper reviewer for PacificVs 2024, EuroVis 2023-2024, IEEE VIS 2022-2024. *2022, 2023, 2024*
- Volunteer for CAVE3 demos hosted by EVL, UIC. *2023, 2024*
- Vice President of Media of Bangladeshi Student Association at UIC. *2022 - 2023*
- IEEE VIS Satellite Event volunteer. Held at EVL, UIC. *2021*
- Class Representative, Department of CSE at MIST. *2018*

HONORS AND AWARDS

- Merit Scholarship for academic performance, Military Institute of Science and Technology *2018*
- Dean's List (two consecutive years), Military Institute of Science and Technology *2016, 2017*