

# Sumon Biswas

*Assistant Professor at Case Western Reserve University*  
Department of Computer and Data Sciences, Case School of Engineering

10900 Euclid Ave, Cleveland, OH 44106

☎ +1 (515) 708-6166 • ✉ [sumon@case.edu](mailto:sumon@case.edu) • 🌐 [sumonbis.github.io](https://sumonbis.github.io)  
📱 [sumonbis](#) • 💻 [sumonb](#) • 🎓 [sumonbiswas](#)

Computer science researcher focusing in the intersection of Software Engineering (SE) and Artificial Intelligence (AI). By adopting both formal and empirical approaches, I design verification and analysis of intelligent software systems for their fairness, safety, and sustainability.

## Research Interest

---

Software Engineering	Verification, Design and Architecture, Empirical Software Engineering
Artificial Intelligence	Algorithmic Fairness, Auto ML, DNN Verification, ML Technical Debts
SE for AI	Causal Reasoning, Sustainable AI, Trustworthiness and Safety

## Academic Qualifications

---

<b>Postdoctoral Researcher</b> <i>Carnegie Mellon University</i> <b>Advisor:</b> Dr. Eunsuk Kang	<b>Pittsburgh, PA</b> 2022–2024
<b>Ph.D. in Computer Science</b> <i>Iowa State University</i> <b>Advisor:</b> Dr. Hridesh Rajan	<b>Ames, IA</b> 2016–2022
<b>M.S. in Computer Science</b> <i>Iowa State University</i>	<b>Ames, IA</b> 2016–2018
<b>B.S. in Information Technology</b> <i>Jahangirnagar University</i>	<b>Dhaka, Bangladesh</b> 2011–2015

## Employments

---

<b>Case Western Reserve University</b> <i>Assistant Professor (tenure-track) at Department of Computer and Data Sciences</i> 🏠 Case School of Engineering	<b>Cleveland, OH</b> Aug 2024 – p.
<b>Carnegie Mellon University</b> <i>Postdoc at School of Computer Science</i> 🏠 Software and Societal Systems Department (S3D)	<b>Pittsburgh, PA</b> May 2022 – Aug 2024
<b>Iowa State University</b> <i>Research Assistant, Laboratory of Software Design</i> 🏠	<b>Ames, IA</b> May 2018 – May 2022
<b>Iowa State University</b> <i>Teaching Assistant, Department of Computer Science</i> 🏠 <b>Courses taught:</b> • Software Development Practices • Advanced Programming Techniques in C & C++	<b>Ames, IA</b> August 2016 – May 2018

**Bangladesh University of Business and Technology** 🏠  
Lecturer, Department of Computer Science & Engineering

**Dhaka, Bangladesh**  
January 2016 – July 2016

## Publications

---

### Referred Conferences.....

- [1] Yining She, Sumon Biswas, Christian Kästner and Eunsuk Kang. FAIRSENSE: Long-Term Fairness Analysis of ML-Enabled System. In *Proceedings of the 47th IEEE/ACM International Conference on Software Engineering, ICSE 2025*. [Preprint]
- [2] David OBrien, Sumon Biswas, Sayem Mohammad Imtiaz, Rabe Abdalkareem, Emad Shihab and Hridesh Rajan. Are Prompt Engineering and TODO Comments Friends or Foes? An Evaluation on GitHub Copilot, In *Proceedings of the 46th IEEE/ACM International Conference on Software Engineering, ICSE 2024*, page 1–14, 2024. [DOI]
- [3] Sumon Biswas and Hridesh Rajan. Fairify: Fairness Verification of Neural Networks. In *Proceedings of the 45th IEEE/ACM International Conference on Software Engineering, ICSE 2023*, page 1546-1558, 2023. [DOI] [Artifact]
- [4] Usman Gohar, Sumon Biswas and Hridesh Rajan. Towards Understanding Fairness and its Composition in Ensemble Machine Learning. In *Proceedings of the 45th IEEE/ACM International Conference on Software Engineering, ICSE 2023*, page 1533-1545, 2023. [DOI] [Artifact]
- [5] Giang Nguyen, Sumon Biswas and Hridesh Rajan. Fix Fairness, Don't Ruin Accuracy: Performance Aware Fairness Repair using AutoML. In *Proceedings of the 31st ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering, ESEC/FSE 2023*, page 502–514, 2023. [DOI] [Artifact]
- [6] Sumon Biswas, Mohammad Wardat and Hridesh Rajan. The Art and Practice of Data Science Pipelines: A Comprehensive Study of Data Science Pipelines In Theory, In-The-Small, and In-The-Large. In *Proceedings of The 44th International Conference on Software Engineering, ICSE 2022*, page 2091-2103, 2022. [DOI] [Artifact]
- [7] David OBrien, Sumon Biswas, Sayem Mohammad Imtiaz, Rabe Abdalkareem, Emad Shihab and Hridesh Rajan. 23 Shades of Technical Debt: An Empirical Study on Machine Learning Software. In *Proceedings of the 30th ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering, ESEC/FSE 2022*, page 734-746, 2022. [DOI] [Artifact]
- [8] Sumon Biswas and Hridesh Rajan. Fair preprocessing: Towards understanding compositional fairness of data transformers in machine learning pipeline. In *Proceedings of the 29th ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering, ESEC/FSE 2021*, page 981–993, 2021. [DOI] [Artifact]
- [9] Sumon Biswas and Hridesh Rajan. Do the machine learning models on a crowd sourced platform exhibit bias? an empirical study on model fairness. In *Proceedings of the 28th ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering, ESEC/FSE 2020*, page 642–653, 2020. [DOI] [Artifact]

### Referred Workshops.....

- [10] Sumon Biswas, Yining She<sup>g</sup> and Eunsuk Kang. Towards Safe ML-based Systems in Presence of Feedback Loops. To appear in *Proceedings of the 1st International Workshop on Dependability and Trustworthiness of Safety-Critical Systems with Machine Learned Components, FSE–SE4SafeML* Position Paper, 2023.
- [11] Sumon Biswas, Md Johirul Islam, Yijia Huang, and Hridesh Rajan. Boa meets Python: A Boa dataset of data science software in Python language. In *2019 IEEE/ACM 16th International Conference on Mining Software Repositories, MSR 2019*, 2019. [DOI]

- [12] [Sumon Biswas](#), M. S. Kaiser, and S. A. Mamun. Applying ant colony optimization in software testing to generate prioritized optimal path and test data. In *2015 International Conference on Electrical Engineering and Information Communication Technology (ICEEICT)*, 2015. [[DOI](#)]
- [13] Manan Binth Taj Noor and [Sumon Biswas](#). A secure data security infrastructure for small organization in cloud computing. In *2015 International Conference on Electrical Engineering and Information Communication Technology (ICEEICT)*, 2015. [[DOI](#)]
- [14] [Sumon Biswas](#), Anisuzzaman, Tanjina Akhter, M. S. Kaiser, and S. A. Mamun. Cloud based healthcare application architecture and electronic medical record mining: An integrated approach to improve healthcare system. In *2014 17th International Conference on Computer and Information Technology (ICIT)*, 2014. [[DOI](#)]

## Honors & Awards

---

- **Distinguished Reviewer:** Selected as *Distinguished Reviewers* for the journal, ACM Transactions on Software Engineering and Methodology (TOSEM) [↗](#) 2022
- **Research Excellence Award:** Awarded by Iowa State University recognizing outstanding research 2022
- **ACM CAPS Award:** Awarded by ACM SIGSOFT to attend in-person ICSE 2023 conference held at Pittsburgh, PA 2022
- **Publication Award:** Awarded by Computer Science Department at Iowa State University for publication in the top-tier venues in consecutive years 2021
- **ACM CAPS Award:** Awarded by ACM SIGSOFT to attend ESEC/FSE conference 2021
- **Panelist at ESEC/FSE'20:** Selected as a panelist in the session on Fairness at ESEC/FSE 2020 [↗](#) 2020
- **PLMW Scholar in PLDI'19:** Awarded by Programming Language Mentoring Workshop (PLMW) at the PLDI conference at Phoenix, AZ 2019
- **Professional Advancement Grants:** Awarded by Graduate and Professional Student Senate at Iowa State University 2019
- **ACM Travel Grant:** Awarded to attend IMA Workshop organized by Institute for Mathematics & its Applications (IMA), University of Minnesota [↗](#) 2019

## Services

---

### Journal Reviewer.....

Publons Web of Science reviewer profile [↗](#)

- **TOSEM:** Serving in the *Board of Distinguished Reviewer* for ACM Transactions on Software Engineering and Methodology (TOSEM) [↗](#) 2021-p
- **TSE:** Serving as the reviewer for IEEE Transactions on Software Engineering (TSE) [↗](#) 2021-p
- **EMSE:** Serving as the reviewer for Springer Journal - Empirical Software Engineering (EMSE) [↗](#) 2022-p
- **IEEE Software:** Serving as the reviewer for IEEE Software. [↗](#) 2022-p

### Conference Program Committee (PC).....

- **FSE'26 - Technical Track:** Serving in the program committee of FSE 2026 Technical Track [↗](#) 2026
- **ICSE'25 - Technical Track:** Serving in the program committee of ICSE 2025 Technical Track [↗](#) 2025
- **ICSE'24 - Technical Track:** Served in the program committee of ICSE 2024 Technical Track [↗](#) 2024
- **ASE'24 - Technical Track:** Served in the program committee of ASE 2024 Technical Track [↗](#) 2024
- **ASE'23 - Technical Track:** Served in the program committee of ASE 2023 Technical Track [↗](#) 2023
- **ASE'23 - Industry Showcase:** Served in the Industry Showcase track of ASE 2023, Luxembourg [↗](#) 2023

- **ASE'22 - Industry Showcase:** Served in the Industry Showcase track of ASE 2022, Oakland, MI 2022  
[↗](#)
- **ASE'22 - LBR:** Served in the Late Breaking Results (LBR) track of ASE 2022, Oakland, MI [↗](#) 2022
- **ESEC/FSE'22 - DS:** Served in the Program Committee of Doctoral Symposium track of ESEC/FSE 2022, Singapore [↗](#) 2022
- **MSR'21 - Technical Track:** Shadow PC member of the Technical Track of International Conference on Mining Software Repositories (MSR'21) held at Madrid, Spain [↗](#) 2021
- **OOPSLA'21 - AEC:** PC Member of Artifact Evaluation Committee (AEC) at ACM SIGPLAN conference on Object-Oriented Programming, Systems, Languages & Applications (OOPSLA) held at Chicago, IL [↗](#) 2021

## Organizing Committee.....

- **WiDS Worldwide Conference Event:** Co-organized the daylong Women-in-Data-Science (WiDS) event at Iowa State University as part of the annual WiDS Worldwide Conference 2022
- **SPLASH'21 (Hybrid):** Served as the Accessibility Chair of the ACM SIGPLAN conference on Systems, Programming, Languages, and Applications (SPLASH 2021) with OOPSLA and REBASE [↗](#) 2021
- **Web Chair:** Served as the web chair of the Midwest Big Data Summer School, organized by Iowa State University, May 17-20, 2021 [↗](#) 2021
- **SPLASH'20 (Virtual):** Served as the Accessibility Chair of the ACM SIGPLAN conference on Systems, Programming, Languages, and Applications (SPLASH 2020) with OOPSLA, ECOOP and REBASE [↗](#) 2020

## Research Experience

---

### Research Grant Experience.....

#### NIH-National Institute of Nursing Research

Case Western Reserve University | 2024

*Health risk assessment for survivors of IPV*

Submitted the collaborative proposal with the researchers from School of Medicine on building data-driven solution for the risk assessment in intimate partner violence. I am ensuring algorithm fairness through the pipeline, starting from data collection, annotation, augmentation, and predictive modeling.

#### DARPA V-SPILLS

Carnegie Mellon University | 2024

*Verified Security and Performance Enhancement of Large Legacy Software* [↗](#)

Working in the synergetic DARPA project to design compositional DSLs and check the safety and liveness of Unmanned Aerial Vehicles (UAV). In particular, building model extraction technique from legacy source code and then verify the models for safe drone systems, e.g., Ardupilot, MAVSDK.

#### NSF EAGER

Carnegie Mellon University | 2023

*Towards a Design Methodology for Software-Driven Sustainability* [↗](#)

Through this grant, we propose a framework for sustainability as a *first-class software quality attribute*. I contributed to writing the proposal and currently building a simulation platform to generate sustainable design strategies for ML-enabled systems.

#### NSF TRIPODS

Iowa State University | 2019 – 2022

*D4: Dependable Data-Driven Discovery* [↗](#)

I actively contributed writing this grant proposal and thereafter it received the institute-level grant under HDR TRIPODS by NSF. I assisted my advisor (who is the PI of the grant), to launch the interdisciplinary data science hub at Iowa State under this institute.

#### NSF CNS – Boa

Iowa State University | 2021

*Enhancing Infrastructure for Studying Software and its Evolution at a Large Scale* [↗](#)

By enabling program analysis on machine learning programs and Jupyter notebooks, I contributed to this grant. Built the Python language support for Boa for large-scale software repository mining and analysis.

**Facebook Probability and Programming Award**

Iowa State University | 2020 – 2021

*Big code assisted neural architecture search* [↗](#)

Contributed to writing the grant proposal and thereafter my dissertation was partially supported by this industry grant. My work on compositional reasoning of ML pipeline (FSE'21) was funded by the grant.

**Research Mentoring**.....

- 2025 – p **Sharon Sharma (she/her)**  
High School (K-12) Intern at Case Western Reserve University
- 2024 – p **Panimalar Gobichettipalayam Annadurai (she/her)**  
Case Western Reserve University (M.S. student)
- 2024 – p **Towsif Raiyan (he/him)**  
Case Western Reserve University (M.S. student)
- 2022 – 2024 **Yining She (he/him)**  
Carnegie Mellon University (Ph.D. student)
- 2021 – 2023 **Giang Nguyen (he/him)**  
Iowa State University (Ph.D. student)
- 2020 – 2022 **David OBrien (he/him)**  
University of Northern Iowa (B.S.) → Iowa State University (Ph.D. student)
- 2020 – 2022 **Usman Goher (he/him)**  
Iowa State University (Ph.D. student)
- 2023 – p **Sayan Nath (he/him)**  
University of Calgary, M.S. (thesis) student
- 2023 – p **Sina Salimian (he/him)**  
University of Calgary, M.S. (thesis) student
- 2019 – 2020 **Senior Design Project Team**  
Department of Electrical and Computer Engineering, Iowa State University

**Research Highlights**.....

- 2025 **Small Research Goes Big: When Less Represented Topics Find Resonance across an Entire Field:** Presented my research journey for the paper–“The Art and Practice of Data Science Pipelines” on the podcast series of the world’s largest network for academic audio. [↗](#)
- 2022 **Data Science Pipeline:** My research on data science pipeline design was highlighted in the TADS group at Iowa State. [↗](#)
- 2021 **Fair ML:** My research identified the prevalence of unfairness in open-source machine learning models. [↗](#)
- 2020 **Dependability:** My association and contributions towards the NSF TRIPODS grant have been highlighted by the department. [↗](#)

**Teaching Experience**

---

**Instructor**.....**CSDS 600 - Special topics: Responsible AI Engineering***Graduate level, Case Western Reserve University**Fall 2024, Fall 2025*

Topics Fairness, robustness, safety and interpretability

**CSDS 393/493 - Software Engineering***Undergraduate/Graduate level, Case Western Reserve University**Spring 2025*

Topics SE process, requirements, software design, testing, verification and analysis

## Teaching Assistant.....

### COMS 327 - Advanced Programming Techniques

Class size: ~230

Undergraduate level, Required CS course, Iowa State University

Fall 2016, Spring 2017, Fall 2019

Topics Differences between managed (Java) and unmanaged languages (C/C++) • Design and build large programs from specification • Memory management in C and C++ • Templates and standard library • Concurrent and network programming

### COMS 309 - Software Development Practices

Class size: ~250

Undergraduate level, Required CS course, Iowa State University

Fall 2017, Spring 2018, Fall 2018

Topics Develop complex software in a team: from idea to release • Software development criteria: client-server architecture, relational database, multi-user setting, concurrent features e.g., online chat • Using SE tools, IDE, source-control e.g., Git • SE lifecycle

## Lecturer.....

### Guest Lecturer

Class size: ~40

Graduate level, Iowa State University

October 2023

Course Responsible AI: Risk Management in Data-Driven Discovery

Lecture title Assessing and Ensuring Fairness in ML Models

Topics covered Understanding societal bias and AI fairness • Fairness metrics and mitigation • Fairness verification • Sustaining fairness

### Primary Instructor

Class size: ~50

Bangladesh University of Business and Technology

January 2016 - July 2016

Responsibilities Lecture • Design courses • Create tests • Conduct programming lab sessions

Courses instructed  
 1. **Computer and Programming Concepts:** Instruct two sections: computer science major and non-computer science major  
 2. **Structured Programming Language:** Instruct theory and lab sessions  
 3. **Pattern Recognition:** Instructor for the seniors in computer science major

## Talks

1. **Kent State University:** Gave an invited talk “Engineering Responsible AI: From Fairness to Long-term Impact” at the Robotics and Autonomous Systems (AUTOBOT) PROGRAM at the College of Aeronautics and Engineering, Kent State University, 2025 Kent, OH
2. **Amazon:** Presented my research on “Fairness verification and debugging” at the Automated Reasoning Group in AWS, 2024 New York
3. **Oracle Labs:** Presented my research on “Mining and analysis of AI-Enabled Software Systems” in the Oracle Labs, 2024 Boston
4. **SE4SafeML Workshop:** Presented the position paper “Towards Safe ML-based Systems in Presence of Feedback Loops” in the workshop of ESEC/FSE 2023 San Francisco
5. **DARPA PI Meeting:** Presented “Software Architecture for Unmanned Aerial Vehicles (UAV): Automatic AADL Model Extraction and Reasoning” in the DARPA V-SPELLS PI Meeting, 2023 Virtual
6. **ICSE’23:** Presented the technical track paper entitled “Fairify: Fairness Verification of Neural Networks” at the 45th ACM/IEEE ICSE conference, 2023 Melbourne
7. **ICSE’23:** Presented the technical track paper entitled “Towards Understanding Fairness and its Composition in Ensemble ML” at the 45th ACM/IEEE ICSE conference, 2023 Melbourne

8. **Invited Talk:** Invited by Dr. Wallapak Tavanapong (Professor and Chair of Broadening Participation, Iowa State University) to present my research on “*Fairness Verification and Sustainability of AI Systems*”, 2023 Virtual
9. **ICSE’22:** Presented technical track paper entitled “The Art and Practice of Data Science Pipeline” at the 44th ACM/IEEE ICSE conference, 2022 Pittsburgh, PA
10. **Invited Talk:** Presented my research in the CREATE SE4AI group at NSERC, Canada; participated by students and researchers from Concordia University, Polytechnique Montreal, Queen’s University, and University of Alberta. Talk title: “Understanding and Reasoning Fairness of ML-Based Software” (February 2022) Virtual
11. **NSF PI Meeting:** Presented my work on “*Modular DNN Verification*” in the NSF TRIPODS PI meeting chaired by Dr. Lenore J. Cowen from Tufts University, December 2021 Virtual
12. **ESEC/FSE’21:** Presented technical track paper entitled “*Fair Preprocessing*” at the 29th ACM ESEC/FSE, 2021 Athens, Greece
13. **ESEC/FSE’20:** Presented technical track paper entitled “An empirical study on ML Model Fairness” at the 28th ACM ESEC/FSE, 2020 Sacramento, CA
14. **TADS Presentation:** Presented my research on “*Fairness of Machine Learning Models*” in front of Theoretical and Applied Data Science (TADS) Group of D4 Institute, Iowa State University, 2020 Ames, IA
15. **MSR’19 Presentation:** Data showcase and paper presentation entitled “*Boa meets python: A boa dataset of data science software in Python language*” in Mining Software Repository Conference (MSR), 2019 Montreal, Canada
16. **Panelist @ ESEC/FSE’20:** Selected as a panelist in the session on Fairness at ESEC/FSE 2020 Sacramento, CA

## Outreach Activities

---

- **Research Outreach:** Mentored Zihe Zhao (she/her), an undergraduate student from Rice University (later MS student at CMU), in the ICSE 2023 Student Mentoring Workshop (SMeW) on graduate study and research career trajectory. <https://conf.researchr.org/track/icse-2023/icse-2023-student-mentoring-workshop> 2023
- **SIGPLAN Blog:** Co-authored the ACM SIGPLAN blog to share the experience of organizing a premier conference in hybrid mode for the first time. <https://blog.sigplan.org/2022/08/25/hybrid-splash-2021-retrospective> 2022
- **Ambassador of Women-in-Data-Science:** Served as the Ambassador of Women in Data Science (WiDS) initiative organized by Stanford University. 2022
- **Lunch-n-Learn:** Organized the weekly interdisciplinary research discussion for the year at Iowa State Theoretical and Applied Data Science (TADS) group. 2020-21
- **K-12 Outreach:** Organized and served as the judge of the K-12 computational project competition at Iowa State University. 2018

## Affiliation

---

- **ACM:** Professional Member of Association for Computing Machinery (ACM) 2019-p
- **SIGSOFT & SIGPLAN:** Member of the ACM SIGSOFT and ACM SIGPLAN 2020-23
- **IEEE Computer Society:** Member of the IEEE Computer Society 2023