Shibbir Ahmed

Assistant Professor, Texas State University

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Research Interest

Software Engineering **Software Engineering (SE) for Artificial Intelligence (AI)**
Data Science SE for data-intensive systems, and data-driven SE
Other Broad Interests **SE for trustworthy, safe, & explainable AI**

Education

Ph.D. in Computer Science *Ames, IA*
Iowa State University *August 2017 - July 2024*
- **Advisor:** Dr. Hridesh Rajan
- **Dissertation:** Design by contract for deep learning APIs and models

M.S. in Computer Science *Ames, IA*
Iowa State University *August 2017 - July 2022*
- **Advisor:** Dr. Hridesh Rajan
- **Thesis:** Semantics and Anomaly Preserving Sampling Strategy for Large-Scale Time Series Data

B.Sc. in Computer Science and Engineering *Dhaka, Bangladesh*
Bangladesh University of Engineering and Technology *March 2009 - July 2014*
- **Advisor:** Dr. A.S.M. Latiful Hoque
- **Thesis:** Knowledge Discovery from Academic Data using Association Rule Mining

Professional Experience

Texas State University *San Marcos, TX*
Assistant Professor, Department of Computer Science *August 2024 - Present*
- **Courses:** CS 5393 Software Quality (Fall 2024, Fall 2025), CS 4398/5394 Advanced Software Engineering (Spring 2025, Spring 2026)
- **Responsibilities:** Teaching, conducting research, writing research articles for top-tier conferences, presenting research at conferences and workshops, collaborating with other researchers, mentoring students, writing research grants, service in the community

Iowa State University *Ames, IA*
Graduate Research Assistant, Laboratory for Software Design *June 2019 - July 2024*
- **Projects:** Data Precondition Inference, Deep Learning Contracts, Characterizing ML Contracts, Study Bugs in Data Analytics Programs, Intent-aware Data Reduction Strategies
- **Project funded by grants:** SHF:Small: More Modular Deep Learning (NSF Award: 22-23812) , CI-EN: Boa: Enhancing Infrastructure for Studying Software and its Evolution at a Large Scale (NSF Award: 15-13263, 21-20448), HDR TRIPODS: D4 (Dependable Data-Driven Discovery) Institute (NSF Award: CCF-1934884), Seed grant from US Census Bureau through Central Plains Federal Statistical Research Data Center (CPRDC: Subaward: 22-1222-0001-ISU3)
- **Responsibilities:** Conducting research, writing research articles for top-tier conferences, presenting research at conferences and workshops, collaborating with other researchers, mentoring junior lab members, contributing to writing research grants

Iowa State University *Ames, IA*
Graduate Teaching Assistant, Department of Computer Science *August 2017 - December 2022*
- **Courses:** *Graduate:* COM S 513: Foundations and Applications of Program Analysis (Class Size≈50), *Undergraduate:* COM S 342: Principles of Programming Languages (Class Size≈90), COM S 309: Software Development Practices (Class Size≈250), COM S 319: Software Construction & User Interfaces (Class Size ≈200)
- **Responsibilities:** Leading other TAs, project supervising and mentoring students, performing recitation classes, conducting office hours, proctoring exams, grading, preparing course contents, assignments, and technical contents

Primeasia University *Dhaka, Bangladesh*

Lecturer, Department of Computer Science and Engineering *June 2015 - July 2017*

- **Courses Instructed:** Object Oriented Programming, Structured Programming Language, Database System Design, Operating System, Introduction to Computer, Computer Application
- **Responsibilities:** Teaching classes as the primary instructor, conducting laboratory, project supervising and mentoring undergraduate students, proctoring exams, grading, and preparing course contents, assignments, projects

Primeasia University *Dhaka, Bangladesh*

Director, Research Lab, Department of Computer Science and Engineering *June 2015 - July 2017*

- **Focus:** Founded and directed Data Mining, Machine Learning & Information Retrieval Lab in the Computer Science & Engineering Department at Primeasia University, Dhaka, Bangladesh
- **Responsibilities:** Conducting research with junior faculty members, collaborating with senior faculty members, publishing articles in peer-reviewed international conferences, mentoring students, and supervising research projects

Independent University Bangladesh *Dhaka, Bangladesh*

Adjunct Faculty, Department of Computer Science and Engineering *January 2017 - April 2017*

- **Courses Instructed:** Data Communication and Computer Networking, Fundamental of Computer Systems
- **Responsibilities:** Teaching classes as the primary instructor, conducting laboratory, project supervising, proctoring exams, grading, and preparing course contents, assignments

Infosys Limited *Mysore, India*

Software Developer Intern *January 2015 - March 2015*

- **Responsibilities**: Completed the internship program on development and maintenance of Java-based applications in Infosys Global Education Center
- **Training:** Completed training on Programming and Database (OOP & RDBMS) and the business tier of an enterprise application development using POJO, persistence tier using JPA, presentation tier using JSP & JSF

Publications

Peer-Reviewed International Conference and Journal Papers

[1] Ragib Shahriar Ayon and **Shibbir Ahmed**, "AutoReSpec: A Framework for Generating Specification using Large Language Models," In Proceedings of the 3rd ACM International Conference on AI Foundation Models and Software Engineering (FORGE), co-located with ICSE 2026, April 2026, Rio de Janeiro, Brazil.

[2] Taythir G Martin, Rodion Podorozhny and **Shibbir Ahmed**, "Precise LLM-Based Semantic Slicing for Deadlock Detection in Concurrent Java Programs," In Proceedings of the 34th International Conference on Program Comprehension (ICPC), Early Research Achievements (ERA), co-located with ICSE 2026, April 2026, Rio de Janeiro, Brazil.

[3] **Shibbir Ahmed**, "Designing Safety Specifications for Clinical AI: A Case Study," In Proceedings of the AAAI Symposium Series, vol. 7, no. 1, pp. 294–302, November 2025.

[4] **Shibbir Ahmed**, Shahnewaz Karim Sakib and Anindya Bijoy Das, "Can Large Language Models Challenge CNNs in Medical Image Analysis?," In Proceedings of the IEEE International Conference on Image Processing (ICIP), 2025, pp. 2874–2879, Anchorage, AK, USA.

[5] Anindya Bijoy Das, **Shibbir Ahmed** and Shahnewaz Karim Sakib, "Hallucinations and Key Information Extraction in Medical Texts: A Comprehensive Assessment of Open-Source Large Language Models," In Proceedings of the IEEE EMBS International Conference on Biomedical and Health Informatics (BHI), 2025.

[6] Shahnewaz Karim Sakib, Anindya Bijoy Das and **Shibbir Ahmed**, "Battling Misinformation: An Empirical Study on Adversarial Factuality in Open-Source Large Language Models," In Proceedings of the 5th Workshop on Trustworthy NLP (TrustNLP 2025), May 2025, pp. 432–443, Albuquerque, New Mexico.

[7] Anindya Bijoy Das, Shahnewaz Karim Sakib and **Shibbir Ahmed**, "Trustworthy Medical Imaging with Large Language Models: A Study of Hallucinations Across Modalities," In Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV) Workshops, October 2025, pp. 1265–1272.

[8] **Shibbir Ahmed**, Hongyang Gao and Hridesh Rajan, "Inferring Data Preconditions from Deep Learning Models for Trustworthy Prediction in Deployment," In Proceedings of the 46th International Conference on Software Engineering, ICSE 2024, April, 2024, Lisbon, Portugal.

[9] **Shibbir Ahmed**, Sayem Mohammad Imtiaz, Breno Dantas Cruz, Samantha Syeda Khairunnesa and Hridesh Rajan, "Design by Contract for Deep Learning APIs," In Proceedings of the ACM Joint European Software Engineering Conference

and Symposium on the Foundations of Software Engineering, ESEC/FSE'2023, pages 94–106, December, 2023, San Francisco, CA, USA.

[10] Samantha Syeda Khairunnesa, **Shibbir Ahmed** , Sayem Mohammad Imtiaz, Hridesh Rajan and Gary Leavens, "What Contracts Do ML APIs Need? An Empirical Study," Empirical Software Engineering Journal, EMSE'2023, 28(6), pages 142, Springer, 2023.

[11] **Shibbir Ahmed**, Md Johirul Islam and Hridesh Rajan, "Semantics and Anomaly Preserving Sampling Strategy for Large-Scale Time Series Data," ACM/IMS Transactions on Data Science, TDS'2022, Volume 2 issue 4, Article 41, pages 1-25, ACM, 2022.

[12] Anika Tabassum, Mahamudul Hasan, **Shibbir Ahmed**, Rahnuma Tasmin, Deen Md. Abdullah and Tasnim Musharrat, "University Ranking Prediction System by Analyzing Influential Global Performance Indicators," In the Proceedings of 9th International Conference on Knowledge and Smart Technology, KST'2017, pages 126-131, February 2017, Thailand.

[13] **Shibbir Ahmed**, Mahamudul Hasan, Md. Nazmul Hoq and Muhammad Abdullah Adnan, "User Interaction Analysis to Recommend Suitable Jobs in Career-Oriented Social Networking Sites," In the Proceedings of 3rd International Conference on Data and Software Engineering, ICoDSE'2016), pages 1-6, October, 2016, Indonesia.

[14] Mahamudul Hasan, **Shibbir Ahmed**, Deen Md. Abdullah and Md. Shamimur Rahman, "Graduate School Recommender System: Assisting Admission Seekers to Apply for Graduate Studies in Appropriate Graduate Schools," In the Proceedings of 5th International Conference on Informatics, Electronics and Vision, ICIEV'2016, pages 502-507, May, 2016.

[15] **Shibbir Ahmed**, Rajshakhar Paul and Abu Sayed Md. Latiful Hoque, "Knowledge Discovery from Academic Data using Association Rule Mining," In the Proceedings of 17th International Conference on Computer & Information Technology, ICCIT'2014, pages 314-319, December, 2014.

[16] Ishat E Rabban, Kaysar Abdullah, **Shibbir Ahmed** and M. Sohel Rahman, "An Easier Approach to Visible Edge Determination from Moving Viewpoint", In the Proceedings of International Conference on Electrical Engineering and Information & Communication Technology, iCEEiCT'2014, pages 1-5, April, 2014.

[17] Md. Nazmus Sadat, **Shibbir Ahmed** and Muhammad Tasnim Mohiuddin, "Mining the Social Web to Analyze the Impact of Social Media on Socialization," In the Proceedings of 3rd International Conference on Informatics, Electronics and Vision , ICIEV'2014, 23-24 May, 2014.

Under Review and Archived Papers

[18]**Shibbir Ahmed**, Hongyang Gao and Hridesh Rajan, "Debugging Features Through Inferring Deep Learning Model's Input Constraints," Submitted, pages 1-18, 2025.

[19]**Shibbir Ahmed**, Mohammad Wardat, Hamid Bagheri, Breno Dantas Cruz and Hridesh Rajan, "Characterizing Bugs in Python and R Data Analytics Programs," Submitted, pages 1-31, 2023.

[21]Rangeet Pan, Md Johirul Islam, **Shibbir Ahmed** and Hridesh Rajan, "Identifying Classes Susceptible to Adversarial Attacks," arXiv, pages 1-10, 2019.

Peer-Reviewed Workshop Papers

[15] Shahnewaz Karim Sakib, Anindya Bijoy Das, **Shibbir Ahmed**, "Battling Misinformation: An Empirical Study on Adversarial Factuality in Open-Source Large Language Models." arXiv preprint arXiv:2503.10690 (2025).," In Proceedings of TrustNLP: Fifth Workshop on Trustworthy Natural Language Processing co-located with the 2025 Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL 2025), May 3, 2025.

[16] Hridesh Rajan, Sayem Mohammad Imtiaz, **Shibbir Ahmed**, "Engineering Deep Learning Models Through Decomposition, Modularization, and Interface Specifications," In Proceedings of the 2030 Software Engineering (SE'2030) co-located with The ACM International Conference on the Foundations of Software Engineering (FSE 2024), ACM, July, 2024.

[17]**Shibbir Ahmed**, "Towards Deep Learning Specification," In Proceedings of the ACM SIGPLAN conference on Systems, Programming, Languages, and Applications: Software for Humanity (SPLASH'2021), Doctoral Symposium, ACM, October, 2021.

Honors & Awards

- **Research Excellence Award recognizing outstanding research accomplishments**, Iowa State University *2024*
- **Publication Award for publishing research paper at ICSE'2024**, Iowa State University *2024*
- **Awarded 2nd place at poster presentation**, Department of Computer Science, Iowa State University *2023*
- **NSF Travel Grant to attend and present poster at Midwest PL Summit**, University of Michigan, Ann Arbor *2023*
- **Publication Award for publishing research paper at ESEC/FSE'2023**, Iowa State University *2023*
- **ACM SIGPLAN Travel Grant for attending PLDI'2023**, SIGPLAN Professional Activities Committee *2023*
- **Award for publishing research paper at ESEC/FSE'2023**, Iowa State University Publication Award *2023*
- **Travel Grant for attending SPLASH 2021**, SIGPLAN *2021*
- **Teaching Excellence Award recognizing outstanding teaching**, Iowa State University *2019*
- **PLMW Scholar Award at PLDI'2019**, Programming Language Mentoring Workshop (PLMW)at PLDI *2019*
- **ACM Travel Grant awarded to attend IMA Workshop**, University of Minnesota, Twin Cities *2019*
- **Award for one way air travel fare for pursuing PhD in USA**, Bangladesh Sweden Trust Fund *2017*
- **Distinguished Participant of IT Training Program**, Infosys Global Education Center, Mysore, India *2015*
- **Travel Award for IT Training Program**, World Bank and Government of Bangladesh *2015*
- **Education Board Scholarship in all undergraduate academic sessions**, Government of Bangladesh *2009-2013*
- **Higher Secondary Board Scholarship for outstanding result**, Dhaka Education Board, Bangladesh *2008*
- **Secondary Board Scholarship for extraordinary result**, Dhaka Education Board, Bangladesh *2006*
- **Award for Perfect Attendance**, demonstrating sincerity & 100% attendance in high school, Bangladesh *2006*

Talks

- **AI in Teaching & Learning Symposium 2025**, Invited talk on *AI in Grading: A Practical Prompt-Based Framework for Research Paper and Project Presentation Assessments* at San Marcos, Texas *March 2025*
- **ICSE'2024**, Scheduled talk on our paper *Inferring Data Preconditions from Deep Learning Models for Trustworthy Prediction in Deployment* at Lisbon, Portugal *April 2024*
- **Invited Talk**, Scheduled talk invited by Dr. Miryung Kim on our work regarding *SE for Trustworthy AI* at UCLA, Los Angeles, CA, USA *January 2024*
- **Invited Talk**, Scheduled talk invited by Dr. Marsha Chechik on our work regarding *SE for Safe ML* at Toronto, Ontario, Canada *January 2024*
- **ESEC/FSE'2023**, Presented our paper *Design by Contract for Deep Learning APIs* at San Francisco, CA, USA *December 2023*
- **Midwest PL Summit'2023**, Presented our poster *Inferring Data Preconditions from Deep Learning Models for Trustworthy Prediction in Deployment* at Michigan, Ann Arbor, USA *October 2023*
- **Annual Poster Presentation Contest'2023**, Presented our work on *Reasoning about Deep Learning Models for Trustworthy Prediction* at Ames, IA, USA *November 2023*
- **Doctoral Symposium at SPLASH'2021**, Presented our work on *Towards Deep Learning Specification* at Chicago, IL, USA *October 2021*

Research Mentoring

- **Ragib Shahariar Ayon**, PhD Student, Texas State University *2025-Present*
- **Md Khairul Azman**, PhD Student, Texas State University *2025-Present*
- **Deepak George Thomas**, PhD Student, Iowa State University *2022-Present*
- **Wasay Mohammed Abdul**, MS Student, Texas State University *2024-Present*
- **Usha Dadi**, MS Student, Texas State University *2024-Present*
- **Sri Vaishnavi Hari**, MS Student, Texas State University *2025-Present*
- **Atieh Bastan**, PhD Student, Iowa State University *2023-2024*
- **Nirman Khadka**, Undergraduate Student, Texas State University *2024-Present*
- **Radha Yadav**, Undergraduate Student, Texas State University *2025-Present*
- **Rayed Fahmi**, Undergraduate Student, Texas State University *2025-Present*
- **Junhyung Shim**, Undergraduate Student, Iowa State University *2023*

Technical Skills

Programming Language:	C, C++, Java, Assembly (Intel 8086), SQL, PL/SQL, Python
Scripting Language:	Shell Script, Prolog, LaTeX
J2EE Technologies:	POJO, JDBC, JPA, Hibernate, Servlet, JSP, JSF, Struts, Spring
Web Development & Database Tools:	PHP, HTML, CSS, JavaScript, Oracle, MySQL, Microsoft SQL Server
IDEs & Development Tools:	Eclipse, NetBeans, Microsoft Visual Studio, Android Studio
Version Control & Project Management Tools:	GitHub, GitLAB, Trello, AgileFant, BitBucket
Data Mining & Big Data Analytics Tools :	RapidMiner, Neo4J, IPython, AWS EC2,S3, EMR; Apache Hadoop, Spark
Machine & Deep Learning Tools :	Weka, TensorFlow, Keras, PyTorch, Caffe, NVIDIA DIGITS
Other Software Skills:	MikTex, Packet Tracer, Proteus, XAMP , Prezi, AVR Studio, Inkscape

Academic & Research Based Selected Projects

DeepInfer *ICSE'2024*

https://github.com/shibbirtanvin/DeepInfer *April 2024*

- This tool infers data preconditions from Deep Learning models and checks violations for unseen inputs for trustworthy prediction in deployment, which is peer-reviewed in ICSE'2024.

DLContract *ESEC/FSE'2023*

https://github.com/shibbirtanvin/DLContract *December 2023*

- This tool allows Keras library developers to specify contracts of the model architecture, data, and training process and check contract violations to prevent low accuracy and high training time-related bugs, which is peer-reviewed in ESEC/FSE'2023.

PASS *TADS'2022*

https://github.com/shibbirtanvin/pass *January 2022*

- PASS (Preserving Anomaly and Semantics Sampling) is a specialized data reduction and sampling strategy that reduces data for the visualization of large-scale time series data as a line chart, which is peer-reviewed in ACM/IMS Transactions on Data Science, TADS'2022.

Software Projects Supervised during Teaching Assistant at ISU *As a TA, Project Supervisor*

Supervised (Selected) *August 2017-May 2019*

- Online Multiplayer Mahjong Game, Dungeon Game, Raise Hand, Tribes of CYdonia, Cy's Rides, Nerds Battle

Research Projects Mentored during Teaching at Primeasia University *As an Instructor, Project Supervisor*

Projects Mentored (Selected) *June 2015-July 2017*

- Smart Parking Sharing System, Train Locator, Online Medicine Shop, Shopping Mall Management, Vehicle Selling Management System, Train Ticketing App, Teachers Rating App, Bus Service Evaluation App, Online Book Sharing Website

A Reinforcement Learning Algorithm using Q-learning with Function Approximation *Keras, TensorFlow, PyTorch*

Principles and Internals of Database Systems Course *August 2018- December 2018*

- A reinforcement learning algorithm using Q-learning algorithm with function approximation i.e., A multi-layer Deep Neural Network (DQNN) has been designed and implemented with environment Acrobot-v1 from the OpenAI Gym package.

Tweet Data Augmentation using DBSmote *Python, NLTK, Google Word2Vec, R*

Principles and Internals of Database Systems Course *August 2017-December 2017*

- To improve an existing algorithm that is related to data augmentation and showing the improvement through experiments; Focus on augmentation method -performed in feature space using tweetsAndTopics dataset; Creating new tweets from existing tweets to improve the balance between classes.

User Interaction Analysis to Recommend Jobs *Java, Amazon EC2,S3, EMR Apache Spark*

Data Management in the Cloud M.Sc. Course, ACM RecSys Challenge *May 2016-August 2016*

- The goal of this job recommendation system is to predict those job postings that are likely to be relevant to the user considering users' interaction (e.g., click, bookmark, apply for job/reply to recruiters, delete shown job recommendations); Handling big Dataset of XING, which was provided in ACM RecSys Challenge 2016.

Outreach & Professional Development

Reviewer & Other Services to Communities

- **Reviewer**, ACM Transactions on Software Engineering and Methodology (TOSEM) *2024*
- **Reviewer**, IEEE Transactions on Software Engineering (TSE) *2024*
- **Reviewer**, Empirical Software Engineering Journal (EMSE) *2025*
- **Reviewer**, Technical Track, 39th IEEE/ACM International Conference on Automated Software Engineering (ASE 2024) *2024*
- **Junior Reviewer**, Technical Track, International Conference on Mining Software Repositories (MSR'2024) *2023*
- **Sub-Reviewer**, Technical Track, International Conference on Software Engineering (ICSE'2024) *2023*
- **Sub-Reviewer**, Technical Track, International Conference on Automated Software Engineering (ASE'2023) *2023*
- **Committee Member**, International Student Council, Iowa State University, Ames, IA, USA *2023*
- **Student Volunteer**, ACM SIGPLAN PLDI'2023 and FCRC'2023, Orlando, USA *2023*
- **Reviewer**, Technical Track, International Conference on Software Engineering & Knowledge Engineering *2022-2023*
- **Cultural Ambassador**, International Students and Scholars Office, Iowa State University, Ames, IA, USA *2023*
- **Student Volunteer**, ACM SIGPLAN SPLASH'2021, Chicago, USA *2021*
- **Reviewer**, IEEE Access Open Access Journal *2020*
- **Student Volunteer**, ACM SIGPLAN SPLASH'2020, Virtual *2020*
- **Website Co-chair**, Laboratory for Software Design, Department of Computer Science, ISU *2019-2024*
- **Committee Member**, Bangladesh Student Association, Ames, IA, USA *2019-2020*
- **Student Volunteer**, Midwest Big Data Summer School, Ames, IA, USA *2019*

Professional Development

- **ESEC/FSE'2023**, Attended and presented paper, developed professional network at ESEC/FSE'2023, San Francisco, CA, December, 2023 *2023*
- **Midwest PL Summit 2023**, Attended and presented a poster at Midwest PL Summit at University of Michigan, Ann Arbor, October, 2023 *2023*
- **PLDI'2023**, Attended the 44th ACM SIGPLAN Conference on Programming Language Design and Implementation, Orlando, FL, June, 2023 *2023*
- **SPLASH'2021**, Attended ACM SIGPLAN conference on Systems, Programming, Languages, and Applications: Software for Humanity, Chicago, USA *2021*
- **ICSE'2020-2021, ASE'2020**, Attended International Conference on Software Engineering ICSE 2020-21 (Virtual), Automated Software Engineering (ASE) Conference (Virtual) *2019*
- **PLDI'2019**, Attended Programming Language Design and Implementation Conference PLDI 2019 at Phoenix, Arizona *2019*
- **Big Data Summer School**, Completed professional development program in Midwest Big Data Summer School Ames, Iowa *2019*
- **IMA Workshop**, Attended workshop on "Recent Themes in Resource Tradeoffs: Privacy, Fairness and Robustness" organized by IMA, University of Minnesota, Minneapolis, MN *2019*
- **Turing Lecture**, Attended Turing Lecture by Geoffrey Hinton and Yann LeCun on Deep Learning Revolution" at FCRC 2019, Phoenix, AZ *2019*

Professional Memberships

- **ACM**, Student and Professional member of Association for Computing Machinery *2019-Present*
- **IEEE**, Professional member of IEEE and IEEE Signal Processing Society *2025-Present*
- **SIGSOFT**, Student member of ACM SIGSOFT *2020-Present*
- **SIGPLAN**, Student member of ACM SIGPLAN *2020-Present*
- **Responsible AI Institute**, Individual member of Responsible AI Institute *2023-Present*

References

Dr. Hridesh Rajan
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`https://hridesh.github.io/`

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