Dr. Md Kamruzzaman Sarker

Assistant Professor (tenure track) Department of Computer Science Bowie State University Tel: 301.860.4501 Email: ksarker@bowiestate.edu Office: BSB 320 Bowie, MD 20715, USA

Curriculum Vitae

Scientific Career	
08.2023 – Current	Assistant Professor Department of Computer Science Bowie State University, Bowie, Maryland, USA
08.2021 – 6.2023	Assistant Professor Department of Computing Sciences University of Hartford, West Hartford, Connecticut, USA
01.2021 – 07.2021	Postdoctoral Fellow Center for Artificial Intelligence and Data Science Department of Computer Science Kansas State University, Manhattan, Kansas, USA
08.2019 –12.2020	Graduate Research Assistant Data Semantics Lab Department of Computer Science Kansas State University, Manhattan, Kansas, USA
01.2019 – 08.2019	Artificial Intelligence Intern Intel Corporation Hillsboro, Oregon, USA
05.2017 – 08.2017	PhD Researcher Accenture Technology Labs Dublin, Ireland
01.2016 – 07.2019	Graduate Research Assistant Data Semantics Lab Department of Computer Science and Engineering Wright State University, Dayton, Ohio, USA
09.2013 – 11.2015	Software Engineer Samsung Research & Development Institute Bangladesh (SRBD) Dhaka, Bangladesh

Scientific Education

01.2016 – 11.2020	PhD in Computer Science
	Dissertation title: Towards explainable artificial intelligence (XAI) based on con-
	textualizing data with knowledge graphs
	Supervisor: Pascal Hitzler
	Kansas State University, Manhattan, KS, USA.
01.2016 – 05.2019	M.S. in Computer Science
	Wright State University, Dayton, Ohio, USA.
	Transferred to Kansas State University from Wright State University.

01.2016 – 05.2018	Graduate certificate in Big and Smart Data Wright State University, Dayton, Ohio, USA.
01.2009 - 09.2013	B.Sc. in Computer Science and Engineering Khulna University of Engineering & Technology, Khulna, Bangladesh.

Web References

Web	https://mdkzaman.com/
Google Scholar	https://scholar.google.com/citations?user=dnySX2QAAAAJ
DBLP	https://dblp.org/pid/186/2804.html
StackOverflow	http://stackoverflow.com/users/1054358/md-kamruzzaman-sarker

1 Grants

1.1 Funded Proposals

- Explaining Deep Learning with Background Knowledge (XBack) University of Hartford. July 2022 to June 2023. Role: PI Funding: \$3500
- Improving HPC cluster for scientific computing: Resource grant University of Hartford. Role: Co-PI Funding: \$40,000
- 2023 Backward Design Across the Curriculum program: Course improvement grant University of Hartford. Role: Co-PI Funding: \$2,500

1.2 Pending Proposals

- Collaborative Research: SCH: RUI: Analysis and profiling of the robustness of machine learning interpretation of medical images Funding Agency: National Science Foundation (NSF) Role: Co-PI (PI: Dr. Lior Shamir, and other Co-PI: Pascal Hitzler, and Dr. Guo-Qiang Zhang,) Application number: 2306131
- Identify Data Bias in Deep Learning Training Funding Agency: University of Hartford (Greenberg Junior Faculty Research Grant)) URL: https://www.hartford.edu/unotes/2023/01/funding-opportunity-greenberg-junior-facultyresearch-grants.aspx Role: PI

1.3 Unfunded Proposals

 Forecasting streamflow in the Mississippi River watershed using deep learning. Funding Agency: National Science Foundation (NSF) Role: Co-PI. PI: Dr. Behzad Ghanbarian, and other Co-PIs: Dr. Pascal Hitzler and Karen Ryberg
 Application number: 2220556

Application number: 2230556

- Explaining Deep Learning With Background Knowledge (XBack). Funding Agency: National Science Foundation (NSF) Role: Co-PI (PI: Dr. Pascal Hitzler, and other Co-PI: Dr. Doina Caragea) Status: declined
- Analysis and profiling of the robustness of machine learning interpretation of medical images Funding Agency: National Institutes of Health (NIH) Role: Co-PI (PI: Dr. Lior Shamir, and other Co-PI: Pascal Hitzler,) Link: https://www.ncbi.nlm.nih.gov/myncbi/1ty4tjFQzUBUf2/cv/414426/ Status: declined
- Securing user authentication process by neural fuzzy extractors Funding Agency: National Science Foundation (NSF) Role: Co-PI (PI: Dr. George Amariucai and other Co-PI: Dr. Doina Caragea) Status: declined
- Reduce Fraudulent Reviews Funding Agency: Amazon Role: PI Status: declined

1.4 Contributions to approved grant proposals

- Explainable Machine Reasoning through the Application of Linked Data (EMERALD). Department of Defense, Air Force. August 2019 to October 2021. Role: Researcher, my developed Efficient Concept Induction for Description Logic (ECII) algorithm (AAAI-2019 paper) was pivotal to obtain this grant. Funding: \$400,000 (Phase 1 \$25,000, Phase 2 \$375,000)
- Recovering the Sources of Individual Differences Unduly-named Errors (ReSIDUE). Defense Advanced Research Projects Agency (DARPA). September 2019 to August 2021. Role: Researcher, my developed ECII algorithm was pivotal to obtain this grant. Funding: \$892,328 (Phase 1 \$392,258, Phase 2 \$500,070)

2 **Publications**

2.1 Pending Patent

1. George Amariucai, Jana Abhishek, Md Kamruzzaman Sarker, Monireh Ebrahimi, Pascal Hitzler, A Secure Way to use Neural Networks for Biometric User Authentication, Kansas State University, 2021.

https://patents.google.com/patent/WO2021188347A1 Patent status: publication.

2.2 Edited Books

 Pascal Hitzler, Md Kamruzzaman Sarker (eds.). 2022. Neuro-Symbolic Artificial Intelligence - The State of the Art. Frontiers in Artificial Intelligence and Applications Vol. 342, IOS Press, Amsterdam.

Book page: https://www.iospress.com/catalog/books/neuro-symbolic-artificial-intelligence-the-state-of-the-art

Top viewed book in the publisher's website.

2.3 Journal Articles

- Kishor Datta Gupta, Nafiz Sadman, Akib Sadmanee, Md Kamruzzaman Sarker, Roy George. Behavioral recommendation engine driven by only non-identifiable user data. Journal: Machine Learning with Applications. Volume 11, issue 4, pp. 86-104, DOI: https://doi.org/10.1016/j.mlwa.2022.100442.
- Abhishek Jana, Bipin Paudel, Md Kamruzzaman Sarker, Monireh Ebrahimi, Pascal Hitzler, George T Amariucai. Neural Fuzzy Extractors: A Secure Way to Use Artificial Neural Networks for Biometric User Authentication. Journal: Proceedings on Privacy Enhancing Technologies. Volume 2022, issue 4, pp. 86-104, DOI: https://doi.org/10.56553/popets-2022-0100
- Md Kamruzzaman Sarker, Lu Zhou, Aaron Eberhart, and Pascal Hitzler. Neuro-Symbolic Artificial Intelligence: Current Trends. Journal of Al Communications by IOS Press, Volume. 34, no. 3, pp. 197-209, 2021, DOI: 10.3233/AIC-210084.
- Pascal Hitzler, Aaron Eberhart, Monireh Ebrahimi, Md Kamruzzaman Sarker, Lu Zhou. Neuro-Symbolic Approaches in Artificial Intelligence. Journal: National Science Review. nwac035, DOI: https://doi.org/10.1093/nsr/nwac035. Impact factor: 17.3
- Pascal Hitzler, Federico Bianchi, Monireh Ebrahimi, Md Kamruzzaman Sarker. Neural-Symbolic Integration and the Semantic Web. Journal of Semantic Web. Volume 11 (1), 2020, 3-11.
- Ajib Susanto, De Rosal Ignatius Moses Setiadi, Eko Hari Rachmawanto, Ibnu Utomo Wahyu Mulyono, Christy Atika Sari, Md Kamruzzaman Sarker, Musfiqur Rahman Sazal. Triple layer image security using bit-shift, chaos, and stream encryption. Journal of Bulletin of Electrical Engineering and Informatics, 2020, 9(3), pp. 980-987. DOI: https://doi.org/10.11591/eei.v9i3.2001.

2.4 Conference Papers

- 9. Cara Leigh Widmer, **MD Kamruzzaman Sarker**, Srikanth Nadella, Joshua Fiechter, Ion Juvina, Pascal Hitzler, Brandon Minnery, A Method for Using Concept Induction to Achieve Human-Understandable Explanations of Machine Learning Image Classifications. 52nd Annual Meeting of the Society for Computation in Psychology, Boston, MA. November 17th, 2022.
- 10. Eko Hari Rachmawanto, Rahmawati Zulfiningrum, **Md Kamruzzaman Sarker**. Text Encryption using Bi-Amold Cat Map and Modulus Operation. IEEE 2021 International Seminar on

Application for Technology of Information and Communication (iSemantic). DOI: 10.1109/iSemantic52711.2021.9573175.

- Monireh Ebrahimi, Md Kamruzzaman Sarker, Federico Bianchi, Ning Xie, Aaron Eberhart, Derek Doran, HyeongSik Kim, Pascal Hitzler: Neuro-Symbolic Deductive Reasoning for Cross-Knowledge Graph Entailment. In: Proceedings of AAAI Spring Symposium: Combining Machine Learning with Knowledge Engineering 2021.
- 12. Aaron Eberhart, Cogan Shimizu, Sulogna Chowdhury, **Md Kamruzzaman Sarker**, and Pascal Hitzler: Expressibility of OWL Axioms with Patterns. In proceedings of The Semantic Web 14th International Conference, ESWC 2021.
- Md Kamruzzaman Sarker, Joshua Schwartz, Pascal Hitzler, Lu Zhou, Srikanth Nadella, Brandon Minnery, Ion Juvina, Michael L. Raymer, and William R. Aue. Wikipedia Knowledge Graph for Explainable AI. 2020. In: Proceedings of Knowledge Graph and Semantic Web Conference, KGSWC 2020.
- E Sugiarto, DRIM Setiadi, A Fahmi, EH Rachmawanto, CA Sari, Md K Sarker, B Widjajanto. Securing Text Messages using the Beaufort-Vigenere Hybrid Method. Journal of Physics: Conference Series. Vol: 1577, Issue: 1.
- Astuti, E.Z., Setiadi, D.R.I.M., Rachmawanto, E.H., Sari, C.A., Md. Kamruzzaman Sarker. LSB-based Bit Flipping Methods for Color Image Steganography. Journal of Physics: Conference Series, 2020, 1501(1), 012019.
- Md Kamruzzaman Sarker, Pascal Hitzler, Efficient Concept Induction for Description Logics. The Thirty-Third AAAI Conference on Artificial Intelligence, AAAI 2019, The Thirty-First Innovative Applications of Artificial Intelligence Conference, IAAI 2019, The Ninth AAAI Symposium on Educational Advances in Artificial Intelligence, EAAI 2019, Honolulu, Hawaii, USA, January 27 - February 1, 2019. AAAI Press 2019, pp. 3036-3043.
- De Rosal Ignatius Moses Setiadi, Afif Faishal Najib, Eko Hari Rachmawanto, Christy Atika Sari, Kamruzzaman Sarker, Nova Rijati. A comparative study MD5 and SHA1 algorithms to encrypt REST API authentication on mobile-based application. IEEE 2019 International Conference on Information and Communications Technology, ICOIACT 2019, pp. 206-211, 8938570. DOI: 10.1109/ICOIACT46704.2019.8938570.
- Md Kamruzzaman Sarker, Adila Krisnadhi, David Carral, and Pascal Hitzler. Rule based OWL Modeling with ROWLTab Protege Plugin. The Semantic Web - 14th International Conference, ESWC 2017, Portoroz, Slovenia, May 28 - June 1, 2017, Proceedings, Part I, volume 10249 of Lecture Notes in Computer Science, pages 419-433, 2017.
- Md Kamruzzaman Sarker, Kazi Md Rokibul Alam, Md Arifuzzaman. Emotion recognition from speech based on relevant feature and majority voting. 2014 International Conference on Informatics, Electronics & Vision (ICIEV), Dhaka, 2014, pp. 1-5, doi: 10.1109/ICIEV.2014.6850685.

2.5 Workshop Papers

20. Md Kamruzzaman Sarker, Ning Xie, Derek Doran, Michael Raymer, and Pascal Hitzler. Explaining trained neural networks with semantic web technologies: First steps. In Tarek R. Besold, Artur S. dÁvila Garcez, and Isaac Noble, editors, Proceedings of the Twelfth International Workshop on Neural-Symbolic Learning and Reasoning, NeSy 2017, London, UK, July 17-18, 2017, volume 2003 of CEUR Workshop Proceedings. CEUR-WS.org, 2017.

 Ning. Xie, Md Kamruzzaman Sarker, Derek Doran, Pascal Hitzler, Michael L. Raymer. Relating Input Concepts to Convolutional Neural Network Decisions. In Thirty-first Conference on Neural Information Processing Systems NeurIPS 2017 Workshop: Interpreting, Explaining and Visualizing Deep Learning, NIPS IEVDL 2017. NIPS, CA, USA, 2017.

2.6 Poster & Demonstrations

- Md Kamruzzaman Sarker, Adila Alfa Krisnadhi, and Pascal Hitzler. Owlax: A Protege plugin to support ontology axiomatization through diagramming. Proceedings of the ISWC 2016 Posters & Demonstrations Track,15th International Semantic Web Conference, Kobe, Japan, October 19, 2016.
- 23. **Md Kamruzzaman Sarker**, Adila Alfa Krisnadhi, and Pascal Hitzler. Modeling OWL with Rules: The ROWL Protege Plugin. Proceedings of the ISWC 2016 Posters & Demonstrations Track,15th International Semantic Web Conference, Kobe, Japan, October 19, 2016.

2.7 Theses

- 24. Md Kamruzzaman Sarker. Towards explainable artificial intelligence (XAI) based on contextualizing data with knowledge graphs. Ph.D. thesis, Kansas State University, 2020.
- 25. Md Kamruzzaman Sarker, Md Arifuzzaman. Emotion Recognition from Speech. B.Sc. thesis, Khulna University of Engineering & Technology, 2013.

3 Research Services

3.1 Journal Editorial Board Member

- Neurosymbolic Artificial Intelligence, started in 2022.
- Guest editor: Semantic Web Journal, issue: Neuro-Symbolic Artificial Intelligence and the Semantic Web.

3.2 Program Committee

- NSF Panel reviewer, 2022.
- 39th International Conference on Logic Programming (ICLP), 2023.
- 2022 IEEE Symposium Series On Computational Intelligence, IEEE SSCI 2022, Singapure.
- Semantic Reasoning Evaluation Challenge (SemREC), 2022, co-located with the 21st International Semantic Web Conference (ISWC 2022).
- 4th Ibero-American Knowledge Graph and Semantic Web Conference (KGSWC), 2022, Universidad Camilo Jose Cela, Madrid, Spain, 21-23 November 2022.
- 2nd International Joint Conference on Learning & Reasoning (IJCLR), Windsor Great Park, United Kingdom, 28-30 September 2022.

- 20th International Semantic Web Conference (ISWC) Virtual, 24 28 October 2021.
- 1st International Joint Conference on Learning & Reasoning (IJCLR), 25 27 October 2021, Virtual.
- Workshop on COMBINATION OF SYMBOLIC AND SUB-SYMBOLIC METHODS AND THEIR APPLICATIONS (CSSA), Co-located with ECML/PKDD2021.
- Third Ibero-American Conference and Second Indo-American Conference (KGSWC) 2021. Kingsville, Texas, USA, November 22-24, 2021.
- Workshop on Combining Symbolic And Sub-Symbolic Methods And Their Applications, CSSA 2020, At 29th ACM International Conference On Information And Knowledge Management (CIKM) 2020.
- 1st Workshop on the Semantic Web in Practice: Tools and Pedagogy, PRAXIS 2020, at International Semantic Web Conference (ISWC) 2020, Athens, Greece (now online), November 2020.

3.3 Reviewer (selected list)

- 37th AAAI Conference on Artificial Intelligence, 2023.
- MDPI (applied math), 2022.
- Semantic Web Journal (http://www.semantic-web-journal.net/), 2019.
- 19th International Semantic Web Conference (ISWC) 2020, Athens, Greece (virtual).
- 16th International Semantic Web Conference (ISWC) 2017, Vienna, Austria.
- 1st Iberoamerican Knowledge Graph and Semantic Web Conference (KGSWC) 2019, Villa Clara, Cuba.
- ICCA 2020 : International Conference on Computing Advancements, Dhaka, Bangladesh.
- 6th Workshop on Semantic Deep Learning (SemDeep-6) at 29th International Joint Conference on Artificial Intelligence and the 17th Pacific Rim International Conference on Artificial Intelligence (IJCAI-PRICAI) 2020.
- 1st Workshop on Semantic Explainability, at 13th IEEE International Conference on Semantic Computing, Newport Beach, California, USA.

3.4 Research Software Development

- ECII: Knowledge graph based data analysis software. Pivotal to obtain \$1 million in funding from DARPA and AFRL. Open-source. https://github.com/md-k-sarker/ecii
- OWLAx: Visual Ontology development tool, popular software in Semantic Web community, open-source. https://github.com/md-k-sarker/owlax
- ROWLTab: SWRL rule to OWL axiom converter, popular software in Semantic Web community, open-source. https://github.com/md-k-sarker/ROWL

3.5 Tutorials (through regular proposal process)

- Organizer and presenter of the On Explainable AI: From Theory to Motivation, Applications and Limitation tutorial, 33rd AAAI Conference on Artificial Intelligence (AAAI 2019), Hawaii, USA.
- Organizer and presenter of the On the Role of Data Semantics for Explainable AI tutorial, 2nd U.S. Semantic Technologies Symposium (US2TS 2019), North Carolina, USA.
- Presenter of the Methods and Tools for Modular Ontology Modeling tutorial, 17th International Semantic Web Conference (ISWC 2018), Monterey, California, USA.

3.6 Hackathons, Symposiums

- Judge at MIT Hackathon, HackMIT 2020.
- Volunteer at Hack K-State 2019.
- Volunteer at 1st U.S. Semantic Technologies Symposium (US2TS) 2018.

4 Teaching Services

4.1 **Program Development**

- Co-coordinator of the MS in Computer Science program, starting in Fall 2023. Developed the course curriculum, program learning outcome with other 3 members Dr. Sheikh Rabiul Islam, Dr. Andrew Jung and Professor Ingrid Russel.
- Co-coordinator of the BS in Cyber Security program, starting in Fall 2023. Developing the program with other 4 members Dr Thomas Eppes, Dr. Sheikh Rabiul Islam, Dr. Yudi Dong and Dr Qisi Liu..

4.2 Course Development

4.2.1 Graduate

Developed multiple courses for the new MS in CS program. https://www.hartford.edu/academics/schools-colleges/arts-sciences/academics/departments-and-centers/computing-sciences/ms-in-computer-science.aspx

- Machine Learning (CS-569) course for the new MS in CS program.
- Developed Application of Deep Learning (CS-570) course for the new MS in CS program.
- Developed High Performance Computing (CS-557) course for the new MS in CS program.

4.2.2 Undergraduate

• Developed Machine Learning (CS-391) course, will be offered in the next semester as a special topic (CS-391). May become a permanent course based on the student enrollment.

4.3 Accreditation Service

• Facilitator for the ABET accreditation of the CSE program at the University of Hartford.

5 Teaching and Student Supervision

5.1 Teaching

5.1.1 Taught Courses at the University of Hartford

- CS 351: Introduction to Artificial Intelligence. Spring 2023.
- CS 355: Computer Networks. Spring 2023.
- CS 220: Data Structures. Fall 2021, Spring 2022, Spring 2023.
- CS 375: Web Services. Spring 2022.
- CS 365: Principles of Database Systems. Fall 2022.
- CS 211: Architecture and Assembly Language. Fall 2021.
- CS 114: Fundamentals of Computing I, Fall 2021, Spring 2022.
- CS 111: Programming Foundations. Fall 2022.
- CS 110: Introduction to Computers. Fall 2022.

5.2 Student Supervision

5.2.1 University of Hartford

- Cyprien Michel Delentie, from March 2023.
 MS student of Ecole normale superiere de Lyon, visiting USA to perform research on Neuro-Symbolic AI. Visiting researcher.
- Rahul Kumar, from October 2021. Undergraduate student.
- Zachary Biernat, from November 2021. Undergraduate student.

5.2.2 Kansas State University

- Abhilekha Dalal, from January 2020.
 Ph.D. student.
 Role: Co-supervising.
- Sulogna Chowdhury, from April 2020. Ph.D. student. Role: Co-supervising.
- Joshua Schwartz, from January 2020 to August 2021.
 Ph.D. student.
 Role: Co-supervised.
- Brayden Pankaskie, from September 2019 to August 2021. Undergraduate student. Role: Supervised.

6 Projects

6.1 Scientific Project Involvement

- Hate Speech detection
 University of Hartford. August 2021 to Current.
 Role: Researcher & PI
- Galaxy morphological classification University of Hartford. August 2021 to Current. Role: Researcher & PI
- Integrating symbolic and sub-symbolic algorithms University of Hartford. August 2021 to Current. Role: Researcher & PI
- Artificial Intelligence for computer security University of Hartford. August 2021 to Current. Role: Researcher & PI
- Explaining Deep Learning with Background Knowledge (XBack) University of Hartford. August 2021 to Current. Role: Researcher
- Combining Symbolic and Sub-Symbolic Artificial Intelligence University of Hartford. August 2021 to Current. Role: Researcher
- Explainable Machine Reasoning through the Application of Linked Data (EMERALD) Department of Defense, Air Force. August 2019 to July 2021. Role: Researcher

- Recovering the Sources of Individual Differences Unduly-named Errors (ReSIDUE) Defense Advanced Research Projects Agency (DARPA). September 2019 to August 2021. Role: Researcher
- Deep learning execution time improvement. Intel Corporation, January 2019 to August 2019. Role: Artificial Intelligence Intern
- Human Centered Big Data (HCBD) Ohio Federal Research Network, August, 2017 to December 2018. Role: Researcher
- Explaining AI Decision Accenture Technology Labs, May 2017 to August 2017. Role: PhD researcher
- Human Centered Big Data (HCBD) Ohio Federal Research Network, August, 2016 to April 2017. Role: Researcher
- Advancing software tools for ontology development National Science Foundation, January 2016 to April 2017. Role: Researcher.

7 Awards

- Exploring Entrepreneurship Scholarship. Kansas State University, October 2020. Amount \$1000.
- Travel Grant to deliver tutorial.
 33rd AAAI Conference Artificial Intelligence (AAAI 2019), Hawaii, USA.
- Travel Grant to deliver tutorial.
 2nd U.S. Semantic Technologies Symposium (US2TS 2019), North Carolina, USA.
- Travel Grant to present ontology modeling. DCVoCamp 2017, Washington DC, USA.
- Nominated for best demo award.
 15th International Semantic Web Conference (ISWC 2016), Kobe, Japan.
- Several travel grants to present papers at different conferences.
- Dean's Award on senior year of undergraduate, KUET, 2013.