Md Masudur Rahman

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Address: 305 N University St, West Lafayette, IN 47907

RESEARCH INTEREST

I specialize in Reinforcement Learning and Robotics, focusing on creating intelligent agents that can make critical decisions under uncertain conditions. My current work centers on generalization in reinforcement learning, with the aim of developing algorithms that are robust against confounders in real-world tasks. I am investigating the use of foundational models in decision-making, exploring their potential in applications such as surgical robotics, medical imaging, and the automation of burn injury treatment.

EDUCATION

Purdue University, West Lafayette, IN, USA
Doctor of Philosophy (Ph.D.), Dept. of Computer Science, Jan 2019 - May 2025 (Expected)
Advisor: Yexiang Xue (Purdue University), Committee: Clifton W. Bingham (Purdue University), Juan P. Wachs (Purdue University), Ahmed H. Qureshi (Purdue University)

University of Virginia, Charlottesville, VA, USA
Master of Science (M.S.), Dept. of Computer Science, Dec 2018
Advisor: Baishakhi Ray (UVA), Committee: Mary Lou Soffa (UVA), Alfred C. Weaver (UVA), Hongning Wang (UVA)

Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh
Bachelor of Science (B.Sc.), Dept. of Computer Science and Engineering, Feb 2013
Advisor: Masud Hasan

WORK EXPERIENCES

Purdue University, West Lafayette, IN, USA
Graduate Research Assistant, Dept. of Computer Science, Jan 2019 - Current
Graduate Teaching Assistant, Dept. of Computer Science, Aug 2020 - May 2021
University of Virginia, Charlottesville, VA, USA
Graduate Research Assistant, Dept. of Computer Science, May 2016 - Jul 2018
Graduate Teaching Assistant, Dept. of Computer Science, Aug 2015 - Dec 2018
BRAC University, Dhaka, Bangladesh
Lecturer, Dept. of Computer Science and Eng., Feb 2013 - Jul 2015

AWARDS & HONORS

- Outstanding reviewer, Top 10%, ICML, 2022
- Complimentary ICML Conference Registration for Outstanding Reviewer, 2022
- Complimentary ICLR Conference Registration Sponsored by Google, 2023
- NSF ICSE Travel Support, 2018
- Student Travel Support for Attendance at the NL4SE Workshop at FSE Conference, 2016

- Student Travel Support for Attendance at the SIGIR Conference, 2016
- Dean's List Award for Academic Excellence, 2008-2013.
- University Merit Scholarship, 2009-2013.
- National Higher Secondary School Merit Scholarship by Bangladesh Government, 2007-2013
- National Secondary School Merit Scholarship by Bangladesh Government, 2005-2007

PUBLICATIONS

Peer Reviewed Full Conference Papers

1. [**NAACL 2024**] *Natural Language-based State Representation in Deep Reinforcement Learning.*
   Md Masudur Rahman and Yexiang Xue. In Proceedings of the Annual Conference of the North American Chapter of the Association for Computational Linguistics, 2024.

2. [**ECML-PKDD 2022**] *Bootstrap State Representation using Style Transfer for Better Generalization in Deep Reinforcement Learning.*
   Md Masudur Rahman and Yexiang Xue. In Proceedings of the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases, 2022.

3. [**ICMLA 2022**] *Bootstrap Advantage Estimation for Policy Optimization in Reinforcement Learning.*
   Md Masudur Rahman and Yexiang Xue. In Proceedings of the IEEE International Conference on Machine Learning and Applications, 2022.

4. [**ICRA 2021**] *DESERTS: Delay-Tolerant Semi-Autonomous Robot Teleoperation for Surgery.*
   Glebys Gonzalez, Mridul Agarwal, Mythra Varun Balakuntala Srinivasa Mur, **Md Masudur Rahman**, Upinder Kaur, Richard Voyles, Vaneet Aggarwal, Yexiang Xue, Juan Wachs. In Proceedings of the IEEE International Conference on Robotics and Automation, 2021.

5. [**RO-MAN 2021**] *Sequential Prediction with Logic Constraints for Surgical Robotic Activity Recognition.*
   Md Masudur Rahman, Richard Voyles, Juan Wachs, Yexiang Xue. In Proceedings of the 30th IEEE International Conference on Robot & Human Interactive Communication - 2021.

6. [**RO-MAN 2021**] *Dexterous Skill Transfer between Surgical Procedures for Teleoperated Robotic Surgery.*
   Mridul Agarwal, Glebys Gonzalez, Mythra V. Balakuntala, **Md Masudur Rahman**, Vaneet Aggarwal, Richard M. Voyles Yexiang Xue, Juan Wachs. In Proceedings of the 30th IEEE International Conference on Robot & Human Interactive Communication - 2021.

7. [**RO-MAN 2019**] *Transferring Dexterous Surgical Skill Knowledge between Robots for Semi-autonomous Teleoperation.*
   Md M. Rahman*, N. Sanchez-Tamayo*, G. Gonzalez, M. Agarwal, V. Aggarwal, R. M. Voyles, Y. Xue, and J. Wachs [* equal authorship], In Proceedings of the 28th IEEE International Conference on Robot and Human Interactive Communication, 2019.

8. [**IROS 2019**] *DESK: A Robotic Activity Dataset for Dexterous Surgical Skills Transfer to Medical Robots.*
   N. Madapana*, **Md M. Rahman***, N. Sanchez-Tamayo*, M. V. Balakuntala, G. Gonzalez, J. P. Bindu, L. N. V. Venkatesh, X. Zhang, J. B. Noguera, T. Low, R. Voyles, Y. Xue, J. Wachs. [* equal authorship]. In Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems, 2019.

9. [**SCAM 2019**] *Toward Optimal Selection of Information Retrieval Models for Software Engineering Tasks.*
   Md Masudur Rahman, Saikat Chakraborty, Gail Kaiser, and Baishakhi Ray, In 19th IEEE International Working Conference on Source Code Analysis and Manipulation.

10. [**MSR 2018**] *Evaluating How Developers Use General-Purpose Web-Search for Code Retrieval.*
    Md M. Rahman, J. Barson, S.y Paul, J. Kayan, F. A. Lois, S. F. Quezada, C. Parnin, K. T. Stolee, B. Ray. In Proceedings of the 15th International Conference on Mining Software Repositories, 2018.

Peer Reviewed Full Journal Papers

1. [**CMBBE Journal 2020**] *SARTRES: A Semi-Autonomous Robot TeleopeRation Environment for Surgery.*
Md Masudur Rahman*, Mythra Varun Balakuntala Srinivasa Mur*, Mridul Agarwal, Upinder Kaur, Vishnunandan Lakshmi Venkatesh, Glebys Gonzalez, Natalia Sanchez Tamayo, Yexiang Xue, Richard Voyles, Vaneet Aggarwal, Juan Wachs. [* equal authorship], Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization Journal - AECAI Special Issue, 2020.

2. [**Military Medicine 2020**] *From the DESK (Dexterous Surgical Skill) to the Battlefield - A Robotics Exploratory Study.*
Glebys T. Gonzalez*, Upinder Kaur*, **Md Masudur Rahman***, Vishnunandan Venkatesh, Natalia Sanchez, Gregory Hager, Yexiang Xue, Richard Voyles, Juan Wachs. [* equal authorship], Military Health System Research Symposium (MHSRS) Journal, 2020.

3. [**IEEE Access 2018**] *Recommending GitHub Projects for Developer Onboarding.*
Chao Liu, Dan Yang, Xiaohong Zhang, Baishakhi Ray, **Md Masudur Rahman**. In IEEE Access, vol. 6, pp. 52082-52094, 2018.

Peer Reviewed Short Papers

1. [**MHSRS 2022**]*ASAP: A Semi-Autonomous Precise robotic framework for remote surgery under delays.*
Glebys Gonzalez, Mythra Balakuntala, Mridul Agarwal, **Md Masudur Rahman**, Thomas Low, Vaneet Aggarwal, Yexiang Xue, Richard M. Voyles, Juan Wachs., Abstract Paper at Military Health System Research Symposium (MHSRS), 2022.

2. [**MHSRS 2021**]*A Semi-autonomous Robotic Framework for Remote Surgery under Delays.*
Glebys Gonzalez, Mythra Varun Balakuntala Srinivasa Murthy, Mridul Agarwal, **Md Masudur Rahman**, Richard M. Voyles, Vaneet Aggarwal, Yexiang Xue, Juan Wachs., Abstract Paper at Military Health System Research Symposium (MHSRS), 2021.

3. [**MHSRS 2020**] *ASTRO: A Semi-Autonomous Telemedicine Robot for Operative Surgery.*
Glebys Gonzalez, **Md Masudur Rahman**, Mridul Agarwal, Mythra Balakuntala, Vishnu Venkatesh, Vaneet Aggarwal, Yexiang Xue, Richard Voyles, Gregory Hager, MAJ Andrew W Kirkpatrick, MAJ Steve Overholser, Juan Wachs. Abstract Paper at Military Health System Research Symposium (MHSRS), 2020.

4. [**ICSE '18 Companion**] *Which Similarity Metric to Use for Software Documents? A study on Information Retrieval based Software Engineering Tasks.*
Md M. Rahman, S. Chakraborty, B. Ray, In Proceedings of 40th International Conference on Software Engineering Companion, 2018.

5. [**SIGIR 2016**] *Topic Model based Privacy Protection in Personalized Web Search.*
W. Ahmad, **Md M. Rahman**, H. Wang, In Proceedings of the 39th International ACM SIGIR Conference on Research and Development in Information Retrieval, 2016.

Peer Reviewed Workshop Papers

1. [**FMDM@NeurIPS 2023**]*Natural Language-based State Representation in Deep Reinforcement Learning.*
Md Masudur Rahman and Yexiang Xue. Foundation Models for Decision Making Workshop at the thirty-seventh Annual Conference on Neural Information Processing Systems, 2023.

2. [**RRL@ICLR 2023**]*Accelerating Policy Gradient by Estimating Value Function from Prior Computation in Deep Reinforcement Learning.*
Md Masudur Rahman and Yexiang Xue. Workshop on Reincarnating Reinforcement Learning at he Eleventh International Conference on Learning Representations, 2023.

3. [**MoDeM@RLDM 2019**]*Morality in Decision-Making: A Causal Approach.*
Md M. Rahman. Accepted for oral presentation at RLDM Workshop on Moral Decision Making, 2019. [MoDeM Link][RLDM Link] [Video].

4. [**NLSE@FSE 2016**]*Finding Similar Projects in GitHub using Word2Vec and WMD.*
Md M. Rahman. Workshop on the Naturalness of Software at the 24th ACM SIGSOFT International Symposium on Foundations of Software Engineering, 2016. [Slides]

Preprint

1. *Open RL Benchmark: Comprehensive Tracked Experiments for Reinforcement Learning.* [arXiv] [pdf] [GitHub] Shengyi Huang, Quentin Gallouédec, Florian Felten, Antonin Raffin, Rousslan Fernand Julien Dossa, Yanxiao Zhao, Ryan Sullivan, Viktor Makoviychuk, Denys Makoviichuk, Mohamad H. Danesh, Cyril Roumégous, Jiayi Weng, Chufan Chen, **Md Masudur Rahman**, João G. M. Araújo, Guorui Quan, Daniel Tan, Timo Klein, Rujikorn Charakorn, Mark Towers, Yann Berthelot, Kinal Mehta, Dipam Chakraborty, Arjun KG, Valentin Charraut, Chang Ye, Zichen Liu, Lucas N. Alegre, Alexander Nikulin, Xiao Hu, Tianlin Liu, Jongwook Choi, Brent Yi. 2024

2. *A Case Study on the Impact of Similarity Measure on Information Retrieval based Software Engineering Tasks.* **Md Masudur Rahman**, Saikat Chakraborty, Gail Kaiser, Baishakhi Ray. Technical Report 2018.

Paper in Preparation

1. *Advancing Burn Depth Assessment through Ultrasound Imaging with Vision Transformers. 2024.* **Md Masudur Rahman**, Mohamed El Masry, Surya Gnyawali, Gayle Gordillo, Yexiang Xue, Juan P. Wachs.

2. *Robust Policy Optimization in Deep Reinforcement Learning. 2023.* **Md Masudur Rahman**, Yexiang Xue.

3. *Adversarial Style Transfer for Robust Policy Optimization in Deep Reinforcement Learning. 2023.* **Md Masudur Rahman**, Yexiang Xue.

4. *Adversarial Policy Optimization in Deep Reinforcement Learning. 2023.* **Md Masudur Rahman**, Yexiang Xue.

5. *Constraint Advantage Estimation for Policy Gradient in Deep Reinforcement Learning. 2023.* **Md Masudur Rahman**, Yexiang Xue.

SERVICE

- Conference Reviewer:
  - ICML 2022, 2023, 2024
  - ICLR 2024
  - NeurIPS 2022, 2023
  - UAI 2023, 2024
  - AISTATS 2023
  - AAMAS 2022, 2023, 2024
  - ECML-PKDD 2021
  - ICRA 2021
  - ICMLA 2021
  - RO-MAN 2021
- Sub-reviewer: ICLR (2023), NeurIPS (2019, 2020, 2021), ICML (2019, 2021), IJCAI (2019, 2021), UAI (2020, 2021), AISTATS 2020, AAMAS 2021, KDD-DMAIC (Workshop) 2019, VLDB Journal 2019.
- Journal Reviewer:
  - IEEE Robotics and Automation Letters (RA-L) 2024, 2023
  - IEEE Access 2018
- Institutional Service:
  - Faculty Search Committee Representative, Computer Science Graduate Student Association (CSGSA), Purdue University, 2022-2023
  - General Secretary, Bangladesh Students Association (BDSA), Purdue University, 2019-2020

TEACHING EXPERIENCES

Purdue University, West Lafayette, IN, USA

- CS 578: Statistical Machine Learning (Graduate), Spring 2021
  Role: Teaching Assistant
- CS 47300: Web Information Search And Management (Undergraduate), Fall 2020
  Role: Teaching Assistant

University of Virginia, Charlottesville, VA, USA

- CS 4780: Introduction to Information Retrieval (Graduate), Fall 2018
  Role: Teaching Assistant
- CS 6501: Data Science for Software Engineering (Graduate), Spring 2016
  Role: Teaching Assistant
- CS 3102: Theory of Computation (Undergraduate), Fall 2015
  Role: Teaching Assistant
- CS 3330: Computer Architecture (Undergraduate), Fall 2015, Spring 2016, Fall 2018
  Role: Teaching Assistant

BRAC University, Dhaka, Bangladesh

- CSE 220: Data Structure (Undergraduate), Fall 2014, Spring 2015, Summer 2015
  Role: Instructor
- CSE 260: Digital Logic Design (Undergraduate), Summer 2015
  Role: Instructor
- CSE 101: Introduction to Computer (Undergraduate), Fall 2014, Spring 2015
  Role: Instructor

MENTORSHIP

Zachery Peter Berg, Purdue University, USA, 2021-2022
B.Sc. in Computer Science, 2021
M.S. in Computer Science 2022
Topic: Double Descent in Deep Reinforcement Learning

Peter Khlebnikov, Purdue University, USA, 2022
B.Sc. in Computer Science, 2022
Topic: Exploration in Deep Reinforcement Learning

Brian Yifei Sun, Purdue University, USA, 2021
B.Sc. in Computer Science, 2021
Topic: Reinforcement Learning

Chao Liu, Chongqing University, China, 2018
Ph.D. in Software Engineering, 2018
Topic: Recommending GitHub Project for Developer Onboarding
Paper: IEEE Access 2018
Appointment (2023): Associate Professor, Chongqing University, China

Jed Barson, University of Virginia, USA, 2018
B.Sc. in Computer Science, 2018
Topic: Code Search
Paper: MSR 2018
First Job Appointment: Software Engineer at Cisco

Eliza Yixuan Nie, University of Virginia, USA, 2017
B.Sc. in Computer Science, 2017
Topic: GitHub Project Search
First Job Appointment: Software Engineer at Facebook

REFERENCE

Yexiang Xue
Assistant Professor, Department of Computer Science, Purdue University, USA
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Juan P. Wachs
Currently Program Director at the National Science Foundation (NSF)
Adjunct Professor of Surgery, IU School of Medicine
Professor of Biomedical Engineering (by courtesy)
Professor, School of Industrial Engineering
Purdue University, USA
Email: jpwachs@purdue.edu

Christopher W. Clifton
Professor and Interim Head of Computer Science, Purdue University, USA
Email: clifton@cs.purdue.edu

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