Ferdous Alam

Assistant Professor
George W. Woodruff School of Mechanical Engineering
Georgia Institute of Technology
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Professional Appointment

2026–now Assistant Professor
George W. Woodruff School of Mechanical Engineering
Georgia Institute of Technology

Director: Inference Lab

2023–2025 Postdoctoral Associate
Department of Mechanical Engineering
Massachusetts Institute of Technology

2022–2023 Research Intern & Collaborator
AI Lab, Autodesk Research
Autodesk Inc.

2016–2018 Lecturer
Department of Mechanical Engineering
Shahjalal University of Science and Technology, Bangladesh

Education

2018–23 **Doctor of Philosophy**
Mechanical Engineering
The Ohio State University

2018-21 **Master of Science**
Mechanical Engineering
The Ohio State University

2010-15 **Bachelor of Science**
Mechanical Engineering
Bangladesh University of Engineering and Technology, Bangladesh

Publications

Google Scholar

† → Equal contribution

Journal Articles

J1. Picard, C., Edwards, K., Doris, A. C., Man, B., Giannone, G., Alam, M. F. & Ahmed, F. From Concept to Manufacturing: Evaluating Vision-Language Models for Engineering Design. *Artificial Intelligence Review* (2025).

J2. Yu, N., Alam, M. F., Hart, A. J. & Ahmed, F. GenCAD-3D: CAD Program Generation using Multimodal Latent Space Alignment and Synthetic Dataset Balancing. *Journal of Mechanical Design*, 1–17 (2025).

J3. Alam, M. F. & Ahmed, F. GenCAD: Image-Conditioned Computer-Aided Design Generation with Transformer-Based Contrastive Representation and Diffusion Priors. *Transaction on Machine Learning Research (TMLR)* **1.** https://arxiv.org/abs/2409.16294 (2024).

J4. Alam, Md Ferdous, Wang, Y., Cheng, C.-Y. & Luo, R. Representation learning for sequential volumetric design tasks. *Journal of Mechanical Design (JMD)* **1.** https://arxiv.org/abs/2409.16294 (2024).

J5. Doris, A. C., Grandi, D., Tomich, R., Alam, Md Ferdous, Cheong, H. & & Ahmed, F. DesignQA: A Multimodal Benchmark for Evaluating Large Language Models' Understanding of Engineering Documentation. *Journal of Computing and Information Science in Engineering (JCISE)* **1.** https://arxiv.org/abs/2409.16294 (2024).

J6. Alam†, Md Ferdous, Lentsch†, A., Yu, N., Barmack, S., Kim, S., Acemoglu, D., Hart, J., Johnson, S. & Ahmed, F. From automation to augmentation: policy and practice to redefine engineering design and manufacturing in the age of nextgen-ai. *MIT Press* **1.** https://arxiv.org/abs/2409.16294 (2023).

J7. Zhang, Z., George, A., Alam, Md Ferdous, Eubel, C., Vallabh, C. K. P., Shtein, M., Barton, K. & Hoelzle, D. Autonomous manufacturing testbed to evaluate machine learning algorithm performance. *ASME Journal of Manufacturing Science and Engineering (JMSE)* **1.** https://arxiv.org/abs/2409.16294 (2023).

J8. Alam, Md Ferdous, Shtein, M., Barton, K. & Hoelzle, D. Reinforcement learning enabled autonomous manufacturing using transfer learning and probabilistic reward modeling. *IEEE Control Systems Letters (L-CSS)* **1.** https://arxiv.org/abs/2409.16294 (2022).

Peer-reviewed Conference Proceedings

C1. Doris, A., Alam, Md Ferdous, Heyrani Nobari, A. & Ahmed, F. *Cad-Coder: An Open-Source Vision-Language Model for Computer-Aided Design Code Generation* in *IDETC-CIE* (2025). https://arxiv.org/abs/2505.14646.

C2. Man, B., Nehme, G., Alam, M. F. & Ahmed, F. *VideoCAD: A Large-Scale Video Dataset for Learning UI Interactions and 3D Reasoning from CAD Software* in *NeurIPS Datasets Benchmarks Track (Poster)* (2025). arXiv%20preprint%20arXiv:2505.24838.

C3. Tsuji, C., Flores Medina, E., Gupta, H. & Alam, Md Ferdous. *Gencad-Self-Repairing: Feasibility Enhancement for 3d Cad Generation* in *IDETC-CIE* (2025). https://arxiv.org/abs/2505.23287.

C4. Yu, N., Alam, Md Ferdous, Hart, A. J. & Ahmed, F. *GenCAD-3D: CAD Program Generation using Multimodal Latent Space Alignment and Synthetic Dataset Balancing* in *IDETC-CIE* (2025).

C5. Doris, A. C., Grandi, D., Tomich, R., Alam, Md Ferdous, Cheong, H. & Ahmed, F. *DesignQA: Benchmarking Multimodal Large Language Models on Questions Grounded in Engineering Documentation* in *ASME International Design Engineering Technical Conferences (IDETC)* (2024).

C6. Alam, Md Ferdous, Shtein, M., Barton, K. & Hoelzle, D. J. *Reinforcement learning enabled autonomous manufacturing using transfer learning and probabilistic reward modeling* in *IEEE Conference on Decision and Control (CDC)* (2022). https://ieeexplore.ieee.org/document/9814884/metrics#metrics.

C7. Alam, Md Ferdous, Shtein, M., Barton, K. & Hoelzle, D. J. *Sample efficient transfer in reinforcement learning for high variable cost environments with an inaccurate source reward model* in *American Control Conference (ACC)* (2022). https://ieeexplore.ieee.org/document/9867896.
– invited paper.

C8. Alam, Md Ferdous, Shtein, M., Barton, K. & Hoelzle, D. J. *A physics guided reinforcement learning framework for an autonomous manufacturing system* in *American Control Conference (ACC)* (2021). https://ieeexplore.ieee.org/document/9482944.

C9. Alam, Md Ferdous, Shtein, M., Barton, K. & Hoelzle, D. J. *Autonomous Manufacturing Using Machine Learning: A Computational Case Study With a Limited Manufacturing Budget* in *Manufacturing Science and Engineering Conference (MSEC)* (2020). https://asmedigitalcollection.asme.org/MSEC/proceedings-abstract/MSEC2020/84263/V002T07A009/1095697.
– Best Paper Award (Conference MSEC 2020).

Preprints

P1. Alam, Md Ferdous, Naghizadeh, P. & Hoelzle, D. J. *Advantage-based policy transfer with metrics of transferability for Reinforcement Learning* ArXiv[Preprint]. 2024. https://arxiv.org/abs/2311.06731.

P2. Alam, Md Ferdous, Sezer, S., Zhang, Z., Shtein, M., Barton, K. & Hoelzle, D. J. *Reinforcement learning for autonomous manufacturing systems* ArXiv[Preprint]. 2024.

Presentations

Abstracts

A1. Alam, Md Ferdous & Ahmed, F. *On the Use of Diffusion Models for Image-Conditional Computer-Aided Design*. IDETC 2024 (Washington DC, USA). July 2024.

A2. Alam, Md Ferdous, Shtein, M., Barton, K. & Hoelzle, D. J. *Incorporating Physics Based Knowledge in Manufacturing Decision Making via Transfer Reinforcement Learning*. INFORMS annual meeting, 2022 (Nashville, TN). 2022.

Talks

T1. *AI for manufacturing excellence*. MIT ILP seminar with Aptar. 2025.

T2. *Challenges and opportunities for CAD augmented by AI.* Data to Design workshop, IDETC. 2025.

T3. *Foundational Models for Generative Computational Design.* NSF Artificial Intelligence (AI) in Engineering Design and Systems Engineering (AI-EDSE) workshop. 2025.

T4. *Generative models for manufacturable representations.* MIT CSE Community Seminar. 2025.

T5. *The role of representation in AI for design.* MIT CSE seminar. 2025.

T6. *The Unfinished Promise of Intelligent Computer-Aided Design.* MIT AI for Design and Manufacturing Lunch Seminar Series. 2025.

T7. *Use of artificial intelligence as foundation model for design.* University of Maine. 2025.

T8. *Artificial Intelligence for generative design and digital manufacturing systems* Mechanical and Aerospace Engineering, New York University (Tandon). 2024.

T9. *Envisioning the next generation of manufacturing automation* Department of Mechanical Engineering, University of Alabama. 2024.

T10. *The role of representation in AI for design* Data2Design workshop, ASME IDETC-CIE (Washington DC, USA). 2024. https://decode.mit.edu/D2D-IDETC24/.

T11. *Towards intelligent CAD system: Generative models for CAD* OnShape CAD Informatics workshop, ASME IDETC-CIE (Washington DC, USA). 2024. https://www.onshape.com/en/education/onshape-idetc/onshape-idetc-2024-workshop.

T12. *On the opportunities and challenges of generative AI* Digital Enterprise Transformation in the Age of AI, CFA Society Columbus. 2023. https://www.cfasociety.org/columbus/events/event-description?CalendarEventKey=48bb47d5-69fa-4178-83b7-018aa98129a5&CommunityKey=0a917673-c20f-4c61-9906-0185e481b96a&Home=%2fcolumbus%2fhome.

T13. *Incorporating Physics Based Knowledge in Manufacturing Decision Making via Transfer Reinforcement Learning* INFORMS Annual Meeting, Physics-based ML session. 2022.

T14. *Machine learning driven autonomous design and manufacturing* Intel Pathfinding Team. 2022.

Demonstrations & Tutorials

D1. *Tutorial on Coding with LLMs* MIT Mechanical Engineering. 2024.

Selected Media Coverage

2022 Featured in the plenary talk by Prof. Barton at CDC 2022 in the talk 'How Do We Learn to Use Learning in Manufacturing Systems'

2021 Featured in the MAE department news board

Awards & Honors

2025 Paper of distinction, IDETC 2025

2025 Ford Best Paper Award, IDETC 2025

2025 SEIKM Best Paper Award, IDETC 2025
2024 Google Research Scholar Award (Role: Co-PI)
2021 3-minute thesis (3rd place), MAE, OSU
2020 Best Paper Award, ASME MSEC 2020

Grants

G1. *MechTool-LLM: Integrating Large Language Models with Engineering Tools for Advanced Mechanical Engineering*. Google Research Scholar Award in Applied Science, ($75*k*). 2024. https://research.google/programs-and-events/research-scholar-program/recipients/.

Teaching

Georgia Institute of Technology

2026 Instructor, Computing Techniques (ME 2016)

Massachusetts Institute of Technology

2023 Teaching Staff, Artificial Intelligence and Machine Learning for Engineering Design (2.155/2.156)

The Ohio State University

2022 Graduate Teaching Associate, Kinematics and Mechanism Design (MEE 3751)
2022 Design and Analysis of Machine Elements, Science Theory and Practice (MEE 3760)

Shahjalal University of Science and Technology, Bangladesh

2018 Instructor, Programming methodology for mechanical engineering (MEE 128)
2018 Instructor, Mechanical engineering drawing (MEE 124)
2017 Instructor, Introduction to Mechanical Engineering (MEE 128)

Academic Advising

Graduate

2025 Ghadi Nehme, PhD student, MIT, Current affiliation: MIT
2024 Annie Clare Doris, PhD student, MIT, Current affiliation: MIT
2024 Nomi Yu, PhD student, MIT, Current affiliation: MIT
2024 Brandon Man, MS student, MIT, Current affiliation: MIT

Undergraduate

2022	Sarp Sezer, MAE senior, OSU, Current affiliation: Boeing
2021	Chris Eubel, MAE senior, OSU, Current affiliation: Path Robotics
2020	Christina Duong, CSE sophomore, OSU, Current affiliation: OSU
2018	A. Ashikuzzaman, ME senior, SUST, Current affiliation: UMN

Academic Service

Journal Reviewer

IEEE Transactions on Automatic Control (TAC)
Mechatronics (Elsevier)
Journal of Dynamic Systems, Measurement and Control
ASME Journal of Mechanical Design (JMD)
Journal of Computing and Information Science in Engineering (JCISE)

Conference Reviewer

Conference on Decision and Control (CDC)
American Control Conference (ACC)
IEEE Conference on Control Technology and Applications (CCTA)
North American Manufacturing Research Conference (NAMRC)
Manufacturing Science and Engineering Conference (MSEC)
IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)
Conference on Computer Vision and Pattern Recognition (CVPR)

Last updated: November 16, 2025