NOWRIN AKTER SUROVI, PhD

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SUMMARY OF QUALIFICATIONS

- 5 **years of research experience** in using **machine learning and AI for real-time monitoring in the Manufacturing domain.** 2 years of research experience applying generative artificial intelligence (GenAI) tools in the manufacturing domain at the **Engineering Lab, System Integration division, NIST**.
- Skilled in integrating acoustic and image-based experimental data with machine learning .
- Proficient in applying PyTorch and Keras libraries for **machine learning and deep learning in manufacturing applications**. Experienced in utilizing Large Language Models (**LLMs**) and Generative AI (**GenAI**) tools to enhance **manufacturing processes and workflows**.
- Serve as a reviewer for numerous journals and conferences in AI, manufacturing, and systems engineering. Worked as the **organizing member** and **session chair** for the *"Generative AI and Large Language Models (LLM) for Engineering"* session at the ASME IDETC/CIE 2025 conference. Currently, working as **organizing member** for *Artificial Intelligence and Machine Learning for Design and Manufacturing* and *Informatics for Design and Manufacturing* at the ASME IDETC/CIE 2026 conference. Elected as **Secretary** for the Systems Engineering, Information, and Knowledge Management (SEIKM) track for the **ASME IDETC-CIE 2026 leadership team.**
- Experienced in teaching Mechanics-related courses relevant to Materials and Mechanical Engineering.

EDUCATION

PhD in Engineering Product Development — Singapore University of Technology and Design (SUTD), Singapore
Interdisciplinary: EEE & Mechanical Engineering *CGPA : 4.30/5.00* — *September 2018-August 2023*

- **Thesis**: Acoustic-Based Geometric Defects Identification and Process Map Generation Using Machine Learning Algorithms in WAAM.

M.Sc. in Electrical and Electronic Engineering — University of Dhaka, Bangladesh
CGPA: 3.74/4.00 — *2015-2016*

- **Thesis**: Development of an algorithm for analyzing different skin diseases using an image processing method.

B.Sc. in Electronics and Communication Engineering — University of Dhaka, Bangladesh
CGPA: 3.76/4.00 (5^{th} among 80 students). — *2010-2014*

- **Thesis**: Comparison of the theoretical and experimental efficiency of silicon solar cell.

WORK EXPERIENCE

Researcher (Postdoctoral) — NIST, Maryland
System Integration Division, National Institute of Standards and Technology (NIST) — *January 2024 - present*

- Application of GenAI tools for materials characterization and defect detection in Additive Manufacturing.
- Focused on experimental data integration, LLM prompt engineering, and AI-informed acoustic/image analysis.

Intern — A*STAR, Singapore
*Singapore Institute of Manufacturing Technology (SIMTech), A*STAR* — *May 2019 - August 2019*

- Built a lightweight semantic segmentation model using ADE20K dataset and FCN+Mobilenetv2 and FCN+ShuffleNetv2 networks.
- Performed literature review on semantic segmentation model with a fisheye camera to navigate a system for mobile robots.

Research Assistant — BCSIR, Dhaka, Bangladesh
Physical Instrumentation Division, Bangladesh Council of Scientific and Industrial Research (BCSIR) — *March 2016 - March 2018*

- Developed algorithms for analyzing different skin diseases based on image features collected from the American Academy of Dermatology.
- Separated diseased skin from normal skin using image segmentation and adaptive histogram methods.
- Performed literature review and initial experiments on designing temperature controller, micro-controller based automatic voltage stabilizer and a monitoring system for Electrical and Electronics equipment using the Internet Of Things (IoT).

RESEARCH PUBLICATIONS

9 published (2 journals, 7 conferences), with additional papers under review.

- **Journals**

1. **Nowrin Akter Surovi**, Gim Song Soh. Acoustic Feature Based Geometric Defect Identification in Wire Arc Additive Manufacturing, *Virtual and Physical Prototyping, Taylor & Francis*, 2023.
2. **Nowrin Akter Surovi**, Gim Song Soh. Process Map Generation of Geometrically Uniform Beads Using Support Vector Machine, *Materials Today: Proceedings, Elsevier, 2022*.

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- **Conference Proceedings**

1. **Nowrin Akter Surovi**, , Paul Witherell, Vinay Saji Mathew, and Soundar Kumara. Current State and Benchmarking of Generative Artificial Intelligence for Additive Manufacturing, *Proceedings of the ASME 2024 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, 2024.
2. **Nowrin Akter Surovi**, Paul Witherell. Generative Artificial Intelligence (GenAI) Prompt Engineering for Additive Manufacturing (AM), *International Solid Freeform Fabrication Symposium*, 2024.
3. Yeun Park, Paul Witherell, **Nowrin Akter Surovi**, and Hyunbo Cho. Ontology-based Retrieval Augmented Generation (RAG) for GenAI-supported Additive Manufacturing, *International Solid Freeform Fabrication Symposium*, 2024.
4. **Nowrin Akter Surovi**, Gim Song Soh. A Heuristic Approach To Classify Geometrically Defective Bead Segments Based on Range of sound power, Range of curvature and Maximum height, *Proceedings of the ASME 2023 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, 2023.
5. **Nowrin Akter Surovi**, Gim Song Soh. Multi-bead and Multilayer Printing Geometric Defect Identification Using Single Bead Trained Models, *International Solid Freeform Fabrication Symposium*, 2023.
6. **Nowrin Akter Surovi**, Shaista Hussain, Gim Song Soh. A Study of Machine Learning Framework For Enabling Early Defect Detection In Wire Arc Additive Manufacturing Processes,*Proceedings of the ASME 2022 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, 2022.*
7. **Nowrin Akter Surovi**, Audelia G. Dharmawan, Gim Song Soh. A Study on the Acoustic Signal Based Frameworks for the Real-Time Identification of Geometrically Defective Wire Arc Bead, *Proceedings of the ASME 2021 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, 2021.*

TEACHING EXPERIENCE and MENTORING

Graduate Teaching Assistant (GTA) SUTD

September 2021 - April 2022

As a graduate teaching assistant, I supervised students in lecture and laboratory classes, tracked attendance, graded home works and assignments and gave extra help to students who were struggling with homework, assignments and concepts.

- **Tutored Courses-**
  - **Machine Element Design (30.105)**: Engineering Product Development (EPD) Pillar - Fall, 2021
  - **Structure and Materials (30.001)**: Engineering Product Development (EPD) Pillar - Spring, 2022.

Mentor SUTD, NIST, POSTECH

I held consultation, discussion and brainstorming to train the students in academic research. I also read their presentations and write-ups and provided feedback to improve them.

- **Wei Sheng Lim**: PhD student at Singapore University of Technology and Design. (2022-2023)
- **Yeun Park**: PhD student at Pohang University of Science and Technology (POSTECH) and associate at NIST (2024).
- **Gisuk Hong**: PhD student at Pohang University of Science and Technology (POSTECH) and associate at NIST (2025).

ACADEMIC SERVICES

- **Reviewer:** SFF Symposium Proceedings 2023 and 2024, International Journal of Cast Metals Research, J. Comput. Inf. Sci. Eng (JCISE) etc.
- **Leadership Role in ASME IDETC/CIE** Elected as Secretary for the Systems Engineering, Information, and Knowledge Management (SEIKM) track at ASME IDETC-CIE for the 2026 leadership team.
- **Organizing member in ASME IDETC/CIE conference** *Associated with organizing members in different tracks in the AI/ML TC and the SEKIM track in ASME IDETC/CIE conference.*
  - **Session: AI/ML TC**: Generative AI and Large Language Model (LLM) for Engineering
  - **Session: SEIKM** : Artificial Intelligence and Machine Learning for Design and Manufacturing
  - **Session: SEIKM**: Informatics for Design and Manufacturing

AWARDS & ACHIEVEMENTS

- **ASME Family Support Micro-Grant 2024 and 2025.**
- **SUTD PhD Fellowship.**
- **Teaching Training Certificate** issued by The Learning Sciences Lab, Singapore.
- **National Science and Technology (NST) Scholarship by the Ministry of Science and Technology, Bangladesh, 2016** for conducting M.Sc thesis work.
- **Dhaka University Merit Scholarship, Bangladesh, 2014.** for outstanding results in Undergrad.
- **Dhaka University Alumni Association Scholarship, Bangladesh, 2011.** for securing the second position in the first year of Undergrad.

TALKS

- **NIST Sigma Xi Early-Career Poster Presentation (ECPP) 2024 and 2025 :** Presented my work on Generative Artificial Intelligence for Additive Manufacturing.
- **Workshop at NIST 2025 :** Presented: AI in Additive Manufacturing at the *"AI in Manufacturing"*workshop organized by NIST
- **IDETC/CIE 2025 :** Presented: *Generative Artificial Intelligence (GenAI) Agent-Based Systems for Manufacturing.*
- **IDETC/CIE 2024 :** Presented my paper: *Current state and Benchmarking of Generative Artificial Intelligence for Additive Manufacturing.*
- **SFF 2024 :** Presented my paper: *Generative Artificial Intelligence (GenAI) Prompt Engineering for Additive Manufacturing (AM).*
- **IDETC/CIE 2023 :** Presented my paper: *A heuristic approach to classify geometrically defective bead segments based on range of curvature, range of sound power and maximum height.*
- **SFF 2023 :** Presented my paper: *Multi-Bead And Multi-Layer Printing Geometric Defect Identification Using Single Bead Trained Models.*
- **SUTD AM Conference 2022:** Presented my paper: *Process map generation of geometrically uniform beads using support vector machine.*
- **DManD Research Seminar 2022 :** Gave a talk on Hybrid Wire-Arc Additive Manufacturing.
- **IDETC/CIE 2021 :** Presented my paper: *A Study on the Acoustic Signal Based Frameworks for the Real-Time Identification of Geometrically Defective Wire Arc Bead.*
- **SUTD Lunch and Talk, 2021 :** Delivered a guest lecture on ' Real time Identification of Defective Beads'.

TECHNICAL SKILLS

- **Software:** Blender, SOLIDWORKS, AutoCAD, Packet Tracer.
- **Languages**: Python, Java, C, Matlab, HTML, JavaScript, Assembly.
- **Libraries**: Scikit-Learn, Numpy, Scipy, Pandas, OpenCV, Hugging Face.
- **Deep learning Libraries**: Keras, Pytorch.
- **GenAI Agent framework**: Autogen
- **Office Application**: Microsoft Word, Microsoft Excel, Microsoft PowerPoint, Outlook.