

Showmic ISLAM, Ph.D.

University of Nebraska-Lincoln

showmicislam.com | sislam2@unl.edu | [linkedin.com/in/showmic-islam/](https://www.linkedin.com/in/showmic-islam/) | 531-248-9538

Last Updated: February 9, 2024



SUMMARY

The overarching goal of my research is to improve the **manufacturing process** of polycrystalline and composite materials by developing state of the art non-destructive material characterization techniques. To achieve this goal, I plan to use my expertise in **computational and experimental mechanics** of Ultrasonic NDE (non-destructive evaluation) techniques. Topic of my research interest includes:

- Develop ultrasonic scattering model for complex polycrystalline and composite materials
- Optimize the process-structure-property relationship of Additive Manufacturing for polycrystalline and composite materials
- Develop methods to certify Additively Manufactured parts in-situ using data fusion from different sensors
- Implement ultrasonic NDE techniques in biomedical applications

EDUCATION

- 2016-2022 **University of Nebraska-Lincoln at Lincoln, Nebraska**
Ph.D. in Mechanical Engineering and Applied Mechanics
Dissertation Title: Ultrasonic scattering in two-phase polycrystalline materials using synthetic volumes
Adviser: Dr. Joseph Turner; **Committee Members:** Dr. Jeffrey Shield, Dr. Ruqiang Feng & Dr. Greg Bashford
- 2022 **University of Nebraska-Lincoln at Lincoln, Nebraska**
M.Sc. in Mechanical Engineering and Applied Mechanics
- 2015 **Bangladesh University of Engineering & Technology (BUET), Dhaka**
B.Sc. in Mechanical Engineering
Thesis Title: Analysis of entropy generation of MHD mixed convection in a lid-driven differentially heated square cavity

GRANTS

- **MxVRail** “Ultrasonic Mapping of Effective Case Depth of Railroad Bearing Components” for **\$105,000. Role Co-PI (Submitted)**
- **MxVRail** “Metal Additive Manufacturing of Railroad Bearing Rollers: Prospects for Integrated Sensors” for **\$102,000. Role Co-PI (Submitted)**

PROFESSIONAL EXPERIENCE

- Aug 2021- **HPC Applications Specialist:** Holland Computing Center
- Work on research software and applications for **High Performance Computing (HPC)**
 - Writing **grants** and research proposal
 - Running scientific parallel computational work in **HPC**
 - **Instructor:** Conduct training and workshop for researchers about High Performance Computing
- Aug 2021- **Research Computing Facilitator:** **OSG**
- **Instructor:** Teach researchers how to run their computations on distributed computing
 - Conduct training for researchers to help them learn **High Throughput Computing (HTC)**
 - Create **parallel computational research** workflow in HTC

- Develop repository of **research software**
- Jan-July 2023 **Post Doctoral Researcher:** University of Nebraska-Lincoln
- Writing **grants** and research proposal
 - Mentor graduate(**1 Ph.D. and 3 Master's**) students.
 - Mentoring resulted in a conference presentation and an invitation to OSG User School.
- 2017-2021 **Substitute Teacher:** Taught 5 classes for two courses
- 2017-2021 **Graduate Research Assistant:** University of Nebraska-Lincoln
Funded by **Air Force Research Laboratory**
- Developed ultrasonic **scattering model** for two-phase polycrystalline materials
 - Created pipeline for creating synthetics with **complex microstructural** features
 - Studied **synthetic microstructures** created using different algorithms
 - Quantified ultrasonic scattering from a **distribution of grain sizes**
- Funded by **Amsted Rail Brenco**
- Developed algorithm to track inclusions and estimate the size and depth of the inclusion in different parts of railway bearings. The **software is being used** by Amsted Rail Brenco to select premium quality materials.
 - Studied the variation of **maximum shear stress** due to presence of an inclusion on a railway bearing assembly using Finite Element Analysis
- 2016-2017 **Graduate Teaching Assistant:** University of Nebraska-Lincoln
- Took **recitation classes** and graded papers for “Heat and Mass Transfer” course
 - Class comprised of 60 students
- 2014 **Internship:** ACI Pharmaceuticals Limited
- Gathered knowledge about **HVAC, Generators, Boilers, Water Purification System** and overall working procedure of a pharmaceutical company.
- Remark:** ACI Pharmaceuticals is one of the largest pharmaceutical companies in Bangladesh

PUBLICATIONS

Peer reviewed Journal Articles **Denotes Under Review by Corresponding Author*

1. **Islam, S.**, Uchic, M. D., & Turner, J. A. (2024). “Dataset for the Ultrasonic Scattering in Polycrystalline materials with a grain size distribution.” Integrating Materials and Manufacturing Innovation(*)
2. **Islam, S.**, Norouzian, M., & Turner, J. A. (2022). “Influence of tessellation morphology on ultrasonic scattering”. The Journal of the Acoustical Society of America, 152(3), 1951-1961. (The paper was cover for the **Physical acoustics** section)
3. Norouzian, M. **Islam, S.**, Uchic, M. D., & Turner, J. A. (2024). “Reconstruction of 3D Grain Size Distribution Based on 2D Statistics”. Scripta Materialia(*)
4. **Islam, S.** & Turner, J. A. (2024). “Ultrasonic Scattering in Two-phase Polycrystalline Materials”. Ultrasonics (*)
5. Norouzian, M., **Islam, S.**, & Turner, J. A. (2020). “Influence of microstructural grain-size distribution on ultrasonic scattering”. Ultrasonics, 102, 106032.

Peer reviewed Conference Papers

6. **Islam, S.**, Deshpande, S. P., Sotelo, L. D., Norouzian, M., Lumpkin, M. T., Ammerlaan, L. F., Fuller, J. A., & Turner, J. A. (2020, September). “Quantitative ultrasonic characterization of subsurface inclusions in tapered roller bearings.” In 12th International Symposium on Rolling Bearing Steel: Progress in Bearing Steel Metallurgical Testing and Quality Assurance (pp. 66-81). ASTM International.

7. Jaman, M. S., **Islam, S.**, Saha, S., Hasan, M. N., & Islam, M. Q. (2016, July). "Effect of Reynolds and Grashof numbers on mixed convection inside a lid-driven square cavity filled with water-Al₂O₃ nanofluid." In AIP Conference Proceedings (Vol. 1754, No. 1). AIP Publishing.
8. **Islam, S.**, Jaman, M. S., Mojumder S., Saha, S (2015). "Effect of Richardson Number on Aiding Mixed Convection Inside A Lid-driven Differentially Heated Square Cavity"; Proceedings of 7th International Mechanical Engineering Conference and 16th Annual Paper Meet, Paper No. HT-08, IEB, Dhaka, Bangladesh

AWARDS & HONORS

- 2022 Recipient of the American Society of Non-destructive Testing (**ASNT**) **Student Travel grant**
- 2019 **Invited to attend OSG Summer School** workshop at University of Wisconsin-Madison
- The workshop focused on High Throughput Computing
 - 60 participants were selected out of 120 applicants
- 2019 3rd out of 25 participants in poster presentation at **Supercomputing and Life Sciences symposium**. The symposium was organized by the Holland Computing Center.
- 2013 15th out of 60 teams in **NASA's Lunabotics Mining Competition**,
- 2013 5th out of 80 teams in Engineering Students Association of Bangladesh (ESAB)'s **Inter University Design Contest, 2013**

TEACHING EXPERIENCE

- Aug 2021- Now **Instructor** at OSG
- **Developed and taught** two courses *Troubleshooting on the OSPool* and *Self-Checkpointing on the OSPool* at [OSG User School 2023](#) and [OSG User School 2022](#)
 - 60 participants** attended the school
 - **Trained faculty and researchers** on how to use distributed computing and different [softwares](#) at multiple software carpentry workshops
- Oct 2021-Now **Certified Software Carpentry instructor**
- Certified to teach any [carpentry courses](#)
 - Developed software **teaching curriculum**-R, MATLAB on distributed computing
- May 2023 Conducted a **teaching workshop** on Scaling up Computing on OSPool at Great Plains Network ([GPN](#)) 2023. Total **20 participants** attended the workshop
- Fall 2021 **Substitute Teacher** for 5 classes in both
- *Mech 801: Analytical Methods in Engineering* (Graduate only)
 - *Mech 875: Vibration theory and Applications* (Dual-Listed)
- Class consisted of around **20 students**
- 2016-2017 **Teaching Assistant** for 2 semesters
- Took **recitation classes** and graded papers for "Mech 420: Heat and Mass Transfer" course (Dual Listed)
 - Class comprised of **60 students**

PRESENTATIONS

Conference Presentations

- July, 2023 Dependence of Ultrasonic Scattering on Case Depth in Railroad Bearing Components. Adelong, T., **Islam, S.**, Matz, N. J., Swerczek, N., Brandl, W. Fuller, A. J., Ammerlaan, A. F., and Turner, J. A.
Proceedings of the ASNT Research Symposium, Columbus, Ohio
- June, 2022 Ultrasonic Scattering in Two-Phase Polycrystalline Materials
S Islam, JA Turner; ASNT Research Symposium
- June, 2022 Numerical and experimental analysis of ultrasonic scattering in two-phase polycrystalline materials
S Islam, M Uchic, JA Turner;

- June, 2022 The Journal of the Acoustical Society of America 152 (4), A282-A282
 Ultrasonic scattering predictions of two-phase polycrystalline materials based on digital microstructures
S Islam, JA Turner
- March, 2021 The Journal of the Acoustical Society of America 151 (4), A272-A273
 Influence of Morphology on Ultrasonic Scattering: A Theoretical Study
S Islam, JA Turner; TMS Annual Meeting & Exhibition
- May 2019 Microstructure characterization of metals: ultrasonic backscatter measurements analyzed using synthetic polycrystals
 M. Norouzian, **S. Islam**, A. L. Pilchak, M. D. Uchic, and J. A. Turner
- June 2018 Review of Progress in Quantitative Nondestructive Evaluation, Portland, OR
 Influence of microstructural grain-size distribution on ultrasonic scattering
 M. Norouzian, **S. Islam**, and J. A. Turner
- Review of Progress in Quantitative Nondestructive Evaluation, Burlington, VT

Poster Presentations

- 2020 Influence of Morphology of Synthetic Microstructures on Ultrasonic Scattering and Attenuation
S Islam, J. A. Turner
- 2019 Detection of Near Race Subsurface Inclusion Using Ultrasonic Surface Waves in Railroad Tapered Roller Bearings
S Islam, S P. Deshpande, J. A. Turner
- 2019 Calculations of Ultrasonic Properties for Simulated Microstructures Created Using DREAM.3D
 N Matz, M Norouzian, **S Islam**, J. A. Turner
 (3rd out of 25 posters)

MENTORING EXPERIENCE

- **Graduate Students (Ph.D.'s)**

- Faezeh Afsar Hatem, Mechanical and Materials Engineering
 - * Mentoring resulted in an invitation to the **OSG User School of 2022**

- **Graduate Students (Master's)**

- Cody Pratt: Mechanical and Materials Engineering
 - * Mentored in using **supercomputing and computational analysis** in MATLAB.
 - * Currently working as Research Engineer at **TIMET**
- Trevor Adelung; Mechanical and Materials Engineering
 - * Mentoring resulted in a **conference presentation at ASNT**
 - * Provided guidance on using ultrasound on inspection of railway bearings
- Anthony Guevarra; Mechanical and Materials Engineering
 - * Mentored on using **HPC** at UNL

- **Undergraduate Students:**

- Matthew Wegener; Mechanical and Materials Engineering
 - * Mentored on usage of ultrasound to calculate the wavespeed and depth of inclusions

* Working as Lead Operations Engineer at **Southwest Research Institute**

SERVICE AND OUTREACH

June 2023-Present **Reviewer** of Research in Nondestructive Evaluation (RNDE)
Summer 2020 Served as a **reviewer** at Undergraduate Creative Activities and Research Experience program in University of Nebraska-Lincoln
Summer 2019 **3D Microstructure Studies Summer School** at Carnegie Mellon University
• The seminar equipped the learner with skills regarding the creation and analysis of complex synthetic microstructures in DREAM.3D Software.

PROFESSIONAL AFFILIATIONS

- The American Society for Nondestructive Testing
- The Acoustical Society of America

SKILLS

Languages	Fluent in English and Bengali
Scientific Tools	DREAM.3D: Creating and analyzing 3D synthetic micro-structures MATLAB: Numerical analysis of wave propagation on synthetic microstructures, Calculation of wave speed & attenuation, Algorithm development for tracking inclusions, GUI development, Image Processing, Serial communication with micro-controller Ansys, Abaqus: 3D Static modeling Comsol: 2D heat convection analyses, Solution of Navier stokes equations
Programming Languages	Python: Automating workflow, Webscraping, Scripting Bash: Automating workflow, scripting C#: 2D Finite Element Analysis
DESIGNING TOOLS	Solidworks, Autodesk Inventor: 2D & 3D modeling
Computing	Docker, Singularity and Apptainer: Build images for scientific computing e.g. DREAM.3D, TOPAS to use on High Throughput Computing