ABDULLAH ARAFAT

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EDUCATION

M.S in Mechanical Engineering [Aug 2022 - May 2024]
The University of Utah | CGPA: 3.850/4.00 *Salt Lake City, UT, USA*

- **Thesis:** Investigated the nano-mechanical behavior of amorphous porous silica and nanoconfined H_2, CO_2, and H_2O in geological hydrogen storage with molecular dynamics simulation using LAMMPS, Ovito, VMD, etc.
- **Projects:** a) Finite Element Analysis (FEA) of heat transfer in a Mug with a mug warmer using Fenics & Abaqus.
  b) Numerical Analysis of Aluminum Alloy 6061-T6: Elastic and Plastic Behavior using Python.
- **Relevant courses:** Molecular Simulation, Mathematics for Data Science, Micromachining, Finite Element Method, Continuum Mechanics.

B.S in Materials Science and Engineering [Feb 2017 - Mar 2022]
Khulna University of Engineering and Technology | CGPA: 3.62/4.00 (Top 20%) *Khulna, Bangladesh*

- **Thesis:** Reaction mechanism of CVD-grown 2D MoS_2 through MoO_3 and H_2S precursors with molecular dynamics simulation using LAMMPS, Orca and Materials studio - **(Published in Nature - Scientific Report Journal)**.
- **Experiments:** a) Microstructure analysis of iron and steel samples using optical microscopy.
  b) Brinell.Rockwell hardness test and Charpy impact test on steel samples.
  c) Sand casting using Aluminum melt.
- **Relevant courses:** Computational Materials Science, Materials Manufacturing Process, Phase Diagram, Welding and Metal Joining Process, Crystallography, Computer-Aided Design.

SKILLS

- **Design, Rendering, and Simulations:**
  SolidWorks (CSWP, CSWA), AutoCAD, Ansys, Abaqus, Fenics, Paraview, **LAMMPS, VMD**, Ovito, VESTA, Materials Studio, Blender, Key Shot.
- **Micromachining:**
  DRIE Bosch Process, Wet etching, CVD, PVD, Thermal oxidation, Mask making, etc.
- **Manufacturing and Testing:**
  3D printing, CNC Milling, Laser cutting, Molding, Sand casting, Pattern Design, Welding, Tensile test, Torsion test, Bending test, Column buckling test etc.
- **Programming, Data analysis & Others:**
  Python, C++, Bash, Batch, LaTeX, Excel, ImageJ, Linux (Ubuntu), Microsoft Office, Adobe Illustrator, Adobe Photoshop.

RESEARCH PUBLICATIONS

Citations: 18, H-index: 2

Book Appendix:

- Mubin, Shafat, Jichen Li, and Steven Plimpton. Extending and Modifying LAMMPS Writing Your Own Source Code: A pragmatic guide to extending LAMMPS as per custom simulation requirements. Packt Publishing Ltd, 2021: Page (304-311)

Journal Publication:

- **Arafat, Abdullah**, Md Sherajul Islam, Naim Ferdous, ASM Jannatul Islam, Md Mosarof Hossain Sarkar, Catherine Stampfl, and Jeongwon Park. "Atomistic reaction mechanism of CVD grown MoS2 through MoO3 and H2S precursors." Scientific Reports 12, no. 1 (2022): 16085. **(Undergraduate Thesis)**
- Hossain Sarkar, Md Mosarof, Md Sherajul Islam, **Abdullah Arafat**, ASM Jannatul Islam, Naim Ferdous, Md Tawabur Rahman, Minhaz Uddin Sohag, Md Al Imran Fahim, Catherine Stampfl, and Jeongwon Park. "Effects of the Substrate Structure on the CVD Growth of Two-Dimensional Hexagonal Boron Nitride." The Journal of Physical Chemistry C 126, no. 14 (2022): 6373-6384.
- Komol, Md Mostafizur Rahman, Md Karimul Joarder**, Abdullah Arafat**, and Amit Kumer Podder. "Fingerprint and password controlled garage access system with belt pulley and power screw driven mechanism." International Journal of Advanced Mechatronic Systems 8, no. 1 (2020): 36-45.
- Komol, Md Mostafizur Rahman, Amit Kumer Podder, **Abdullah Arafat**, and Tanzim Nabeed. "Remote sensing global ranged door lock security system via mobile communication. " International Journal of Wireless and Microwave Technologies 9, no. 5 (2019): 25-37.

Conference Publication:

- Md. Jarir Hossain, Md. Mahbubur Rahman, Fahim Islam Anik, MD Ikramul Hasib, **Abdullah Arafat**. "Numerical Investigation on Fatigue Life Estimation of Aluminum Structure for Uniaxial Cyclic Loading by Finite Element Modeling." International Conference on Mechanical Engineering and Renewable Energy 2019 (ICMERE2019)

RESEARCH EXPERIENCE

Graduate Research Assistant [Aug 2022 - Present]
The University of Utah Salt Lake City, UT, USA

- Conducting research within the computational and theoretical framework of porous media at the atomic scale
- Investigating the dependency of mechanical properties of porous SiO_2 on pore size and shape at the atomic scale.
- Investigating the impact of different gases and fluids on the diffusivity of hydrogen in underground hydrogen storage at the atomic scale.

WORK EXPERIENCES

Laboratory Teaching Assistant (Team Lead) [Aug 2022 - Present]
The University of Utah Salt Lake City, UT, USA

- Conducted laboratory sessions and supervised over 200 students, instructing them in experimental techniques and safety protocols for the **Mechanics of Materials (ME EN 3315) course**.
- Set up and calibrated various mechanical testing equipment:
    - Used Instron 5985 for dogbone specimen and rivet joint **tensile tests**, Admet 9618 V for **torsion tests**, MTS Insight 50 for **bending & column buckling tests**, and P3 strain indicator for measuring strain in pressure vessels.
- Offered individualized assistance, addressing inquiries and clarifications
- Collaborated with instructors to develop new experiment procedures.

Operator [Aug 2019 - Mar 2020]
FabLab KUET Khulna, Bangladesh

- Managed fabrication of 13 undergraduate thesis projects, 1000 key rings, and 10+ intricate designs using different equipment:
    - Used Ultimaker 3 for Fused deposition modeling (FDM) **3D Printing**, Roland MDX-540 for **CNC milling**, and Epilog Laser MINI 18 for **laser cutting**.
- Maintained lab instrument functionality, ensuring smooth project operations.

CERTIFICATIONS

- Certified SOLIDWORKS Professional (CSWP) - Credential ID: C-A6HWVU5MSB — Jan 2019
- Certified SOLIDWORKS Associate (CSWA) - Credential ID: C-49FPLUKRNS — Jun 2019

EXTRA-CURRICULAR EXPERIENCES

- Dassault Systems community - **Official SOLIDWORKS Champion** — 2021 - Present
- Graduate Student Advisory Committee (GSAC) **-** Member — 2023 - Present
- American Geophysical Union - Member — 2023 - Present
- KUET Career Club - Head of IT and Resource — 2019 - 2022
- Spectrum (Professional Skill Development Club of KUET) - Chief Technology Officer (CTO) — 2019 - 2020
- CADers - Head of IT and Resource — 2018 - 2020
- Youth Opportunities (YO) - Campus Ambassador — 2018 - 2020

HONORS AND AWARDS

- ASME CUET Extrusion **CAD Contest** - 2nd/100 participants — Aug 2020
- Dean List Award for academic excellence — Jan 2019
- IPE FEST **CAD Contest** - 2nd/75 participants — Dec 2018
- Ignition **CAD Contest** - 1st /150 participants — Sept 2018
- WASH Innovation Challenge 2018 (*Bhutan*) - Finalist in South Asia — Oct 2018
- 9th International Olympiad on Astronomy and Astrophysics (IOAA) (Indonesia): Finalist among 41 countries — Jul 2015