Abdullah Al Amin, Ph.D.

Assistant Professor, Department of Mechanical and Aerospace Engineering, University of Dayton
Principal Investigator, Smart Manufacturing Advancement and Logistics Technology Lab, SMALT Lab
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Research Interests

- **Additive Manufacturing**
  - Laser Powder Bed Fusion Process Modeling
  - AM Part Qualification via Non-Destructive Evaluation
- **Superconducting Magnet Design**
  - Magnetic Resonance Imaging (MRI) Magnets
  - Tokamak Fusion Magnets
  - Magnetic Sensing Devices
- **Energy & Materials**
  - Metal Matrix Composites, Fusion Energy, Superconducting Wires
  - Solar Cells
  - Battery Technologies
- **Computational Science**
  - Multiphysics and Multiscale Modeling
  - High Performance Computing
  - Scientific Machine Learning
  - Atomistic, molecular, and continuum modeling

Education

Ph.D. **Case Western Reserve University**, Mechanical Engineering — 2018
Thesis: *Multiscale Multiphysics Thermo-Mechanical Modeling of an MgB_2 Based Conduction Cooled MRI Magnet System*
Adviser: Prof. Michael Martens and Prof. Ozan Akkus

M.S. **The University of Akron**, Mechanical Engineering — 2014
Thesis: *High throughput particle separation using differential Fermat spiral microchannel with variable channel width*
Adviser: Prof. Jiang Zhe

B.S. **Bangladesh University of Engineering and Technology**, Mechanical Engineering — 2009
Thesis: *Design, Improvement, Modification & Fabrication of Mechanisms and Control Systems of Robots for ABU ROBOCON*
Adviser: Prof. Maglub Al Nur

Appointments

Assistant Professor, Mechanical and Aerospace Engineering, University of Dayton — Dayton, OH, Aug 2023 - Present

Postdoctoral Fellow, Mechanical Engineering, Northwestern University — Evanston, IL, Feb 2021 - Jul 2023
Adviser: Prof. Wing Kam Liu
Project: Development of an FVM based high fidelity multiphysics laser powder

bed fusion solver.

Research Engineer, Research Engineer, Bridgestone Americas Technical Center — Akron, OH — Jan 2018 - Jan 2021

Projects:

- Development of a hybrid analytical-FEA tire analysis framework for cornering and braking
- Composite polymer material modeling

Graduate Research Assistant, Case Western Reserve University — Cleveland, OH — Aug 2013 - Dec 2017

Projects: Development of a multiscale multiphysics model of a full body 1.5 T MRI main magnet

Graduate Research Assistant, The University of Akron — Akron, OH — Aug 2010 - Jul 2013

Projects:

- Characterization of a high temperature, high vacuum soft microgripper
- Development of a high throughput microparticle separation device

Teaching Experience

Assistant Professor, Mechanical and Aerospace Engineering — Dayton, OH — Aug 2023 - Present

University of Dayton

Courses Taught:

- MEE 427 - Mechanical Design I (Undergraduate)
- MEE 490/590 - Advanced Manufacturing (Senior Undergraduate/Graduate)

Assistant Director, Predictive Science and Engineering Design (PSE&D) — Evanston, IL — Sep 2022 - Jun 2023

Northwestern University

A Northwestern University fellowship program where fellows are selected from a pool of applicants and trained with concurrent state-of-the-art computational modeling techniques through three quarters (Fall, Winter, Spring) of courses.

Guest Lecturer, Northwestern University — Akron, OH — Jan 2018 - Jan 2021

Courses Taught:

- Mechanistic Data Science
- Advanced FEM II: Materials and reduced order models

Graduate Teaching Assistant, Case Western Reserve University — Cleveland, OH — Aug 2013 - Dec 2017

Courses Assisted and Taught:

- Musculoskeletal Biomechanics
- Mechanical Engineering Measurements Laboratory
- Senior Design Project

Graduate Teaching Assistant, The University of Akron — Akron, OH — Aug 2010 - Jul 2013

Courses Taught:

- Mechanical Engineering Drawing
- Tools for Mechanical Engineering Lab

Lecturer, Green University of Bangladesh — Dhaka, Bangladesh — Jun 2010 - Aug 2010

Courses Taught:

- Introduction to Mechanical Engineering

- Machine Ergonomics
- Mechanical Engineering Drawing

Lecturer, College of Aviation Technology, Bangladesh — Dhaka, Bangladesh
Courses Taught: — Feb 2010 - May 2010
- Introduction to Mechanical Engineering

Adjunct Lecturer, Green University of Bangladesh — Dhaka, Bangladesh
Courses Taught: — Oct 2009 - May 2010
- Mechanical Engineering Drawing

Journal Articles

(Mentees are in red text with an asterisk *)

[J1] Sultana, Nishat; Amin, Abdullah A.; Payton, Eric J.; Kim, Woo Kyun. Prediction of Raman Signatures, Electronic Structure, and Ion Transport Mechanisms in Nb2C and Nb2CO2 MXenes for Li/Na-ion Batteries: An *Ab Initio* Study. *Journal of Physics and Chemistry of Solids* 209 (Feb. 2026), p. 113218.

[J2] Li, Yangfan; Mojumder, Satyajit; Lu, Ye; Amin, Abdullah Al; Guo, Jiachen; Xie, Xiaoyu; Chen, Wei; Wagner, Gregory J.; Cao, Jian; Liu, Wing Kam. Statistical Parameterized Physics-Based Machine Learning Digital Shadow Models for Laser Powder Bed Fusion Process. *Additive Manufacturing* 87 (May 2024), p. 104214.

[J3] Amin, Abdullah Al; Li, Yangfan; Lu, Ye; Xie, Xiaoyu; Gan, Zhengtao; Mojumder, Satyajit; Wagner, Gregory J.; Liu, Wing Kam. Physics Guided Heat Source for Quantitative Prediction of IN718 Laser Additive Manufacturing Processes. *npj Computational Materials* 10.1 (Feb. 2024), p. 37.

[J4] Mojumder, Satyajit; Gan, Zhengtao; Li, Yangfan; Amin, Abdullah Al; Liu, Wing Kam. Linking Process Parameters with Lack-of-Fusion Porosity for Laser Powder Bed Fusion Metal Additive Manufacturing. *Additive Manufacturing* 68 (Apr. 2023), p. 103500.

[J5] Huang, Hannah; Mojumder, Satyajit; Suarez, Derick; Amin, Abdullah Al; Fleming, Mark; Liu, Wing Kam. Knowledge Database Creation for Design of Polymer Matrix Composite. *Computational Materials Science* 214 (Nov. 2022), p. 111703.

[J6] Lu, Ye; Li, Hengyang; Saha, Sourav; Mojumder, Satyajit; Al Amin, Abdullah; Suarez, Derick; Liu, Yingjian; Qian, Dong; Kam Liu, Wing. Reduced Order Machine Learning Finite Element Methods: Concept, Implementation, and Future Applications. *Computer Modeling in Engineering & Sciences* 129.3 (2021), pp. 1351–1371.

[J7] Islam, Mahmudul; Thakur, Md Shajedul Hoque; Mojumder, Satyajit; Al Amin, Abdullah; Islam, Md Mahbubul. Mechanical and Vibrational Characteristics of Functionally Graded Cu–Ni Nanowire: A Molecular Dynamics Study. *Composites Part B: Engineering* 198 (Oct. 2020), p. 108212.

[J8] Sultana, Nishat; Al Amin, Abdullah; Metin, Dani Z.; Gaston, Nicola. Unveiling the Structures and Electronic Properties of CH3NH3PbI3 Interfaces with TiO2, ZnO, and SnO2: A First-Principles Study. *Journal of Materials Science* 54.21 (Nov. 2019), pp. 13594–13608.

[J9] Poole, Charles; Al Amin, Abdullah; Baig, Tanvir; Martens, Michael. Mechanical Analysis of an MgB_2 1.5 T MRI Main Magnet Protected Using Coupling Loss Induced Quench. *Cryogenics* 100 (June 2019), pp. 18–27.

[J10] Amin, Abdullah Al; Sabri, Laith; Poole, Charles; Baig, Tanvir; Deissler, Robert J.; Rindfleisch, Matthew; Doll, David; Tomsic, Michael; Akkus, Ozan; Martens, Michael. Computational Homogenization of the Elastic and Thermal Properties of Superconducting Composite MgB_2 Wire. *Composite Structures* 188 (Mar. 2018), pp. 313–329.

[J11] Amin, Abdullah A.; Baig, Tanvir N.; Deissler, Robert J.; Sabri, Laith Abed; Doll, David; Tomsic, Michael; Akkus, Ozan; Martens, Michael A. Mechanical Analysis of MgB_2 Based Full Body MRI Coils Under Different Winding Conditions. *IEEE Transactions on Applied Superconductivity* 27.4 (June 2017), pp. 1–5.

[J12] Deissler, Robert J.; Baig, Tanvir; Poole, Charles; Amin, Abdullah; Doll, David; Tomsic, Michael; Martens, Michael. A Computational Study to Find an Optimal RRR Value for a 1.5-T Persistent-Mode Conduction-Cooled MgB_2 MRI Magnet From a Quench Protection Point of View. *IEEE Transactions on Applied Superconductivity* 27.4 (June 2017), pp. 1–6.

[J13] Baig, Tanvir; Al Amin, Abdullah; Deissler, Robert J; Sabri, Laith; Poole, Charles; Brown, Robert W; Tomsic, Michael; Doll, David; Rindfleisch, Matthew; Peng, Xuan; Mendris, Robert; Akkus, Ozan; Sumption, Michael; Martens, Michael. Conceptual Designs of Conduction Cooled MgB_2 Magnets for 1.5 and 3.0 T Full Body MRI Systems. *Superconductor Science and Technology* 30.4 (Mar. 2017), p. 043002.

[J14] Deissler, Robert J; Baig, Tanvir; Poole, Charles; Amin, Abdullah; Doll, David; Tomsic, Michael; Martens, Michael. Numerical Simulation of Quench Protection for a 1.5 T Persistent Mode MgB_2 Conduction-Cooled MRI Magnet. *Superconductor Science and Technology* 30.2 (Dec. 2016), p. 025021.

[J15] Amin, Abdullah Al; Baig, Tanvir; Deissler, Robert J; Yao, Zhen; Tomsic, Michael; Doll, David; Akkus, Ozan; Martens, Michael. A Multiscale and Multiphysics Model of Strain Development in a 1.5 T MRI Magnet Designed with 36 Filament Composite MgB_2 Superconducting Wire. *Superconductor Science and Technology* 29.5 (May 2016), p. 055008.

[J16] Mojumder, Satyajit; Amin, Abdullah Al; Islam, Md Mahbubul. Mechanical Properties of Stanene under Uniaxial and Biaxial Loading: A Molecular Dynamics Study. *Journal of Applied Physics* 118.12 (Sept. 2015), p. 124305.

[J17] Amin, Abdullah Al; Jagtiani, Ashish; Vasudev, Abhay; Hu, Jun; Zhe, Jiang. Soft Microgripping Using Ionic Liquids for High Temperature and Vacuum Applications. *Journal of Micromechanics and Microengineering* 21.12 (Dec. 2011), p. 125025.

Conference Proceedings

(Mentees are in red text with an asterisk *)

[C1] Rathun, Rahul*; Amin, Abdullah A. “Multi-Track Melt-Pool Dimensions and Cooling Rates Prediction for Laser Powder Bed Fusion with Inconel-718”. *17th Dayton Engineering Science Symposium*. Wright State University, Oct. 2025.

[C2] Amin, Abdullah Al; Tanner, Caleb*; Rohmer, John. “Rapid Aero-Structural Design With Topological Optimization Of Tailored Fiber Placement Using Differentiable Programming”. *18th US Congress on Computational Mechanics*. Chicago, IL: USACM, July 2025.

[C3] Sultana, Nishat; Amin, Abdullah Al; Rathun, Rahul Singha*; Guo, Jiachen; Liu, Wing Kam. “A Flexible and Parallelizable Python Framework for Additive Manufacturing Process Simulation”. *18th US Congress on Computational Mechanics*. Chicago, IL, July 2025.

[C4] Rathun, Rahul*; Amin, Abdullah A. “Heat Source Modeling on ANSYS Fluent for Metal Laser Powder Bed Fusion Additive Manufacturing”. *Stander Symposium 2025*. University of Dayton, Apr. 2025.

[C5] Rathun, Rahul*; Amin, Abdullah A. “High-Fidelity Process Modeling for Metal Laser Powder Bed Fusion Additive Manufacturing”. *16th Dayton Engineering Science Symposium*. Oct. 2024.

[C6] Amin, Abdullah Al; Lowe, Robert; Sultana, Robert; Liu, Wing Kam. "Physics-Guided Heat Source for Transient Laser Absorptance Prediction In Metal Additive Manufacturing". *16th World Congress on Computational Mechanics and 4th Pan American Congress on Computational Mechanics*. Vancouver, British Columbia, Canada: Not presented due to CrowdStrike Computer Outage in 2024, July 2024.

[C7] Amin, Abdullah Al; Lowe, Robert; Sultana, Nishat. "High-Fidelity Melt Pool Prediction with a Physics-Guided Heat Source for Accelerated Laser Powder Bed Additive Manufacturing Simulations". *DaytonCincinnati Aerospace Sciences Symposium*. Dayton, OH, Mar. 2024.

[C8] Amin, Abdullah Al; Mojumder, Satyajit; Li, Yangfan; Xie, Xiaoyu; Liu, Wing Kam. "Physics Augmented Stochastic Simulation (PASS) for Accelerated Computation of Laser Absorption in Powder Bed Fusion Additive Manufacturing". *17th US Congress on Computational Mechanics*. Albuquerque, NM, July 2023.

[C9] Li, Yangfan; Lu, Ye; Amin, Abdullah Al. "A Stochastic Additive Manufacturing Simulation Method for Surface Roughness and Porosity Prediction". *17th US Congress on Computational Mechanics*. Albuquerque, NM, July 2023.

[C10] Xie, Xiaoyu; Amin, Abdullah Al; Guo, Jiachen; Kizer, Nathan J; Mutswatiwa, Lovejoy; Katch, Lauren; Kube, Christopher; Liu, Wing Kam. "Real-Time Keyhole Porosity Detection in Metal Additive Manufacturing With In-Situ Ultrasound and X-Ray Imaging". *17th US Congress on Computational Mechanics*. Albuquerque, NM, July 2023.

[C11] Mojumder, Satyajit; Huang, Hanna; Suarez, Derek; Amin, Abdullah Al; Liu, Wing Kam. "Mechanistic Data Science Approach for Reinforced Polymer Composites Design". *Mechanistic Machine Learning and Digital Twins for Computational Science, Engineering & Technology*. San Diego, California, Sept. 2021.

[C12] Li, Hengyang; Amin, Abdullah Al; Lu, Ye; Liu, Wing Kam. "Advances and Applications of Mechanistic Machine Learning, Reduced-order and Data-driven Analyses". *16th US Congress on Computational Mechanics*. July 2021.

[C13] Amin, Abdullah Al; Bhusal, Bhumi; Baig, Tanvir Noor; Deissler, Robert J.; Sabri, Laith; Akkus, Ozan; Martens, Michael. "A Comparative Study of Coil Winding Techniques of a Full Body 1.5 T MgB_2 Based MRI Magnets". *ISMRM 25th Annual Meeting & Exhibition*. Hawaii, USA, Apr. 2017.

[C14] Amin, Abdullah Al; Baig, Tanvir Noor; Deissler, Robert J.; Sabri, Laith; Doll, David; Akkus, Ozan; Martens, Michael. "A Comparative Study of Coil Winding Techniques of a Full Body 1.5 T MgB_2 Based MRI Magnets". *Applied Superconductivity Conference*. Superconductivity News Forum Contest Runner Up, SNF Contest for Best ASC 2016 Contributed Preprints – PART II, 2016. Denver, Colorado, Oct. 2016.

[C15] Deissler, Robert J.; Baig, Tanvir Noor; Poole, Charles Randall; Amin, Abdullah Al; Doll, David; Tomsic, Michael; Martens, Michael. "A Computational Study to Find an Optimal RRR Value for a 1.5 T Persistent-Mode Conduction-Cooled MgB_2 MRI Magnet from a Quench Protection Point of View". *Applied Superconductivity Conference*. Denver, Colorado, USA, Oct. 2016.

[C16] Amin, Abdullah Al; Bhusal, Bhumi; Baig, Tanvir Noor; Deissler, Robert J.; Sabri, Laith; Akkus, Ozan; Martens, Michael. "Variation in Strain Characteristics for Multiscale Multiphysics Models of a 1.5T Conduction Cooled MRI System Based on a 36 Filament MgB_2 Composite Wire". *ISMRM 24th Annual Meeting & Exhibition*. Singapore City, Singapore, May 2016.

[C17] Amin, Abdullah Al; Baig, Tanvir; Yao, Zhen; Martens, Michael. "Stress and Strain Sensitivity Study of 1.5T Conduction Cooled MgB_2 Magnet Design". *ISMRM 23rd Annual Meeting & Exhibition*. May 2015.

Conference Posters

(Mentees are in red text with an asterisk *)

[P1] Alboush, Husam*; Amin, Abdullah. *Subsurface Defect Detection on Additively Manufactured Parts Using Eddy Current Sensor*. Poster. Fairborn, OH, Sept. 2025.

[P2] Rathun, Rahul*; Amin, Abdullah. *Reduced Order Process Modeling for Metal Laser Powder Bed Fusion*. Poster. Fairborn, OH, Sept. 2025.

Patents

(Mentees are in red text with an asterisk *)

[P1] Baig, Tanvir; Brown, Robert; Deissler, Robert; Grimberg, Brian T.; Amin, Abdullah. "Magneto-Optical Detection and Discernment of Biofluid Crystals". May 2024.

Honors & Awards

1. **Honorable Mention**, NIST-AMBench 2025, Best Modeling Results Predicting the Melt Pool Geometry for a Scanned Laser with residual heat for a multi-track scanning, November 2025.
2. **Participant**, NASA GPU Hackathon 2022. (September 19, 26-28). Only nine teams selected worldwide.
3. **1st Place**, NIST-AMBench 2022, CHAL-AMB2022-03-PSCR: Best modeling results predicting the cooling rate immediately following solidification at specified locations within 2D scan tracks on IN718, August 2022.
4. **1st Place**, NIST-AMBench 2022, CHAL-AMB2022-03-PMPG: Best modeling results predicting the melt pool geometry at specified locations within 2D laser scan tracks on IN718, August 2022.
5. **1st Place** NIST-AMBench 2022, CHAL-A-AMB2022-01-Scan-MWD & ASR Scan Geometry: Best modeling results predicting the melt pool geometry for a scanned laser weld, August 2022.
6. **2nd Place**, NIST-AMBench 2022, CHAL-AMB2022-03-TTAM: Modeling results predicting the time above melting temperature for individual laser tracks on IN718 with different processing conditions, August 2022.
7. **Fellow**, NSF CMMI Game Changer Academies for Advancing Research Innovation, December 2021
8. **NSF Fellow as Conference Attendee**, Mechanistic Machine Learning and Digital Twins for Computational Science, Engineering & Technology (July 30, 2021).
9. **Contest Runner-Up**, Superconductivity News Forum (SNF), Applied Superconductivity Conference (October 2016).
10. **Financial Assistance**, Applied Superconductivity Conference, Denver, Colorado; USA (September 2016).
11. **Fellow (Summer Short Course)**, MIT Professional Education, Multiscale Material Design, Boston, USA (Summer 2016) [Covered 50% of the Registration]
12. **Graduate Student Travel Award**, Graduate School, Case Western Reserve University (May 2016).
13. **ISMRM Educational Stipend**, 23rd annual meeting of ISMRM, Singapore City, Singapore (May 2016).
14. **ISMRM Educational Stipend**, 22nd annual meeting of ISMRM, Toronto, Canada (May 2016).
15. **Travel Grant**, Sweden-Bangladesh Trust Fund, December 2011.
16. **University Blazer**, Award recognizing international representation to ABU Robocon 2008 on behalf of Bangladesh University
17. **Merit Scholarship**, Bangladesh University of Engineering and Technology, Dhaka. (2004 - 2008)

Professional Membership

1. United State Association for Computational Mechanics (2018, 2022 - Present)
2. The Minerals, Metals & Materials Society (2022 - Present)
3. Tire Society (2018 - 2021)
4. Society of Automotive Engineering (2018)
5. IEEE Council of Superconductivity (2016 - 2017)
6. International Society of Magnetic Resonance in Medicine (2015-2016)

Software Programs

1. AM-CFD: An FVM based Additive Manufacturing Part Modeling Program (2024 - present)
2. Fire F&M: HYbrid analytical-FEM tire force analysis program (Bridgestone Propreitary)
3. LAMMPS Input Structure Generator for Functionally Graded Materials (FGM) - M S H Thakur, M Islam, A Amin, S Mojunder, M M Islam (2019)

Workshops/Short Courses

1. **Participant**, KEEN National Conference, February 8th - 10th, 2024, Austin, Texas.
2. **Co-Instructor**, Mechanistic Data Science for STEM students, Northwestern University, May 30 - August 10, 2022.
3. **Participant**, CMMI Game Changer Academics, NSF Division of CMMI, May 18, 2022
4. **Co-organizer**, Mechanistic Data Science for STEM Education and Applications, Mechanistic Machine Learning and Digital Twins for Computational Science, Engineering & Technology, Sand Diego, CA. September 26, 2021.
5. **Co-organizer**, Mechanistic Data Science for STEM Education and Applications, 16th USNCCM, July 25, 2021, Chicago, IL.
6. **Co-organiger**, Mechanistic Data Science for STEM students. (June 8 - August 11) Summer 2021.
7. **Participant**, Multiscale Material Design, Instructor: Dr. Markus Buehler, MIT Professional Education, June 2016.

Awarded External Grants

1. **August 2025, PI**, "Hot Cracking and Porosity Detection in Metal Additive Manufacturing using Eddy Current Sensor", National Science Foundation, $125,000.

Awarded Internal Grants

1. **Summer 2026, PI**, "Rapid Additive Manufacturing of Kirigami-Inspired Aircraft Structures", Summer Undergraduate Research Experience Program, University of Dayton, $6,250.
2. **August 2025, Co-I**, "University of Dayton Supercritical Carbon Dioxide Center of Excellence: Experimental Investigation of Blended sCO2 Power Cycle Heat Exchangers", University of Dayton School of Engineering Post-Doctoral Research Fellow Program, 2023, $20,000. Investigators: A.J. Schrader (PI), R.B. Mulford (Co-I), C.T. Wanstall (Co-I), R.L. Lowe (Co-I).
3. **August 2025, PI**, "Experiential Learning Innovation Fund", University of Dayton, $1,500.
4. **Summer 2025, PI**, "Defect detection and part quality improvements for metal additive manufacturing", Research Council Seed Grant, University of Dayton, $6,500.

5. **August 2024, PI**, "Experiential Learing Innovation Fund", University of Dayton, $750. Investigators: A.A. Amin (PI), Dr. D. Myszka (Co-PI).
6. **Summer 2024, PI**, "UD-UDRI Summer Faculty Fellow", University of Dayton-University of Dayton Research Institute, $14,500.
7. **Summer 2024, PI**, "Reduce defect and improve part quality for metal additive manufacturing", Summer Undergraduate Research Experience Program, University of Dayton, $6,250.

Awarded Grants Pre UDayton

1. **August 11, 2022, PI**, NASA GPU Hackathon 2022, Three-day intensive GPU training, NASA-NVIDIA.
2. **April 2022, Contributing Author**, GPU Accelerated Computational Mechanics at Northwestern University, McCormick Equipment Awards, $20,000.
3. **December 3, 2021, Contributing Author**, GPU accelerated computational modeling of laser powder bed additive manufacturing of metallic parts. Quest High-Performance Computing Cluster, Northwestern University. 35,000 Compute hours.
4. **April 2021, Contributing Author**, Thermal-CFD simulation of melt pool dynamics in additive manufacturing of metals, XSEDE Startup Grant, 2,500 GPU compute hours.
5. **November, 2016, Co-PI**, "Crystis: A biocrystal detection system", VentureWell, USA. $5,000.
6. **August, 2016, Contributing Author**, "Supercomputer to model MRI quench strains", Ohio Supercomputer Center. $ 50,000 Compute hours.

Pending Grants

1. **June 2025, Co-I**, "Accelerating the Manufacturing Advantage for OHIO", Ohio Department of Higher Education, Investigators: Ohio State University, University of Cincinnati, Miami University, Wright State University, Central State University, Shawnee State University, Ohio University, Bowling Green State University, University of Toledo, Cleveland State University, Case Wesetern Reserve University, Kent State University, University of Akron, Youngstone State University. $20,000,000, UDayton Share $1,750,854.

Unsuccessful Grants

1. **May 2025, PI**, "Defect Free Liquid Rocket Engine Component Manufacturing by In-situ Control of Additive Manufacturing Process through Transformer Network", Amazon Research Awards, Co-PI: Wright State University. $100,000.
2. **April 2025, PI**, "Digital Twin Framework for Additive Manufacturing of Defect Free Hypersonic Grade Refractory Alloys", Ohio Federal Research Network Round 7, Co-PIs: Wright State University, GE Aerospace. $1,215,469.26, UDayton Share: $468,098.06.
3. **April 2025, PI**, "Machine Learning-Enabled Multiscale, Multiphysics Computational Modeling Framework for Accelerated Spherical Tokamak Design.", Department of Energy, Early Career Research Program, Announcement: DE-FOA-0003450. $875,000.
4. **April 2025, Co-I**, "HV/HP Switchgear for Aerospace Electrification", Ohio Federal Research Network Round 7, PIsCo-PIs: University of Akron, PC Krause and Associates. $1,189,622, UDayton Share: $194,851.
5. **April 2025, Co-I**, "NSF Engine: Kentucky Additive Manufacturing Engine (KY-AME)", National Science Foundation, Co-PIs: University of Kentucky. $718,173.
6. **February 2025, Co-PI**, "Promoting Resilient Industries with Manufacturing and Emerging Artificial Intelligence (PRIME AI): Manufacturing Institute", National Institute of Standards and Technology, Investigators: (G. E. Kremer, R. L. Lowe, A.A. Amin, A. J. Schrader, V.K. Asari, L. Cao, E. E. Gunay, K. Hallinan, K.

Hirakawa, S. J. Langley-Turnbaugh) University of Dayton, (K.A. Beigh, A. B. Morgan, B. N. Naryanan) University of Dayton Research Institute, (Kaber, D., M. I. Campbell, A. Dong, K. R. Haapala, C. Hoyle, P. -H., Hsieh, D. Lin, K. Murali, D. J. Roach, A. H. Vergara, Z. Wu) Oregon State University, (C. Christodoulou, C. Danielson, M. Devetsikiotis, R. Fierro, X. Sun) University of New Mexico, (D. C. Chrzan, C. Grigoropoulos, G. X. Gu, P. Hosemann, X. Zheng, T. Zodhi) University of California Berkeley, (R. Pavel) ARCTOS Technology Solutions LLC. $70,000,000.

7. **July 2024, Co-PI**, "MessengerAM: Multimodal-enabled structural safety engine for Additive Manufacturing", DARPA, Defense Sciences Office, Announcement: HR001124S0018, Investigators: (G. Wagner) Northwestern University, (W. K. Liu, D. Qian) HIDENN-AI, (F. M. Carter) DMG MORI Federal Services, (S. Mojumder) Washing State University, (S. Saha) Virginia Polytechnic Institue and State University, (O. Kafka) National Institute of Standards and Technology, (Y. Lu) University of Maryland Baltimore County, (W. Xiong) University of Pittsburgh, (T. Osborn,) University of Dayton Research Institute. $13,626,055, UDayton Share: $500,000.
8. **June 2024, PI**, "Magneto-Electro-Thermo-Mechanical Field Interaction Study for Hypersonic Material by a Temperature-Assisted Eddy Current Sensor", Air Force Office of Scientific Research, (AFOSR), Announcement: FOAAFRLAFOSR20240004, $450,000.
9. **March 2024, PI**, "SALT-NIBs: Smart Additive-Subtractive Laser Technology for Sodium-ion Batteries", Department of Energy, Announcement: DE-FOA-0003236, Platform Technologies for Transformative Battery Manufacturing, Investigators: (A.A. Amin, R. L. Lowe, A. J. Schrader) University of Dayton, (T. Osborn) University of Dayton Research Institute, (M. Islam) Wayne State University. &1,800,000, Cost Share: $420,000, UDayton Share: $1,330,000.
10. **March 2024, PI**, "Laser Powder Bed Fusion Additive Manufacturing of Reticulated Porous Structure of $CaMnO_3$", Department of Energy, Announcement: DE-FOA-0003308, Small Innovative Projects in Solar: Concentrating Solar Power and Photovoltaics (SIPS: CSP & PV), Investigators: (A. Ambrosini) Sandia National Laboratory, (A. A. Amin, A. J. Schrader, R. L. Lowe) University of Dayton$500,000, Cost Share: $100,000, UDayton Share: $400,000.

Unsuccessful Grants Pre UDayton

1. **September 2022, Contributing Author**, CDS&ECollaborative Research: Convolution HiDeNN-Tensor Decomposition for Integrating Multiscale Topological Optimization with Additive Manufacturing.
2. **August 2021, Contributing Author**, Hierarchical Deep Learning Neural Networks Artificial Intelligence (HiDeNN-AI), NSF-SBIR., National Science Foundation.
3. **January 2022, Contributing Author**, Hybrid Equivalence- and Model-Based Approach for Machine-to-Machine Fatigue Life Qualification NIST Metals-based Additive Manufacturing Grant Program.
4. **December 2021, Contributing Author**, Collaborative Research: Framework Implementations: HiDeNN-CI: Hierarchical Deep-learning Neural Network Cyberinfrastructure, NSF - Cyberinfrastructure for Sustained Scientific Innovation.

Invited Talks

I1. Multiscale Multiphysics Computational Modeling: A Perspective in Additive Manufacturing, Magnetic Resonance Imaging Research, and Automotive Tire Analysis, Abdullah Al Amin, University of Wisconsin-Milwaukee, April 26, 2023.

I2. Multiscale Multiphysics Computational Modeling: A Perspective in Additive Manufacturing, Magnetic Resonance Imaging Research, and Automotive Tire Analysis, Abdullah Al Amin, Florida Institute of Technology, April 19, 2023.

I3. Large Scale System Design with Multiphysics and Multiscale Analysis: Applications in MRI Magnet and Additive Manufacturing, Abdullah Al Amin, South Dakota School of Mines, March 9, 2023.

I4. Winning 2022 NIST Additive Manufacturing Benchmark Challenge and Beyond, Abdullah Al Amin, University of Dayton, March 6, 2023.

I5. Multiscale Multiphysics Computational Modeling: A Perspective in Automotive Tire, Additive Manufacturing, and Magnetic Resonance Imaging Research, Abdullah Al Amin, University of Akron, March 3, 2023.

I6. Winning the NIST AM Bench Challenge by Successfully Predicting the Laser Powder Bed Fusion Process, Abdullah Al Amin, University of Houston, February 28, 2023.

I7. Predicting the Laser Powder Bed Fusion Process for Metal Additive Manufacturing, Abdullah Al Amin, University of Minnesota Duluth, February 6, 2023.

I8. AM-CFD: a Well-validated Thermal-fluid Simulator for Additive Manufacturing Part Qualification, Yangfan Li, Abdullah Al Amin, Sourav Saha, Wing Kam Liu, August 18, 2022, Additive Manufacturing Benchmarks (AM-Bench 2022), Bethesda, MD.

I9. Building the Next Generation Magnetic Resonance Imaging (MRI) Machines, October 2017, Intel Corporation, Oregon, USA.

I10. Next Generation Magnetic Resonance Imaging (MRI) Magnet, August 2017, Bridgestone Americas, Ohio, USA.

I11. "A comparative study of coil winding techniques of a full body 1.5 T MgB_2 based MRI magnets."April 2017, ISMRM 25th annual meeting & exhibition, Hawaii, USA.

I12. "Effect of Mechanical Support Conditions of Winding on the Strain Development of a Composite MgB_2 Based Full Body, MRI Coil." October 2016, Applied Superconductivity Conference, Denver, Colorado, USA.

I13. "A Computational Study to Find an Optimal RRR Value for a 1.5 T Persistent-Mode ConductionCooled MgB_2 MRI Magnet from a Quench Protection Point of View." October 2016, Applied Superconductivity Conference, Denver, Colorado, USA.

I14. "Variation in strain characteristics for multiscale multiphysics models of a 1.5T conduction cooled MRI system based on a 36 filament MgB_2 composite wire." May 2016, ISMRM 24th annual meeting & exhibition, Singapore City, Singapore.

I15. "Stress and Strain Sensitivity Study of 1.5T Conduction Cooled MgB_2 Magnet Design." May 2016, ISMRM 23rd annual meeting & exhibition, Toronto, Canada.

I16. High throughput microparticle separation on curved microchannel based on inertial microfluidics. September 2013, Intel Corporation, Oregon USA.

Services

- **Grant Review Panels**

1. Ad-hoc Reviewer, NextFlex, NextFlex's Project Call 10.0, May, 2024.
2. Panelist, National Science Foundation, Advanced Manufacturing, April 2025.
3. Ad-hoc Reviewer, National Science Foundation, Advanced Manufacturing, March 2025.
4. Panelist, National Science Foundation, Partnerships for Research and Education in Materials (PREM), April, 2024.
5. Panelist, National Science Foundation, Communications, Circuits and Sensing-Systems, Division of Electrical, Communications and Cyber Systems, November, 2023.

- **Conference Session Chair**

    1. Session Chair, Materials 1, 49th Dayton-Cincinnati Aerospace Sciences Symposium, Dayton, OH, March 5, 2024.

- **Journal Reviewer**

    1. Additive Manufacturing
    2. Advances in Mechanical Engineering
    3. Acta Metallurgica Sinica
    4. Applied Thermal Engineering
    5. Computational Mechanics
    6. Engineering Applications of Artificial Intelligence
    7. Engineering Research Express
    8. Nondestructive Testing and Evaluation
    9. IEEE Industrial Electronics Society
    10. IEEE Access
    11. IEEE Industrial Informatics
    12. IEEE Reliability Society
    13. International Journal of Mechanical Sciences
    14. Journal of Industrial Information Integration
    15. Journal of Materials Engineering and Performance
    16. Qeios
    17. Results in Engineering
    18. Scientific Reports
    19. SME Journal of Manufacturing Processes
    20. Superconductor Science and Technology
    21. International Journal of Computer Integrated Manufacturing
    22. Digital Twin
    23. Materials Technology

- **UDayton Internal**

    1. Mechanics, Materials, Manufacturing & Mechanical Design (M4) Curriculum Committee, 2023-present.

Mentorship

- **University of Dayton**

    1. **Husam Alboush**, Undergraduate Researcher, Summer 2025
    2. **Rahul Singha Rathun**, Graduate Researcher, Fall 2024 - Present
    3. **Caleb Tanner**, Doctoral Student, Fall 2024 - present
    4. **Ian Wall**, Undergraduate Researcher, Summer 2024 - Fall 2024
    5. **Liam Howley**, Undergraduate Researcher, Summer 2024

- **Northwestern University**
    1. **Jiachen Guo**, Graduate Student, Northwestern University. (2022-2023)
    2. **Satyajit Mojumder**, Graduate Student, Northwestern University. (2021-2023)
    3. **Sourav Saha**, Graduate Student, Northwestern University. (2021-2023)
    4. **Hengyang Li**, Graduate Student, Northwestern University. (2021-2023)
    5. **Yangfan Li**, Graduate Student, Northwestern University. (2021-2023)
- **Remote Mentoring**
    1. **Rabiul Hasan Kabir**, Bangladesh University of Engineering and Technology. (2016-2019)
    2. **Moinuddin Shuvo**, Bangladesh University of Engineering and Technology. (2016-2019)
    3. **Oishwarya Bhowmik**, Bangladesh University of Engineering and Technology. (2016-2019)
    4. **Md Shajedul Hoque Thakur**, Bangladesh University of Engineering and Technology. (2020)
    5. **Mahmudul Islam**, Bangladesh University of Engineering and Technology. (2020)