

CURRICULUM VITAE

Jason P. Mack

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EDUCATION

The University of Akron, Akron, Ohio (8/2021-Present)

Doctor of Philosophy, Mechanical Engineering

Certificate, Computational Data Science

Current GPA: 4.00/4.00

Ph.D. Candidacy Exam: Passed on May 3, 2024

Advisor: Dr. K.T. Tan

The University of Akron, Akron, Ohio (8/2016-12/2020)

Bachelor of Science (Cum Laude and Williams Honor Scholar)

Mechanical Engineering, Minor in Applied Mathematics

Final GPA: 3.51/4.00

The University of Akron, Akron, Ohio (8/2014-5/2016)

College Credit Plus (CCP) Program

Completed college coursework while in high school through Ohio's CCP program, earning college credit and exposure to STEM topics.

RESEARCH INTERESTS

Aerospace Materials and Structures, Composite Materials and Structures, Impact and Dynamic Response, Fracture Mechanics and Material Damage, Nondestructive Evaluation, Extreme Environmental, Machine Learning, Data Science, Biomedical, Additive Manufacturing, Sustainability, Biomimetic Materials, Metamaterial Lattice Structures.

TEACHING INTERESTS

Tools for Mechanical Engineering, ME Freshman Design, Statics, Dynamics, Mechanics of Solids, Engineering Analysis, Analysis of Mechanical Components, Design of Mechanical Components, Aerospace Structures, Aerospace Materials, Aerospace Systems Manufacturing, Advanced Engineering Materials, Finite Element Analysis, Continuum Mechanics, Mechanical Behavior of Materials

RESEARCH EXPERIENCE

The University of Akron, Akron, OH

Graduate Research Assistant, Department of Mechanical Engineering (1/2022-Present)

- Perform low velocity impact tests utilizing drop tower to evaluate the dynamic impact response of composite structures.
- Conduct residual strength testing after impact to understand the effects of low velocity impact.
- Implement non-destructive techniques to elucidate internal damage of composite structures.
- Develop analytical models and numerical methods to study crack propagation in composites.
- Create machine learning models to predict impact damage and residual strength.
- Mentored undergraduate research students in the mechanical recycling of additively manufactured carbon fiber reinforced thermoplastic composites into reusable short-fiber reinforced filament.
- Support undergraduate research student on the design and manufacturing of biomimetic additive manufactured carbon fiber reinforced thermoplastic for increased impact performance.
- Perform and analyze impact testing of cranial implants (collaborator: Dr. Prabaha Sikder, Cleveland State University).
- Designed and executed novel impact testing protocols for tubular composite structures intended for modern airship applications (collaborator: LTA Research).
- Identified and engaged with potential industry partners, performing key project support to advance the goals of the Center for Advanced Materials Performance (CAMP).

NASA Glenn Research Center, Materials and Structures Division, Cleveland, OH

Summer NRT Research Fellow, Multiscale and Multiphysics Modeling Branch (5/2024-8/2024)

- Built a foundational experimental dataset by extracting and analyzing uniaxial tension data from composite systems.
- Generated comprehensive virtual datasets by tuning and executing MAC/GMC composite models.
- Developed a novel loss function for a surrogate neural network, strategically weighting experimental data and non-linear regions to enhance prediction accuracy.
- Automated the tuning of MMCDM damage parameters for MAC/GMC by implementing Bayesian and differential evolution optimization frameworks, significantly reducing manual calibration time.

The University of Akron, Akron, OH

Undergraduate Honor's Design Project, Department of Mechanical Engineering (8/2019-5/2020)

- Designed a piezoelectric energy harvester to enable a self-powered smart tire sensor system.
- Refined and calibrated the sensor's measurement system to ensure high-fidelity, accurate data acquisition during dynamic testing.
- Engineered a new housing prototype in CAD for a smart tire sensor to ensure robust mounting and protection from road conditions.

TEACHING EXPERIENCE

The University of Akron, Akron, OH

Instructor, Department of Mechanical Engineering (8/2024-Present)

MECE 165: Tools for Mechanical Engineering

MECE 166: ME Freshman Design

- Develop and deliver lectures and lab sessions on essential engineering tools (SolidWorks and MATLAB) to first-year mechanical engineering students.
- Create assessments and provide detailed feedback to ensure students meet course learning objectives.
- Mentor students, providing guidance on course topics, and supporting their academic success.

The University of Akron, Akron, OH

Graduate Teaching Assistant, Department of Mechanical Engineering (8/2021-5/2023)

- Taught freshman-level engineering students important software (SolidWorks and MATLAB).
- Proctored upper classman level Measurements Lab and guided them on the use of equipment (Strain gauge, DAQ, wind tunnel) and software (LabVIEW).
- Conducted computer lab sessions for engineering students to practice what they have learned.
- Graded weekly assignments and provided feedback for students to make improvements.
- Advised students on good engineering principles so that they could be well-trained engineers.

The University of Akron, Akron, OH

Undergraduate Grader, Department of Mechanical Engineering (8/2020-12/2020)

- Evaluated and provided feedback on homework assignments for an upper-level course in Thermal System Components.

INDUSTRY EXPERIENCE

Bridgestone Americas, Akron, OH

Intern Data Science, Material Digitization (6/2025-8/2025)

- Developed a custom data analysis and visualization tool to streamline predictive modeling and lab data review, reducing model error (MAPE) by 6 percentage points.
- Enhanced and maintained a Python-based ETL tool, improving data transformation workflows and increasing data accessibility for engineering and lab teams.
- Standardized data quality criteria across internal platforms, improving consistency and confidence in predictive model results.
- Collaborated with lab, compound engineering, and data science teams to align model interpretation and improve training data quality.
- Contributed to the ideation and early-stage planning of a virtual development initiative aimed at improving material processability.

TenPoint Crossbow Technologies, Mogadore, OH

Mechanical Engineering Co-Op (1/2018-5/2019)

- Executed comprehensive performance and material validation tests on prototypes and samples to ensure product quality and adherence to specifications.
- Developed detailed SolidWorks assembly drawings to streamline repair processes and improve

accuracy for the warranty department.

- Ensured product quality and specification conformance by performing rigorous QC testing on production parts and inspecting incoming components.
- Centralized and managed a library of vendor CAD models for part mold tools to improve accessibility and version control for the engineering team.
- Identified significant financial savings opportunities by analyzing product weight and manufacturing cost data.
- Standardized prototype testing procedures by developing a new documentation framework and tracking database to improve consistency and data quality.

STUDENT AWARDS & RECOGNITION

- Ashley Holland (Undergraduate Researcher), Senior Design Day, 1st Prize in Research Project, 2024

HONORS & AWARDS

- **National Science Foundation (NSF) Research Trainee (NRT)** Fellowship (8/2022 - Present)
- **American Society for Composites (ASC)**, Ph.D. Scholarship Award (10/2025)
- **American Society for Composites (ASC)**, 4-Minute Doctoral Research Impact Competition (Honorable Mention) (10/2025)
- **The University of Akron**, LIFE Doctoral Scholar Award (4/2025)
- **The University of Akron, Mechanical Engineering**, Grotefend Endowed Scholarship (8/2024, 1/2025, 8/2025)
- **The University of Akron**, GSG Professional Enrichment Grant (11/2024)
- **American Society for Composites (ASC)**, Sustainable Composite Design Competition (Winner) *Team Lead* (6/2024)
- **Ohio Space Grant Consortium (OSGC)** Summer Internship Award (6/2024-8/2024)
- **American Institute of Aeronautics and Astronautics (AIAA)**, 2024 Region III Student Conference (Third Place), Masters Category (4/2024)
- **American Society for Composites (ASC)**, Sustainable Composite Design Competition (Honorable Mention), *Team Lead* (6/2023)
- **The University of Akron**, Scholarship For Excellence (8/2016-12/2020)
- **The University of Akron**, Swagelok Engineering Merit Scholarship (8/2016-12/2020)
- **The University of Akron**, Williams Honors College Scholarship (8/2016-12/2020)
- **The University of Akron**, President's List (5/2020)
- **The University of Akron**, Dean's List (12/2016, 5/2019, 12/2019, 12/2020)

PEER REVIEWED JOURNAL PUBLICATIONS

Published Journal Articles

1. F. Mirza, J.P. Mack, Z.H. Duan, and K.T. Tan (2025). Predicting Bending Impact Failure Mode and Strength of Hybrid Sandwich Composites: A Machine Learning Approach, **Engineering Structures**, 345 Part A: 121493.
2. M.J. Mohammad Fikry, J.P. Mack, F. Mirza, N. Prasasti Martono, K.T. Tan, V. Vinogradov, and

- S. Ogihara (2025). A Machine Learning-driven Approach to Predict Mechanical Degradation Associated with Matrix Cracks in Fiber-reinforced Composite Laminates, **Next Materials**, 9: 101209.
3. J.P. Mack and K.T. Tan (2025). Study of Equi-Energetic Effects on the Low-Velocity Impact and Compression After Impact Response of Carbon Fiber Composite Tube Structures, **Composites Part B: Engineering**, 291:112056.
 4. J.P. Mack, F. Mirza, A. Banik, M.H. Khan, and K.T. Tan (2024). Hybridization of Face Sheet in Sandwich Composite to Mitigate Low Temperature and Low Velocity Impact Damage, **Composite Structures**, 338:118101.
 5. F. Mirza, J.P. Mack, A. Banik, M.H. Khan, and K.T. Tan (2024). Bending After Impact Failure of Foam-Core Hybrid Sandwich Composites in Low Temperature Conditions, **Composites Science and Technology**, 258:110897.
 6. S.Y. Sonaye, J.P. Mack, K.T. Tan, and P. Sikder (2024). A Comprehensive Analysis of High-temperature Material Extrusion 3D Printing Parameters on Fracture Patterns and Strength of Polyetheretherketone Cranial Implants, **Progress in Additive Manufacturing**, 1-16.

Manuscripts in Preparation/Submission

7. J.P. Mack, F. Mirza, Z.H. Duan, S. Hasebe, R. Higuchi, T. Yokozeki, and K.T. Tan (2025). Machine Learning Insights: Predicting Compression Strength After Low-Velocity Impact on Carbon Fiber Composites, *under review*.
8. J.P. Mack, F. Mirza, Z.H. Duan, S. Hasebe, R. Higuchi, T. Yokozeki, and K.T. Tan (2025). Deep Learning for Predicting Impact Parameters and Post-Impact Strength in Composite Materials Using C-Scan Images, *under review*.
9. J.P. Mack and K.T. Tan (2025). Linear Elastic Fracture Mechanics Compression-After-Impact Model for Composites with Multiple Delaminations, *prepare for submission*.
10. J.P. Mack and K.T. Tan (2025). Micro-CT-Informed Model for Damage Characterization in Impacted Composites, *prepare for submission*.
11. J.P. Mack and K.T. Tan (2025). Physics-Informed Neural Network for Predicting Impact Response in Composite Structures, *prepare for submission*.

PEER-REVIEWED CONFERENCE PUBLICATIONS & PRESENTATIONS

1. J.P. Mack, F. Mirza, Z.H. Duan, S. Hasebe, R. Higuchi, T. Yokozeki, and K.T. Tan (2025). Prediction of Compression After Impact Strength Using Deep Learning on C-Scan Images of Composite Materials, Conference Proceeding for **American Society for Composites 40th Technical Conference**, 6-8 Oct, Dayton, Ohio, USA.
2. F. Mirza, J.P. Mack, Z.H. Duan, S. Hasebe, R. Higuchi, T. Yokozeki, and K.T. Tan (2025). Data-Driven Approach for Impactor Shape Classification in Composite Laminates Using Image Analysis, Conference Proceeding for **American Society for Composites 40th Technical Conference**, 6-8 Oct, Dayton, Ohio, USA.
3. J.P. Mack, A. Kovac, F. Mirza, Z.H. Duan, S. Hasebe, R. Higuchi, T. Yokozeki, and K.T. Tan (2024). Data-Driven Approaches for Assessing Compression After Low-Velocity Impact in Carbon Fiber Reinforced Composites, Conference Proceeding for **American Society for Composites 39th Technical Conference**, 21-23 Oct, San Diego, California, USA.
4. A. Holland, J.P. Mack, F. Mirza, V.B.C. Tan, T.E. Tay, and K.T. Tan (2024). Investigating the Low-Velocity Impact Resistance of Helicoidal and Double Double 3D Printed Carbon Fiber Reinforced Polymer Layups, Conference Proceeding for **American Society for Composites 39th**

Technical Conference, 21-23 Oct, San Diego, California, USA.

5. F. Mirza, J.P. Mack, Z.H. Duan, and K.T. Tan (2024). A Machine Learning Approach for Predicting Bending After Impact Strength and Failure Modes in Hybrid (CFRP/GFRP) Sandwich Composites, Conference Proceeding for **American Society for Composites 39th Technical Conference**, 21-23 Oct, San Diego, California, USA.
6. J.P. Mack and K.T. Tan (2024). Machine Learning Applications for Compression Strength After Low Velocity Impacted Carbon Fiber Composites, Conference Proceeding for **American Institute of Aeronautics and Astronautics 2024 Region III Student Conference**, 5-6 Apr, Akron, Ohio, USA.
7. J.P. Mack and K.T. Tan (2023). Equi-Energetic Low-Velocity Impact Effects on the Compression After Impact Strength of Carbon Fiber Composite Tube Structures, Conference Proceeding for **American Society for Composites 38th Technical Conference**, 17-20 Sept, Greater Boston, Massachusetts, USA.
8. J.P. Mack, F. Mirza, A. Banik, M.H. Khan and K.T. Tan (2023). Impact Damage and Failure Mechanisms of Hybrid Facesheet Sandwich Composites under Low Temperature Conditions, Conference Proceeding for **American Society for Composites 38th Technical Conference**, 17-20 Sept, Greater Boston, Massachusetts, USA.
9. F. Mirza, J.P. Mack, A. Banik, M.H. Khan and K.T. Tan (2023). Investigation of Bending After Impact Failure Behavior in Foam-Core Hybrid Sandwich Composites at Extreme Low Temperature, Conference Proceeding for **American Society for Composites 38th Technical Conference**, 17-20 Sept, Greater Boston, Massachusetts, USA.

POSTER PRESENTATIONS

1. J.P. Mack, F. Mirza, Z.H. Duan, S. Hasabe, R. Higuchi, T. Yokozeki and K.T. Tan (2025). CNN-Based Predictions from Post-Impact C-Scans, **NRT Symposium**, 21 Mar, Akron, Ohio, USA.
2. J.P. Mack and K.T. Tan (2024). Data-Driven Approaches for Assessing Compression After Low-Velocity Impact in Carbon Fiber Reinforced Composites, **Case Western Reserve University, Glenn Space Technology Symposium, American Astronautical Society**, 15-17 July, Cleveland, Ohio, USA.
3. J.P. Mack, A.Kovac, F. Mirza, Z.H. Duan, S. Hasabe, R. Higuchi, T. Yokozeki and K.T. Tan (2024). Utilizing Machine Learning to Predict Compression Strength in Carbon Fiber Composites Subjected to Low-Velocity Impact, **The University of Akron, Graduate Student Research Day**, 3 Apr, Akron, Ohio, USA.
4. J.P. Mack, A.Kovac, F. Mirza, Z.H. Duan, S. Hasabe, R. Higuchi, T. Yokozeki and K.T. Tan (2024). Machine Learning Applications for Compression Strength in Low-Velocity Impacted Carbon Fiber Composites, **NRT Symposium**, 1 Mar, Akron, Ohio, USA.
5. P. Cuddihy, J.P. Mack and A. Russel (2023). Applying Various Machine Learning Techniques to Predict Material Properties, **NSF Research Traineeship Annual Meeting**, 29-31 Oct, Tempe, Arizona, USA.
6. J.P. Mack, F. Mirza, A. Banik, M.H. Khan and K.T. Tan (2023). Extreme Arctic Temperature Effects on Impact Performance of Hybrid (CFRP/GFRP) Face Sheet Sandwich Composites, **The University of Akron, Graduate Student Research Day**, 17 Apr, Akron, Ohio, USA.

INVITED ADDRESSES & TALKS

1. J.P. Mack (2024). Surviving the Impact: A Journey Through Composites Research, **The University of Akron, Fundamentals of Composites Manufacturing and Mechanics (MECE 486/696-807)**, 18 Nov, Akron, Ohio, USA.
2. J.P. Mack (2024). Prediction Response Improvements for MMCDM with Surrogates and Optimization, **National Aeronautics and Space Administration (NASA), Glenn Research Center**, 26 July, Cleveland, Ohio, USA.
3. J.P. Mack (2023). Low Velocity Impact Effects on Various Composite Structures, **The University of Akron, Fundamentals of Composites Manufacturing and Mechanics (MECE 486/696-807)**, 1 Nov, Akron, Ohio, USA.

VOLUNTEER & OUTREACH ACTIVITIES

- **Presidential AI Challenge – Hudson City Schools**, Coach (September 2025 – Present)
- **SWAG Kickbacks**, Volunteer and Mentor (October 2025)
- **Department of Mechanical Engineering**, Graduate Ambassador (February 2025 – Present)
- **CEPS Fall 2025 Career Fair**, Volunteer (September 2025)
- **ZIPs: Engineered for Success Mentoring Event**, Volunteer (September 2024 – September 2025)
- **16th Annual Rotary Camp Cornhole Tournament**, Volunteer (August 2025)
- **International Science and Engineering Fair - Society for Science**, Grand Judge (May 2025)
- **UA Pitch Competition**, Organizer and Host (April 2024 – April 2025)
- **State Science Day**, Judge (April 2025)
- **District 5 Science Day**, Judge (March 2023 – March 2025)
- **Department of Management Networking Night**, Organizer (February 2025)
- **69th Annual APS STEM EXPO**, Judge (January 2025)
- **MECE:166 ME Freshman Design Project**, Judge and Score Keeper (April 2024)
- **Akron Regional Science Olympiad**, Volunteer (March 2024)
- **Kids Career Day**, Group Leader (March 2024)
- **Rotaract**, Volunteer (September 2022)
- **Youth “Ninja Night”**, Volunteer (June 2021)

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

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| 1. American Society for Composites (ASC) | 2022–Present |
| 2. American Society of Mechanical Engineers (ASME) | 2022–Present |
| 3. American Institute of Aeronautics and Astronautics (AIAA) | 2024–Present |

MEMBERSHIP IN STUDENT ORGANIZATIONS

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| 1. Northeast Ohio Student Venture Fund (NEOSVF), President | Summer 2024–Present |
| 2. Northeast Ohio Student Venture Fund (NEOSVF), Member | Fall 2022–Present |
| 3. Meta Coffee Club (MC ²), Co-founder and Vice President | Fall 2024–Present |
| 4. Northeast Ohio Student Venture Fund (NEOSVF), Vice President | Fall 2023–Summer 2024 |

5. Finite Element Analysis Design Team, Vice President
6. Finite Element Analysis Design Team, Member
7. Zips Racing Design Team, Member

Summer 2019-Fall 2020
Spring 2019-Fall 2020
Fall 2015-Spring 2017

PROFESSIONAL SERVICES

Reviewer of manuscripts submitted to the following international journals:

- *International Journal of Lightweight Materials and Manufacture*
- *Applied Composite Materials*
- *Scientific Reports*

Reviewer of manuscripts submitted to the following conference proceedings:

- *Springer - 2024 American Society for Composites 39th Annual Technical Conference*
- *Springer – 2025 American Society for Composites 40th Annual Technical Conference*

RESEARCH SKILLSETS

Computer Software: Abaqus, Ansys, SolidWorks, MATLAB, LabVIEW, Python, Tensorflow, PyTorch, Pandas, Scikit Learn, Google Colab, Jupyter Notebook, VS Code, Microsoft Office, SQL, 3D Slicer.

Experimental Techniques: Instron/MTS universal testing machines, Instron CEAST 9350 Drop Tower, Additive manufacturing machines, Environmental chambers, Micro-computed tomography imaging machines, Keyence digital microscope.

FEATURED IN MEDIA

- Featured in The University of Akron News for receiving the 2025 ASC Ph.D. Research Scholarship along with my research group lab mates receiving NSF travel awards at the 40th annual ASC Technical Conference in Dayton, OH.
[Mechanical engineering graduate students showcase research, earn awards at ASC Conference | The University Akron News | Ohio](#)
- Featured by The University of Akron's University Communications and Marketing for my team's victory in the 2024 ASC Sustainable Composite Design Competition.
<https://www.uakron.edu/im/news/engineering-students-win-asc-design-competition-and-nsf-travel-awards>
- Recognized in the AIAA press release for the 2024 Region III Student Conference for earning third place in the master's category, also featured by The University of Akron's University Communications and Marketing. <https://www.aiaa.org/news/news/2024/05/07/aiaa-announces-2024-regional-student-conference-winners>
- <https://www.uakron.edu/im/news/ua-student-chapter-of-the-american-institute-of-aeronautics-and-astronautics-hosts-region-iii-student-conference>
- Featured in the University of Akron News for Kids' Career Day for community engagement.
<https://www.uakron.edu/im/news/kids-career-day-inspires-future-inventors>

PROFESSIONAL REFERENCES

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