

Xuzhe Zeng

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EDUCATION

Carnegie Mellon University | GPA: 3.86/4

Pittsburgh, PA

Master of Science in Mechanical Engineering

May 2026

Selected Coursework: Machine Learning with Large Datasets, Additive Manufacturing, Deep Learning

University College Dublin | GPA: 3.87/4.2 | First Class Honors

Xi'an, China

Bachelor of Engineering

June 2024

Joint program with Chang'an University

Selected Coursework: Solid Mechanics, Computational Fluid Dynamics, Design, System Modeling & Simulation

RESEARCH EXPERIENCE

Closed-loop Process Monitoring and Control for MIG Welding

Sept. 2025 – Present

Advisor: Levent Kara (Professor of Mechanical Engineering Department, Carnegie Mellon University)

- Identified key defect types and selected corresponding sensors, integrating them on the equipment for multi-modal data collection
- Design and implement an ML-based closed-loop framework to quantify defect severity and adapt process parameters in real time
- Plan validation with an industry partner to improve weld quality and process stability

Airborne Acoustic Emission for Porosity Quantification in LPBF

Dec. 2024 – Aug. 2025

Advisor: Levent Kara (Professor of Mechanical Engineering Department, Carnegie Mellon University)

- Processed and analyzed airborne acoustic data collected during LPBF experiments to extract features for porosity evaluation
- Designed and implemented machine learning pipelines for effective analysis of process signals and porosity prediction
- Trained and validated models to correlate acoustic signals with porosity metrics, ensuring reproducible and robust performance
- Performed advanced data-driven analyses to interpret latent feature behaviors and elucidate the formation of keyhole boundaries
- Collaborated with a multi-disciplinary team, contributing as second author to a peer-reviewed publication

Machine Learning for Melt Pool Prediction and Visualization

Aug. 2024 - Dec. 2024

Advisor: Levent Kara (Professor of Mechanical Engineering Department, Carnegie Mellon University)

- Collected and processed acoustic and photodiode signals under varying printing conditions in laser powder bed fusion (LPBF)
- Developed and trained multiple deep learning pipelines with Principal Component Analysis (PCA) preprocessing
- Compared and evaluated the results using different performance indices and visualized the melt pool images for further analysis

Computational Dynamics: Modeling the Dynamics of Cars

Aug. 2021 - Oct. 2021

Advisor: Eric Darve (Professor of Mechanical Engineering Department, Stanford University)

Remote

- Simplified car model dynamics by using vectors and matrices to establish equations linking forces to car parts
- Analyzed tire-road dynamics during turns and lane changes in BMW M3 and Chevrolet Cavalier
- Utilized Python to plot graphs of wheel forces in M3 and Cavalier, enhancing intuitive car performance and stability analysis

PUBLICATIONS

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- Haolin Liu, **Xuzhe Zeng**, David Guirguis, Logan Maurer, Vigklesh Rajan, Niloofar Sanaei, Chi-Ta Yang, Jack L. Beuth, Anthony D. Rollett, Levent Burak Kara. Airborne acoustic emission enables sub-scanline keyhole porosity quantification and effective process characterization for metallic laser powder bed fusion. arXiv:2508.13492 (2025)
 - **Xuzhe Zeng**, J. Tan, Z. Wen, Analysis of tire forces in cornering situations using Python modeling, Proceedings of MEMAT 2022: 2nd International Conference on Mechanical Engineering, Intelligent Manufacturing and Automation Technology, 2022, pp. 1–6

PRESENTATIONS & POSTERS

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- Listening to 3D Printing: Acoustic Emission Enables High-Resolution Keyhole Porosity Mapping in LPBF, Next Manufacturing Symposium poster, Carnegie Mellon University, Sep 2025; presented methods and key findings from our acoustic study; fielded Q&A from about 30 faculty/industry attendees; informed follow-up experiment design

PROJECTS

Simulation and optimization of mechanical connection process - University College Dublin Feb. 2024 - June 2024

- Proposed a concept for the parameterization of the die in SPR process to simplify the complexity of die model establishment
- Designed a set of methods to evaluate the performance of dies effectively to facilitate the assessment of different dies
- Utilized Simufact.forming for SPR simulation on each die and conducted selection process to selected the most suitable die

Personal Mobility Device for People with Disabilities - University College Dublin Mar. 2023

- Developed a wheelchair design tailored for disables by creating PUGH matrix based on technical requirements
- Created a wheelchair model in CATIA with assembly animations and exploded views to showcase its design and features clearly
- Determined part design and sourcing for compatibility, with stress analysis through Solidworks and CATIA to ensure durability

Design and build a simple vehicle (Group project) - University College Dublin Sept.2023 - Nov.2023

- Collaborated with other teammates to calculate and evaluate crucial parameters including frame and power system of the vehicle
- Modeled the vehicle in Solidworks and optimized the design through simulations, enhancing strength and preventing fractures
- Collaboratively constructed the vehicle by purchasing each component and material, followed by welding and precise assembly

INTERNSHIP EXPERIENCE

Porsche Remote | Shanghai, China Aug. 2022 - Sept.2022

- Summarized and analyzed the project mission to improve procurement efficiency and clarify project goals for all stakeholders
- Mastered the understanding and the use of various relays to design circuits with different functionalities
- Drafted schematic circuit diagram and collaborated with other parts to successfully achieve clients' mission statements

Institute of Automation, Chinese Academy of Sciences Researcher | Beijing, China July 2022 - Aug.2022

- Wrote C++ programs in Arduino for remote control of the unmanned vehicle in different directions via a joystick
- Utilized MATLAB to adjust the value of PID parameters to enhance the accuracy of the vehicle in a straight line
- Assembled the structure and burned the programs into the receiver board to verify each functionality

AWARDS

- First Class Honors, university level (2024)
- Academic Excellence Award ×3, university level
- Course Excellence Award ×7, school & university levels

SKILLS

- **Programming & Tools:** Python, C++, MATLAB
- **Machine Learning:** PyTorch
- **Modeling & Simulation:** SolidWorks, ANSYS, Simufact.forming, CATIA
- **Visualization & Design:** Inkscape, Blender
- **Languages:** English, Mandarin

HONORS & ACTIVITIES

- University Tennis Team; Doubles 3rd Place ×2 (2022, 2023)
- College Basketball Team, Chang'an Dublin International College (2020–2023)