Jeremy Yin

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Education

MSc Civil and Environmental Engineering *Carnegie Mellon University* **Pittsburgh, PA** *2021-2022*

GPA: 3.83/4 - **Relevant Courses:** Data Acquisition, Data Management, Probability and Estimation Methods for Engineering Systems, Urban Systems Modeling, Foundations of Intelligent Infrastructure Systems, Infrastructure Management, Adv. Topics in Machine Learning and Game Theory, Introduction to Machine Learning

BSc Civil and Environmental Engineering *University of Illinois at Urbana-Champaign* **Champaign, IL** *2017-2021*

Research Experience

Real-time Broken Rail Detection for In-Service Locomotives *Carnegie Mellon University*

PI: *Professor Katherine A. Flanigan and Professor Mario Bergés* **Pittsburgh, PA** *01/2023 - 05/2024*

- Led data acquisition hardware design and sourced components for real-time rail condition rail monitoring
- Conducted state-of-the-art literature reviews to identify potential research gaps between current direct condition monitoring and indirect approaches
- Developed a multi-modal data pre-processing pipeline and tested encoder-decoder based machine learning models using pytorch to identify structural anomalies

Laboratory Scale Simulation Model for Broken Rail Analysis *Carnegie Mellon University*

PI: *Professor Katherine A. Flanigan and Professor Mario Bergés* **Pittsburgh, PA** *06/2022 - 12/2022*

- Built acceleration data collection infrastructure and 27' scaled track model to study indirect structural health monitoring
- Analyzed the acceleration data and successfully detected structural defects from the experimental study
- Tested dimensionality reduction techniques on the collected testbed data, achieving 95% accuracy in damage identification
- Deployed 6 depth sensors across Porter Hall and ran custom occupancy estimation software on edge computing devices to optimize energy utilization in an indoor occupancy study

Analysis of Railway Tie Padding on Load Dampening and Aggregate Spoiling *University of Illinois RailTEC*

PI: *Professor J. Riley Edwards* **Champaign, IL** *09/2020 - 08/2021*

- Investigated the impact of rail tie padding to improve the lifespan of surface and subsurface aggregate
- Developed and implemented multiple MATLAB scripts aimed to process and analyze files with the collected field data and isolating load and pressure peaks
- Interpreted train field data from BNSF Railways and designed graphics used in sponsorship presentations

Earthwork Operation Optimization using Minimum Spanning Tree *National University of Singapore*

PI: *Professor Justin Yeoh Ker-Wei* **Singapore, Singapore** *06/2019 - 08/2019*

- Built a Python optimization simulation program using a minimal spanning tree algorithm to identify the optimal earthwork cut and fill operations
- Presented findings in Engineering Research Fair & International Research Symposium

Work Experience

Seasonal Engineering Technician Intern, *Illinois Department of Transportation* **Champaign, IL** *06/2020 - 08/2020*

- Reviewed construction design plans, specifications, and documents about the $10.3 million curb and gutter, lighting, and sidewalk project on University Avenue
- Oversaw curb and gutter, sidewalk, and lighting removal and installation for the 2 miles of road
- Performed air, slump, and strength tests to determine the reliability and quality of the reinforced concrete used on the sidewalk, driveway, and mast arm foundations
- Conducted routine traffic control checks to preserve the safety of pedestrians and motorists

Publications

- Montero, G., **Yin, J.**, Flanigan, K. A., Bergés, M., & Brooks, J. D. (2023). Anomaly identification algorithms for indirect structural health monitoring using a laboratory-scale railroad track system. Health Monitoring of Structural and Biological Systems XVII. https://doi.org/10.1117/12.2658463
- **Yin, J.**, Montero, G., Flanigan, K. A., Bergés, M., & Brooks, J. D. (2023). Open-source hardware and software for a laboratory-scale track and moving vehicle actuation system used for indirect broken rail detection. Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2023. https://doi.org/10.1117/12.2658438

Teaching Assistant - Carnegie Mellon University

- **12-301** Integrating the Built, Natural and Information Environments
- **12-770** Autonomous Sustainable Buildings: From Theory to Practice
- **12-760** Fundamentals of Programming for Engineering Systems

Skills

- **Programming:** Python [Proficient], MATLAB [Proficient], SQL [Intermediate], LaTeX [Intermediate], HTML [Intermediate], CSS [Basic], JavaScript [Basic]
- **Frameworks:** pytorch, tensorflow, matplotlib, numpy, scipy, pandas
- **Languages:** English [Native], Chinese Mandarin [Conversational]
- **Certificate:** NVIDIA DLI Certificate – Applications of AI for Anomaly Detection (Nov. 2023) - NVIDIA