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, Geographic Information Systems, 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*
International Minor in Engineering - East Asia

Research Projects

Habitats Optimized for Missions of Exploration (HOME) *Carnegie Mellon University*
PI: *Professor Mario Bergés* **Pittsburgh, PA** *03/2024 - 05/2024*
- Revamped fault detection algorithm to identify anomalies during CO_2 absorption phase and detect defects in CO_2 removal unit
- Improved model query selection UI for CO_2 scrubber digital twin and composed docker file to containerize the HOME demo

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 monitoring operations
- Conducted state-of-the-art literature reviews to identify potential research gaps between current direct and indirect structural health monitoring approaches
- Developed a multi-modal data pre-processing pipeline and tested encoder-decoder-based machine learning models using pytorch to identify structural anomalies

Fine grained Occupancy estimatoR using Kinect (FORK) Redeployment *Carnegie Mellon University*
PI: *Professor Katherine A. Flanigan and Professor Mario Bergés* **Pittsburgh, PA** *06/2022 - 12/2022*
- Coordinated tear-down of the inactive system with facility management personnel across four department buildings
- Reformatted and revived Odroid-XU4 through the command line interface and re-established network authorization for remote access
- Re-deployed six depth sensors and computational units across Porter Hall that ran custom occupancy estimation software on edge computing devices to optimize energy utilization in an indoor occupancy study

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 on a custom 27' scaled train-track model to study indirect structural health monitoring methods on rail discontinuities
- Tested dimensionality reduction techniques on testbed data to identify the best method to facilitate damage identification
- Analyzed acceleration data to successfully detect structural defects from the experimental study and achieved a 95% accuracy

Analysis of Railway Tie Padding on Load Dampening and Ballast Spoiling *University of Illinois RailTEC*
PI: *Professor J. Riley Edwards* **Champaign, IL** *09/2020 - 08/2021*
- Investigated the impact of rail tie padding material to improve the lifespan of surface and subsurface aggregate
- Developed MATLAB scripts to process and analyze files from the collected field data to isolate 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 simulation model 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

Conferences

- 2019 UIUC Engineering Research Fair and International Research Symposium [Poster Presentation] Champaign, IL
- SPIE Smart Structures + NDE 2023 [Conference Papers and Oral Presentations] Long Beach, CA
- EMI 2024 [Abstract and Oral Presentation] Chicago, IL
- I3CE 2024 [Conference Volunteer] Pittsburgh, PA

Teaching Experience

- **Teaching Assistant**, *12-301: Integrating the Built, Natural and Information Environments* *Fall 2022*
  Lead Instructors: Professor Joe Moore and Professor Don Coffelt *Carnegie Mellon University*
- **Teaching Assistant**, *12-770: Autonomous Sustainable Buildings: From Theory to Practice* *Spring 2023*
  Lead Instructor: Professor Mario Bergés *Carnegie Mellon University*
- **Teaching Assistant**, *12-760: Fundamentals of Programming for Engineering Systems* *Fall 2023*
  Lead Instructor: Professor Susan Finger *Carnegie Mellon University*

Skills

- **Programming Languages:** Python [Proficient], MATLAB [Proficient], SQL [Intermediate], LaTeX [Intermediate], HTML [Intermediate], CSS [Basic], JavaScript [Basic]
- **Packages and Libraries:** pytorch, tensorflow, matplotlib, numpy, scipy, pandas
- **Languages:** English [Native], Chinese Mandarin [Conversational]
- **Engineering Software:** ArcGIS Pro, Autodesk Inventor, Autodesk Fusion 360
- **Certificate:** NVIDIA DLI Certificate – Applications of AI for Anomaly Detection (Nov. 2023) - NVIDIA

References

References upon request