Jeremy Yin

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EDUCATION

PhD in Civil and Environmental Engineering | *Carnegie Mellon University* | *Pittsburgh, PA* Jan 2023 - May 2024
GPA: 3.78/4.00 **Relevant Courses**: Introduction to Machine Learning [PhD], Geographic Information Systems

MSc in Civil and Environmental Engineering | *Carnegie Mellon University* | *Pittsburgh, PA* Graduated: Dec 2022
GPA: 3.83/4.00 **Relevant Courses**: Data Acquisition, Data Management, Fundamentals of Programming for Engineering Systems, Urban Systems Modeling, Advanced Topics in Machine Learning and Game Theory, Probability and Mathematical Statistics

BSc in Civil and Environmental Engineering | *University of Illinois at Urbana-Champaign* | *Urbana, IL* Graduated: May 2021
Relevant Courses: Engineering Risk and Uncertainty, Systems Engineering and Economics, Computer Methods

CERTIFICATES

AWS Certified AI Practitioner - Amazon Web Services *May 2, 2025*
Applications of AI for Anomaly Detection - Nvidia *November 2, 2023*

SKILLS

Programming Languages	Python, MATLAB, SQL, LaTeX
Packages and Libraries	PyTorch, Scikit-learn, Pandas, NumPy, SciPy, matplotlib, Seaborn
Collaboration	Microsoft Office Suite, Google Workspace, Overleaf
Engineering Software	NI LabVIEW, ArcGIS Pro, Autodesk Inventor, Autodesk Fusion 360

RESEARCH PROJECTS

Carnegie Mellon University | Pittsburgh, PA **PhD Research Assistant** | Jan 2023 - May 2024
Habitats Optimized for Missions of Exploration (HOME) PI: Dr. Mario Bergés

- Enhanced fault detection model selection framework for simulated CO2 scrubbers with Python scripts to ensure environmental habitability for potential NASA missions
- Containerized the HOME project using Docker to ensure environment consistency and facilitate a seamless research demonstration for NASA collaboration

Real-time Broken Rail Detection for In-Service Locomotives PI: Dr. Katherine Flanigan

- Developed and deployed a real-time unsupervised anomaly detection pipeline using a multi-modal (accelerometer, vision, GPS) autoencoder ensemble in PyTorch to autonomously detect defects for targeted maintenance across 3 mi. of test track.
- Designed and fabricated custom data acquisition hardware and data management system using Autodesk Fusion 360 and NI DAQ for real-time sensor data processing and storage, which enables seamless data collection from in-service locomotives for machine learning model training

Carnegie Mellon University | Pittsburgh, PA **Graduate Research Assistant** | Jun 2022 - Dec 2022
Fine-grained Occupancy estimatoR using Kinect (FORK) Redeployment PI: Dr. Mario Bergés

- Re-deployed six Microsoft Kinect depth sensors and Odroid-XU4 edge computing units to optimize building energy utilization through custom occupancy estimation software and establishing network access for remote data collection
- Coordinated system tear-down and re-deployment across multiple campus buildings through collaboration with university facility management and staff

Laboratory Scaled Track and Moving Vehicle Actuation System PI: Dr. Katherine Flanigan

- Built custom data collection infrastructure and NI LabVIEW software, which included a tuned 27 ft. scaled train-track model, to collect data and identify the optimal dimensionality reduction technique (PCA) for efficient feature extraction, ultimately achieving 95% accuracy in damage classification using SVM
- Led the testbed's transition to the cornerstone project for Carnegie Mellon University's AI Engineering - Digital Twins & Analytics graduate certificate, teaching students the real-world value of AI in engineering

University of Illinois RailTEC | Urbana, IL **Undergraduate Research Assistant** | Sep 2020 - Aug 2021
Analysis of Railway Tie Padding Material on Ballast Spoiling PI: Dr. J Riley Edwards

- Developed MATLAB scripts for statistical analysis and visualization of field data, assessing cross-tie padding performance and identifying key trends in load and pressure peaks from BNSF-operated rail
- Formulated presentation graphics for sponsors and industry partners based on research findings related to rail tie padding and ballast spoiling, effectively communicating complex data insights

National University of Singapore | Singapore **International Undergraduate Research Assistant** | Jun 2019 - Aug 2019
Earthwork Operation Optimization for Dense Urban Environments PI: Dr. Justin Yeoh Ker-Wei

- Designed a Python simulation environment to model earthwork operation for Singapore's mass rapid transit maintenance facility and conducted literature reviews to inform the tool's development
- Explored minimum spanning tree and linear programming for earthwork optimization to reduce construction costs in dense urban environments

INDUSTRY EXPERIENCE

Illinois Department of Transportation | Urbana, IL **Seasonal Engineering Technician Intern** | Jun 2020 - Aug 2020

- Inspected a $10.3 million construction renovation project to ensure compliance with state and federal regulations
- Conducted air, slump, and strength field tests on construction materials and monitored construction and traffic progress to maintain quality and safety
- Prepared reports and documentation for project managers and contractors for curb and gutter, sidewalk, and lighting removal and installation across 2 miles of road

TEACHING EXPERIENCE

12-760: Fundamentals of Programming for Engineering Systems **Teaching Assistant** | Fall 2023
Instructors: Dr. Susan Finger *Carnegie Mellon University*

12-770: Autonomous Sustainable Buildings: From Theory to Practice **Teaching Assistant** | Spring 2023
Instructors: Dr. Mario Bergés *Carnegie Mellon University*

12-301: Integrating the Built, Natural and Information Environments **Teaching Assistant** | Fall 2022
Instructors: Dr. Joe Moore and Dr. Don Coffelt *Carnegie Mellon University*

PUBLICATIONS

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. SPIE Smart Structures + NDE: Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2023 https://doi.org/10.1117/12.2658438

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. SPIE Smart Structures + NDE: Health Monitoring of Structural and Biological Systems XVII https://doi.org/10.1117/12.2658463

PERSONAL PROJECTS

Proximal Policy Optimization Reinforcement Learning Agent for Settlers of Catan

- Scripted PPO reinforcement learning agents for Settlers of Catan were developed using PyTorch and OpenAI Gymnasium. These agents were trained through self-play and optimized using a customized Catan Gym environment.

Real-Time Pittsburgh Port Authority Bus Tracking

- Engineered a real-time data pipeline and web application that integrated PRT TrueTime's API, scraped geospatial vector data, and visualized the data on OpenStreetMap via folium to track public transportation in Pittsburgh

LANGUAGES

English: *Native* **Mandarin**: *Conversational*