Peijing Li

CONTACT INFORMATION

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EDUCATION

University of Michigan, B.S.E. in Computer Science
Anticipated graduation: May 2024
- Minor in Civil and Environmental Engineering
- Enrolled in College of Engineering Honors Program
- Cumulative GPA: 4.0/4.0, 144 credit hours completed

EMPLOYMENT POSITIONS

Software Test Engineer Intern
ASML Silicon Valley, San Jose, CA
May 2023 – August 2023, manager: Mingjing Zhao

Instructional Aide
CEE 375 *Sensors and Circuits* course
University of Michigan Department of Civil and Environmental Engineering, Ann Arbor, MI
January 2023 – present, faculty instructor: Jeff Scruggs, Ph.D.

Research Assistant
University of Michigan Transportation Research Institute, Biosciences Group, Ann Arbor, MI
February 2022 – August 2022, supervisors: Shelia Ebert; Jingwen Hu, Ph.D.

Software Engineering Intern
Dell EMC Research and Development Shanghai, Co., Ltd., Shanghai, China
June 2021 – August 2021, manager: Carl Shi

RESEARCH

Postgraduate Research Interests
- Computer architecture, heterogeneous multi-core platforms, domain-specific hardware
- Security-conscious and privacy-preserving hardware design, benchmarking, and validation
- Compiler frameworks for heterogenous and parallel hardware
- Reconfigurable hardware generation and high-level synthesis
- Application of reconfigurable hardware for mobile, distributed, and embedded computing

Research Projects

Road-side Based Cybersecurity in Connected and Automated Vehicle Systems

Independent study, University of Michigan Center for Connected and Automated Transportation
February 2022 – Present, principal investigators: Neda Masoud, Ph.D.; Henry Liu, Ph.D.

- Contributed to holistic framework that integrates data-driven modeling and dynamic decision-making under uncertainty and partial information to improve cybersecurity in connected and automated vehicles.
- Proposed integrated real-time, robust, joint hardware-software security protocol for communication within platoons of connected vehicles forming vehicular ad-hoc networks, aiming at decreasing communication overhead and increasing efficiency while maintaining the goals of authentication and privacy. Poster presentation in [1].
- Developed configurable, co-simulation of car-following models in CARLA and SUMO to represent connected and automated vehicles operating in adversarial environments.

Evaluation of Motion Sickness

University of Michigan Transportation Research Institute, Biosciences Group
June 2022 – August 2022, principal investigator: Monica Jones, Ph.D.
https://www.umtri.umich.edu/about/news-information-and-media/evaluation-of-motion-sickness/

- Processed data of video recordings of operators and passengers of automated vehicles.
- Assisted in the development of computer vision algorithm to identify movement of key physiological landmarks during vehicle motion and possibility of motion sickness.

Human Shape Modeling

University of Michigan Transportation Research Institute, Biosciences Group
February 2022 – June 2022, supervisor: Jingwen Hu, Ph.D.
http://humanshape.org/

- Processed images of 3D body scans of test subjects and label landmarks on the test subjects' bodies, to aid the development of female-specific, parametrized 3D human models of vehicle occupants.
- Automated the labeling process by contributing to Python code that automates the landmark detection process.
- Investigated relevant literature in the field of 3D human body literature on own initiative and composed literature review manuscript that features a systematic review methodology and usage of computerized bibliometric tools. Research manuscript in [2].

Publications

[1] P. Li and N. Masoud "A Communication Protocol for Securing Connected Vehicle Platoons Using Joint Hardware-Software Means." 6th Student Poster Competition at the CCAT Global Symposium. Ann Arbor, MI: Center for Connected and Automated Transportation, Mar. 2023. url: https://ccat.umtri.umich.edu/symposium/2023-symposium/#poster.
[2] P. Li and J. Li, "Exploration of the application of Grey-Markov models in the causality analysis of traffic accidents in roundabouts," PLOS ONE, vol. 18, no. 9, pp. 1–21, Sep. 2023, doi: 10.1371/journal.pone.0287045.

[3] J. Li, P. Li, and J. Hu. "Digital Human Models in Automotive Engineering Applications: A Bibliometric Analysis of Research Progress and Prospects." International Journal of Vehicle Design, Accepted in Oct. 2023 and in press, doi: 10.1504/ijvd.2023.10060019

SELECTED COURSEWORK

- EECS 481, *Software Engineering*, Xinyu Wang, Winter 2024
- MATH 561, *Linear Programming*, Ruiwei Jiang, Winter 2024
- EECS 573, *Microarchitecture*, Todd Austin, Fall 2023
- EECS 583, *Advanced Compiler Construction*, Scott Mahlke, Fall 2023
- CEE 552, *Travel Analysis and Forecasting*, Atiyya Shaw, Fall 2023
- EECS 470, *Computer Architecture*, Jonathan Beaumont, Winter 2023
- EECS 442, *Computer Vision*, Andrew Owens, Fall 2022
- CEE 551, *Traffic Science*, Henry Liu, Fall 2022
- EECS 388, *Introduction to Computer Security*, Peter Honeyman, Winter 2022
- CEE 450, *Introduction to Transportation Engineering*, Henry Liu, Winter 2022
- CEE 375, *Sensors and Circuit*s, Jeff Scruggs, Winter 2022
- ENGR 255, *Introductory Multidisciplinary Engineering Project*, Ivo Dinov, Winter 2021

Course Projects

Out-of-order, Superscalar Implementation of the RISC-V ISA
EECS 470 Computer Architecture, February 2023 – April 2023
Collaborators: Wenjie Geng, Haowen Tan, Yunjie Zhang and Yunqi Zhang
- Proposed framework for register-transfer-level design on P6-style microarchitecture that implements the RV32-IM ISA.
- Managed BitBucket repository and code base of 20,000+ lines of SystemVerilog.
- Set up build and testing infrastructure using GNU Make, Synopsys VCS, and Synopsys Design Compiler for both unit and integration testing of different processor modules.
- Implemented 32-stage, pipelined divider using the SRT division algorithm.
- Implemented 256-byte, set-associative data cache with parameterized associativity.

Investigation of representation of accidents in car-following models
CEE 551 Traffic Science, November 2022 – December 2022
Collaborator: Zhaoming Zeng
- Reviewed mainstream car following models, such as the Intelligent Driver Model and the Gipps model, and mathematically evaluate their performances in simulating traffic accidents.
- Set up simulations with SUMO to validate mathematical calculations.

Nested, variable-depth UNet++ model architecture for medical imaging segmentation
EECS 442 Computer Vision, November 2022 – December 2022
Collaborators: Feilong Meng, Yongxiang Zhao
- Re-implemented and enhanced functionalities of UNet++ model for image segmentation by configuring it with parameterized model layer depth.
- Investigated relationship of model layer depth and training and validation accuracies.

Analysis and modeling of traffic accidents in roundabouts
CEE 450 Introduction to Transportation Engineering, March 2022 – August 2022

- Gathered and analyzed data of traffic crashes in roundabouts in Michigan and causality factors associated with every crash.
- Developed a mixed model consisting of a multivariate grey formulation and Markov chain calculations to model such causality factors, identify which factors are more prominent than others, and use such model to predict future traffic crash numbers. Published in [3].

Statistics Online Computational Resource Analytical Toolbox
ENGR 255 Introductory Multidisciplinary Engineering Project, January 2021 – December 2022
https://www.socr.umich.edu/, https://socr.umich.edu/HTML5/SOCRAT/

- Directed an 8-person team to maintain the SOCR Analytical Toolbox (SOCRAT), a collection of various HTML-5 and JavaScript-based web apps for data analytics and visualization to assist education and training of students in health science fields.
- Integrated TensorFlow.JS and TensorBoard Projector data visualization modules into SOCRAT to enable machine learning and visualization of datasets with up to 5,000 dimensions, e.g., of large samples of MRI imaging of patients' brains.
- Initiated migration of code base from Angular JS to React JS.

Talks

A tour of accelerator architectures for AI/ML applications
Topic lecture for the EECS 573 Microarchitecture class, November 13, 2023
Collaborator: Mason Nelson

- Introduced state of the art for hardware for artificial intelligence uses to class of 20 students.
- Identified and explain parallelizable computation patterns within deep learning algorithms.
- Reviewed and synthesized the literature and classify existing HW accelerator solutions.
- Proposed future research direction for heterogeneous hardware and memory architectures.

HONORS, AWARDS, AND FUNDING

All awards received at the University of Michigan
- McLane Family Scholarship for Experiential Learning (Winter 2024), College of Engineering funding for academic conference attendance.
- Two-time James B. Angell Scholar (Winter 2022, Winter 2023), awarded for 3 or more consecutive terms of straight-A grades.
- Two-time Class of 1935 Engineering Scholarship (Fall 2021, Fall 2022), merit-based scholarship from the College of Engineering.
- Four-time University Honors (Fall 2020, Fall 2021, Winter 2022, Fall 2022), awarded for GPA of over 3.5 through a term.
- Four-time Dean's Honor List (Fall 2020, Fall 2021, Winter 2022, Fall 2022), awarded for GPA of over 3.5 through a term at the College of Engineering.
- William J. Branstrom Freshman Prize (Winter 2021), awarded to top 5% of the freshman class.

PERSONAL DEVELOPMENT AND SERVICE

- Tau Beta Pi Engineering Honor Society, Michigan Gamma chapter (Winter 2023 – Present)
- University of Michigan Club Cycling Team (Fall 2021 – Present)
- University of Michigan Engineering Student Government (Fall 2020 – Winter 2022)