HaoChen Xia

hx17@illinois.edu | www.linkedin.com/in/haochen-xia-614bb0251 | https://github.com/ssimonxia

Education

University of Illinois at Urbana Champaign **Graduation Date 2026**

Major in Computer Engineering GPA: 4.0/4.0

- Dean's List: Fall 2022, Spring 2023, Fall 2023, Spring 2024
- Relevant coursework: Algorithm, Artificial Intelligence, Data Structure, Introduction to Robotics, Probability with Engineering Application, Differential Equation, Discrete Structure, Linear Algebra, Data Science, Fundamental Mathematics

Research Experience

Human-Centered Autonomy Lab Champaign, IL

Advisor: Professor Katie Driggs-Campbell

Undergraduate Research Assistant February 2024 – Present

- **Structured Graph Network for Constrained Robot Crowd Navigation**
  - Implemented dynamic window approach on a low-fidelity simulator as a non-neural-network baseline
  - Collaborated to develop and identify neural network baseline without attention mechanisms to investigate the effects of spatial-temporal interaction graph used in reinforcement learning (RL) policies
  - Assisted in conducting real-world robot crowd navigation evaluation to analyze the performance of RL policies in the real world and the gap between the low-fidelity simulator and the real environment
- **Generative Model for In-car Hand Gesture Video Generation**
  - Collaborated to develop variational autoencoder (VAE) and generative adversarial network (GAN) to reconstruct in-car hand gesture videos
  - Investigated neural network architecture and parameters to optimize reconstruction video generation models
  - Developed transformer-based classifiers to classify frames in the video generation process by integrating various CNN, attention mechanism, and random forest algorithms

Research in ECE Department at UIUC Champaign, IL

Advisor: Professor Deming Chen and Professor David M. Nicol

Undergraduate Research Assistant January 2024 – Present

- **High-Performance Fault Tolerant Communication Protocols in Safety-Critical Industry**
  - Analyzed the operations, stages, and bottlenecks of conventional Parallel Redundancy Protocol (PRP)
  - Developed and implemented Data Plane Development Kit (DPDK) and Data Processing Unit (DPU) compatible versions of PRP to investigate the optimization of PRP
  - Collaborated to construct a redundancy network to evaluate and analyze the performance of conventional and accelerated PRP
  - Identified and utilized benchmarks to analyze the performance bottlenecks of the conventional PRP and improvements achieved by DPDK and DPU

Working Experience

Garg Group at UIUC Champaign, IL

Computer Vision Engineer May 2024 – Present

- Developed object tracking and counting algorithms with Deep Simple Online and Real-time tracking (DeepSORT) to track and count the number of certain objects
- Applied decision-level multi-modality to improve the performance of You Only Look Once (YOLO) models and overall algorithms
- Collected and annotated waste data using Roboflow for YOLO model training and detecting different types of objects

Applied Technologies for Learning in the Art & Science Internship Program Urbana, IL

Data Analyst & Educational Technologist January 2023 – May 2023

- Managed and visualized K-12 educational program data from 70+ schools to evaluate the effectiveness of the program
- Analyzed data from 100+ survey questions before and after the program to assist in developing educational strategies
- Created videos and Word tutorials to teach clients to analyze and visualize data with Power BI and Tableau

Project Highlights

Automated Codebase Modification with Large Language Model Urbana, IL

ApeEpoch AI Team Cofounder March 2024 – July 2024

- Analyzed the stages and workflows of the Warehouse Management System codebase written in Django and Vue.js
- Investigated and applied SWE-agent to enable automated modification of the codebase by a large language model based on input prompts
- Developed and optimized suitable prompt inputs and configurations for large language models to ensure accurate and effective codebase modification

Keylogger with Large Language Model Urbana, IL

Independent project April 2023 – July 2024

- Developed a keylogger in Rust to record computer activities, including files, actions, and keyboard inputs
- Designed and implemented filtering algorithms to identify and highlight potentially sensitive information
- Implemented encryption and decryption algorithms to encode and decode recorded data for disguise purpose
- Enhanced keylogger result analysis by integrating large language models

UR3 Robot Arms Tools Recognition and Handling in Collaborative Work Environments Urbana, IL

ECE470 Final Project March 2024 – May 2024

- Developed a real-time algorithm for UR3 Robot Arms to classify tools, determine optimal pick-up points, and accurately deliver tools to human hands
- Implemented and integrated computer vision techniques to analyze tools' shapes and positions to enhance robot arms' ability to assist human work
- Evaluated and optimized the algorithm's performance in dynamic environments to ensure continuous and accurate tool handling and delivery

SigAIDA Machine Learning and Computer Vision Projects Urbana IL

SigAIDA Project Team Lead August 2023 – February 2024

- Led a project team at SIGAIDA to build Region-Based Convolution Neural Networks (R-CNN) to detect dangerous objects in images
- Developed multiple Long Short-Term Memory (LSTM) models to predict stock prices on daily, weekly, and monthly intervals
- Collaborated on developing CNN models for classifying potato diseases, animals, and guns
- Implemented plant leaf classification using pretrained VGG19 and Imagenet50 models

A* Search Algorithm Implementation Urbana IL

CS225 Extra Credit Project October 2023 – December 2023

- Implemented A* Algorithm to find the shortest path in a graph from source to destination without traversing all the nodes
- Designed several heuristic functions to handle different graphs and situations
- Generated random grids and graphs to test the algorithm to ensure its correctness and time efficiency

Android Map App with Comments and Planning System Urbana, IL

CS124 Final Project October 2022 – December 2022

- Developed a comment system to give comments and rates to a place on an Android map of Urbana-Champaign with Java
- Created a planning system to add plans and notes to a place with a map pin on the map
- Implemented search algorithms to search for places on the map based on names and types

Certificates

IBM AI Engineering Professional Certificate December 2023

IBM Building Deep Learning Models with TensorFlow Certificate December 2023
IBM Deep Neural Networks with PyTorch Certificate November 2023
IBM Introduction to Computer Vision and Image Processing Certificate November 2023
Career Certificate – International Student October 2023
IBM Introduction to Deep Learning & Neural Networks with Keras Certificate October 2023
IBM Machine Learning with Python Certificate September 2023

Technical Skills

Programming language: C++, Python, Rust, Java, HTML, CSS, JavaScript, C
Packages: Pytorch, TensorFlow, OpenCV, Keras, Scikit-learn, OpenAI, Ultralytics, Django, DPDK
Software & Tools: LaTeX, ROS, RoboFlow, Git, IBM CV Studio, Power BI, Haskell, Tableau

Extracurricular Activities

Association for Computing Machinery Urbana, IL
Participant September 2022 – Present
- Volunteered and participated in Reflection | Projection activity to assist participants and listen to tech talks
- Expand computer knowledge about hacking and cybersecurity using Python in Special Interest Group Pwny

Institute of Electrical and Electronics Engineers Urbana, IL
Participant September 2022 – Present
- Participate in TAG, Flask, and PCD workshops to learn networking, information security, Flask, and PCB
- Meet with leaders from the industry in tech talks to learn applications and technology about electrical engineering

Leadership I Program Urbana, IL
Participant October 2022 - December 2022
- Developed leadership skills in innovation and problem-solving with other participants and facilitators
- Improved intrapersonal and interpersonal skills by completing self-knowledge and innovation inventory

Honors

Yunni and Maxine Pao Memorial Scholarship 2024 - 2025
James Scholar Honors Program 2023 - 2026
American Mathematics Competition 12 December 2021
- Certificate of Distinction

National Olympiad in Informatics in Provinces 2021 December 2021
- First Place

United States of America Computing Olympiad February 2021
- Silver Place

United States Academic Decathlon China 2021 February 2021
- National Individual Overall Award, Third Place
- Second Place in Math and Art
- National Overall Team Award, Third Place