

# Taowei Huang

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## EDUCATION

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### University of Illinois Urbana-Champaign

*Master of Science in Electrical and Computer Engineering*

Champaign, IL

Aug 2026 – May 2028

### University of Illinois Urbana-Champaign

*Bachelor of Science in Computer Engineering* | GPA: 3.97/4.00

Champaign, IL

Aug 2022 – May 2026

## RESEARCH EXPERIENCE

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### Intelligent Motion Laboratory, University of Illinois

*Undergraduate Research Assistant (Advisor: Prof. Kris Hauser)*

Champaign, IL

Jun 2025 – Present

- Designed and implemented a novel sampling strategy for Model Predictive Path Integral (MPPI), increasing target-reaching success rate by 20% in cluttered dynamic environments.
- Implemented GPU-parallel MPPI rollouts in MuJoCo Warp, achieving 10× speedup over CPU-based simulation.
- Integrated an online-learned heuristic map (inspired by Real-Time Adaptive A\*) into MPPI, reducing required escape planning horizon from 1.1s to 0.2s.

### Coordinated Science Laboratory, University of Illinois

*Undergraduate Research Assistant*

Champaign, IL

May 2024 – May 2025

- Developed and trained neural networks in PyTorch to address non-linear inverse problems in slitless instantaneous spectral imaging
- Engineered an optimization-inspired neural network architecture that surpassed UNet by 10% in reconstruction quality
- Integrated iterative optimization principles into the neural network architecture to improve robustness against input distribution shifts

## TEACHING EXPERIENCE

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### Department of Electrical and Computer Engineering, University of Illinois

*Teaching Assistant for ECE484 (Principles of Safe Autonomy)*

Champaign, IL

Aug 2026 – Present

- Led lab sections on key topics robotics such as safety, control, machine learning, and planning
- Modified project codes used in machine problem from ROS2 Humble to ROS2 Jazzy

### Department of Electrical and Computer Engineering, University of Illinois

*Course Assistant for ECE 391 (Computer Systems Engineering)*

Champaign, IL

Jan 2025 – May 2026

- Maintained and extended a custom RISC-V Unix operating system serving as the instructional codebase for 300+ students.
- Debugged core OS kernel components, including the shell, scheduler, and file system, to ensure stability for 300+ students.
- Guided students on kernel-level concurrency, virtual memory, and C/RISC-V assembly integration during office hours.

### Department of Mathematics, University of Illinois

*Course Assistant for MATH 257 (Linear Algebra with Computational Applications)*

Champaign, IL

Jan 2024 – May, 2025

- Led lab sessions for 40+ students, facilitating hands-on learning using Python and NumPy to explore linear algebra concepts
- Held office hours to deliver individualized academic support on lab exercises and homework

## PROJECTS

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### Self-driving RC Car with SLAM | *Python, ROS2, LiDAR, Linux*

Mar 2025 – May 2025

- Developed a SLAM and autonomous exploration system on a LiDAR-equipped RC car with Nvidia Jetson NX system using ROS2.
- Developed a custom heuristic for frontier-based search algorithms, optimizing path planning in unknown environments.
- Validated system performance through real-world trials, achieving a 45% improvement in exploration efficiency.

### RISC-V Unix Operating System | *C, Assembly (RISC-V), QEMU*

Aug 2024 – Dec 2024

- Implemented core OS components including trap handling, context switching, system calls, ELF loading, forking, file-system, timer-driven preemption, and VirtIO device support.
- Built Sv39 virtual memory with page-table walking, user page-fault handling, process memory cloning, pointer validation, and user/kernel isolation.

### Computer Vision Model for Vehicle Detection | *Python, PyTorch, TorchVision*

Aug 2024 – Dec 2024

- Developed a computer vision model using PyTorch and TorchVision to detect vehicles at traffic intersections.
- Improved validation IoU by 20% over baseline using early stopping, augmentation, and gradient clipping.

### FPGA Puzzle Game “Baba Is You” | *System Verilog, C*

March 2024 – May 2024

- Engineered a functional replica of the puzzle game “Baba Is You” on a Spartan-7 FPGA using a MicroBlaze processor in a System-on-Chip (SoC) architecture
- Implemented SPI protocol in SystemVerilog to interface with USB keyboard inputs for real-time character control
- Utilized AXI4 protocol for communication between MicroBlaze and on-chip memory, optimizing frame buffer usage for smooth gameplay
- Developed game logic and rendering using C, significantly improving code modularity, readability, and debuggability

## TECHNICAL SKILLS

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**Languages:** Python, C/C++, MATLAB, RISC-V Assembly

**Frameworks & Tools:** MuJoCo, ROS/ROS2, PyTorch, NumPy, JAX, Docker, Git, Linux

**Robotics:** SLAM, MPPI, MPC