

# YAN MIAO

Phone: (949) 239-4966  
yanmiao2@illinois.edu

## EDUCATION

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### **Doctor of Philosophy in Computer Engineering**

University of Illinois at Urbana-Champaign  
Advisor: **Prof. Sayan Mitra**

**Expected: May 2027**

GPA: 4.0/4.0

### **Master of Science in Computer Engineering**

University of Illinois at Urbana-Champaign  
Advisor: **Prof. Sayan Mitra**

**Expected: Dec 2023**

GPA: 4.0/4.0

### **Bachelor of Science in Electrical and Computer Engineering**

University of Illinois at Urbana-Champaign  
Graduated with High Honors

**May 2021**

GPA: 3.88/4.0

## RESEARCH EXPERIENCE

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### **Coordinated Science Laboratory**

Graduate Research Assistant

**Sep 2022 to Present**

Advised by Prof. Mitra

#### **Project: Synthesis Safe Controller of F1-tenth vehicle with ML-based perception**

- Implementing indoor vehicle localization using RGB camera with particle filter algorithm.
- Developing a 'preimage perception contract' for the lane detection module and localization algorithm, effectively characterizing perception uncertainties.
- Engineering a safety-focused controller grounded in the preimage perception contract, enhancing vehicle response and reliability.

#### **Project: Correcting ML-based perception for Safety Autonomous Vehicle in simulation**

- Refined the error boundaries of ML-based perception systems through the application of a preimage perception contract.
- Using risk heuristic to choose from approximated perception to drive safe control decision
- Conducted rigorous testing in Autonomous Cruising Control scenarios, demonstrating a 73% success rate in averting unsafe controls without excessive conservatism.

#### **Project: Learning-based Testing on Autonomous Vehicle in Simulation**

- Predicted performance of received GRAIC controllers without running the simulator
- Approximated the vehicle dynamics and trajectories with machine learning techniques
- Synthesized controllers with better performance based on optimization of received baseline controllers
- Generating scenarios where controllers might fail to assist with software testing

**Project: Generalized RAing Intelligence Competition(GRAIC) Jan 2022 to Dec 2022**

- Provided a CARLA-based platform for comparing different AV algorithms developed by researchers in dynamic and uncertain environments
- Designed different tracks, maps and scenarios for competitors' controller agents to run on using Scenario Runner and Road Maker
- Improved the scoring function so that different agents can be evaluated using common rules and benchmarks
- Enabled the multi-agent scenario to allow different agents to run on the same track at the same time for evaluation purposes

**DEPEND, Coordinated Science Laboratory**

**Jun 2021 to Dec 2021**

Graduate Research Assistant

Advised by Saurabh Jha and Prof. Iyer

**Project: Assessing Risk in Dynamic Environments for Safe Driving**

- Proposed a novel risk metric to calculate the importance of each actor in dynamic driving scenarios
- Demonstrated usefulness of metric through case study with Pylot for control and CARLA for simulation
- Created more benchmarks using Scenario Runner to verify the risk metric during run-time simulation
- Modified existing planners to integrate to the ADS pipeline and evaluating their performance using our novel risk metric

**DEPEND, Coordinated Science Laboratory**

**Jan 2021 - Jun 2021**

**Undergraduate Research Assistant**

Advised by Saurabh Jha and Prof. Kalbarczyk

Project: DiverseUAV -- Error Detection

- Duplicated the software agent(FASTER) in ROS by adding parallel ROS nodes
- Designed a low-overhead error detection algorithm for UAVs by using round-robin on 2 software agents
- Injected customized faults on the duplicated agent and analysis the difference of the two agents' outputs

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## **HONORS AND AWARDS**

**List of Teachers Ranked as Excellent**

Fall 2021

These lists are compiled on semester basis and reflect student ratings of instruction. To be included on the list instructors needed to be rated among the top 30% across campus in their respective Elective-Mixed-Required course group.

**Deans' List**

Fall 2017, Spring 2018, Fall 2018, Fall 2020

Dean's List designation is given to the top 20 percent of students in each curriculum on the basis of grade point average in a semester.

## TEACHING EXPERIENCE

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University of Illinois at Urbana-Champaign, ECE Department

### ECE484 HEAD TA

Aug 2022- Dec 2022, Sep 2023 – Dec 2023

- Held weekly lab sections with 30 students and provided visual aids and hint to help them complete MPs
- Created the final project(modified GRAIC) that allows students to apply knowledge learnt during labs
- Design exam questions and had extra OH to help students consolidate their understanding on materials

### ECE391 HEAD TA

Aug 2021 - Present

- Lead and taught two weekly discussion sections of 60 students, covering the following topics: synchronization, interrupts, system calls, filesystems and devices drivers
- Held regular weekly office hours to help students with OS Material and debugging their programming assignments
- Developed Problem Sets, exams and grading scripts to automate grading process
- Managed communication between faculty and CA as well as communication between staff and over 200 students
- Implemented features on course websites and discord API that improve student user experience

## PUBLICATIONS

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(Submitted) Yan Miao, Hussein Darir, Sayan Mitra (2023). Correcting Learning-based Perception for Safety. In ICCPS 2024.

Jha, S., **Miao, Y.**, Kalbarczyk, Z., & Iyer, R. K. (2021). *Watch out for the risky actors: Assessing risk in dynamic environments for safe driving*. NeurIPS 2021 Workshop on Machine Learning for Autonomous Driving

## PROFESSIONAL EXPERIENCE

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### Co-Founder & CTO at TALKLET INC

Oct 2019 - Dec 2020

- Designed a MERN stack web app to connect certificated therapists to users with mental health symptom
- Launched a prototype web app on Heroku with reservation matching, feedback and user rating functions
- Collaborated closely with the product team to meet clients in person and to modify the web app to account for market's demand such as developing a dynamic pricing model algorithm for different cities

## LANGUAGES

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**English: Fluent**  
**Chinese: Native Speaker**

## COMPUTER SKILLS

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- Autonomous Vehicles: ROS, Computer Vision, Python, C++, CARLA, Pylot
- Web design: MERN Stack, Python crawler
- Programming skills: Python, C++, x86 assembly, Git, Unity
- Database: MongoDB, MySQL
- Machine Learning: PyTorch, Tensorflow, Neural Networks

## REFERENCES

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**Dr. Sayan Mitra**, Professor  
Department of Electrical and Computer Engineering  
University of Illinois at Urbana-Champaign  
266 Coordinated Science Laboratory  
Phone: (217)-333-7824  
Email: mitras@illinois.edu

**Dr. Ravishankar K Iyer**, George and Ann Fisher Distinguished Professor of Engineering  
Department of Electrical and Computer Engineering  
University of Illinois at Urbana-Champaign  
255 Coordinated Science Laboratory  
Phone: (217)-333-9732  
Email: rkiyer@illinois.edu

**Dr. Zbigniew Kalbarczyk**, Research Professor  
Department of Electrical and Computer Engineering  
University of Illinois at Urbana-Champaign  
267 Coordinated Science Laboratory  
Phone: (217)-244-7110  
Email: kalbarcz@illinois.edu

**Dr. Saurabh Jha**, Research Staff Member  
IBM Research  
Yorktown Heights, NY  
Email: Saurabh.Jha@ibm.com