

# YAN MIAO

Phone: (949) 239-4966  
[yanmiao2@illinois.edu](mailto:yanmiao2@illinois.edu)  
<https://yanmiao.netlify.app/>

## EDUCATION

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<b>Doctor of Philosophy in Computer Engineering</b> University of Illinois at Urbana-Champaign Advisor: <b>Prof. Sayan Mitra</b>	<b>Expected: May 2028</b> GPA: 3.96/4.0
<b>Master of Science in Computer Engineering</b> University of Illinois at Urbana-Champaign Advisor: <b>Prof. Sayan Mitra</b>	<b>May 2024</b> GPA: 3.96/4.0
<b>Bachelor of Science in Electrical and Computer Engineering</b> University of Illinois at Urbana-Champaign Graduated with High Honors	<b>May 2021</b> GPA: 3.88/4.0

## INTERNSHIP EXPERIENCE

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<b>Toyota Research Institute North America</b> Research Intern	<b>May 2024 to Aug 2024</b> Advised by Dr. Georgios Fainekos
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**Project: From Dashcam Videos to Driving Simulations: Stress Testing Automated Vehicles against Rare Events**

- Developed an automated pipeline to convert real-world dashcam videos into detailed simulation scenarios for autonomous vehicle (AV) testing, leveraging prompt-engineered GPT models and SCENIC.
- Achieved time efficiency with scenario generation averaging 1.5 minutes per test case, significantly reducing manual coding time for real-to-simulation conversions.
- Implemented iterative refinement to enhance scenario accuracy and realism, improving 34% of test cases in an evaluation of 50 accident scenarios.
- Demonstrated automation success with 64% of scenarios fully automated from the Car Crash Dataset (CCD), requiring no human intervention.

## RESEARCH EXPERIENCE

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<b>Coordinated Science Laboratory</b> Graduate Research Assistant	<b>Aug 2022 to Present</b> Advised by Prof. Mitra
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**Project: Vision-based Fixed-wing Aircraft Landing with Adversarial Attack Prevention**

- Developing a closed-loop control system for vision-based autonomous landing using a ViT-based controller and Dubins dynamics model.

- Designing reinforcement learning (RL) algorithms to generate multi-step adversarial perturbations that maximize trajectory deviations.
- Incorporating barrier functions to ensure safety in the presence of adversarial attacks and to guide adversarial attack prevention strategies.

**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: 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**

Graduate Research Assistant

**Jun 2021 to Dec 2021**

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

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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**, Georgios Fainekos, Bardh Hoxha, Hideki Okamoto Danil V. Prokhorov, Sayan Mitra. *From Dashcam Videos to Driving Simulations: Stress Testing Automated Vehicles against Rare Events*. Submitted to 2025 Workshop on Machine Learning for Autonomous Driving (ML4AD) at Association for the Advancement of Artificial Intelligence (AAAI)

(Working Paper) **Yan Miao**, Hussein Darir, Sayan Mitra. *Correcting Learning-based Perception for Safety*.

Saurabh Jha, **Yan Miao**, Kalbarczyk, Zbigniew Kalbarczyk, Ravi Iyer. (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. Georgios Fainekos**, Senior Principal Scientist at

Toyota Motor North America R&D

1555 Woodridge Ave, Ann Arbor, MI 48105

Email: georgios.fainekos@toyota.com