

# EMILY Y. CHEN

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## EDUCATION

### University of Illinois Urbana - Champaign

B.S. Computer Engineering, James Scholar, Overall GPA: 3.8

08.2021- 05.2024

#### ▪ Relevant Coursework

- Deep Learning for Computer Vision (Graduate section), Machine Learning, Artificial Intelligence, Parallel Programming in CUDA, Algorithms and Models of Computation, Computer Architecture & OS, Probability, Linear Algebra, Numerical Methods, Data Structures, Quantum Information Theory & Computing

## AWARDS:

- Awarded by the University of Illinois Urbana-Champaign (2021 - Present)
  - Pascoe Engineering Scholarship, Illinois Engineering Achievement Scholarship, Illinois Engineering Outstanding Scholarship, ECE Visionary Scholarship, Eleftherios Polychronopoulos Scholarship, Engineering Visionary Scholarship, Oakley Scholarship, Yunni and Maxine Pao Memorial Scholarship, Lauren Kelley Memorial Scholarship
    - One of 4 recipients (from ~13,000 engineering applicants) to receive the top merit scholarship amount

## RESEARCH PROJECTS

### Unified World Model

03.2023 – Present

*Prof. Shenlong Wang, Vision @ UIUC, Champaign, IL*

- Creating a unified multi-modal latent representation for accurate, consistent, and realistic 3D scene understanding
  - Goal is to achieve high-geometric 3D neural reconstruction, accurate object-level and scene-level segmentation and tracking, and realistic conditional data generation for autonomous vehicle applications
- Utilizing BEVFusion for camera-LiDAR fusion and TensorRF for radiance field reconstruction and rendering
- Technologies: PyTorch, CUDA, Tensorboard, Weights & Biases

### NeRF2Physics: Neural Physical Property Fields

09.2023 – Present

*Prof. Shenlong Wang, Vision @ UIUC, Champaign, IL*

- Conducted experiments to collect physical data on 10 objects, measuring Young's Modulus, strength & load capacity, friction, and roughness for calculating model loss
  - Model uses NeRF, feature distillation, and CLIP to enable zero-shot estimation of dense 3D physical properties from 2D images
- Submitted to CVPR 2024

### Active Stabilization System for Optical Quantum Memory Process

12.2021 – 08.2023

*Prof. Paul Kwiat, Illinois Quantum Information Science and Technology Center, Champaign, IL*

- Designed a proof-of-concept active stabilization system for long, low-loss free-space optical delays in lab's optical quantum memory project
- Contributed to ongoing presentation topics and discussion sections hosted by the Illinois Quantum Information Science and Technology Center
- Technologies: Numpy, MatLab, ThorLabs MDT API, RPi

### Effects of Modifying MaskRCNN's Parameters on Clothing-Layer Instance Segmentation Performance

*Fulfillment for CS 444: Deep Learning for Computer Vision's Graduate section final project*

02.2023 – 05.2023

- Investigated and wrote a paper evaluating how modifying MaskRCNN's backbone architecture (FPN, MobileNet, ViT, ResNet34), number of trainable layers (0, 3, 5), and image size (64, 254, 508) affected clothing-layer instance segmentation performance

- Architectures, parameters, and datasets evaluated were not in MaskRCNN's original paper (Kaiming He, Georgia Gkioxari, Piotr Dollár, and Ross Girshick. 2017. Mask R-CNN. In ICCV.)
- Link: <https://tinyurl.com/maskrcnnfinal>
- Technologies: PyTorch, TensorFlow

### **Geospatial Models to Monitor and Calculate the Global Yield Gap**

02.2021 – 08.2021

*Prof. Johannes Lehmann, Cornell University, Ithaca, NY (Remote)*

- Used R to create geospatial models that monitor and calculate the global yield gap based on soil acidity
- Model was applied in lab's machine learning project aimed at enhancing crop production cost-effectively in developing nations
- Technologies: R, GDAL

### **Investigation of Applying Optical Spectroscopy to Determine Banana Ripeness**

07.2021-08.2021

*Prof. Charles Tu, Prof. Peter Ilinykh, Prof. Sabarnaz Baghdadchi, UCSD, La Jolla, CA*

- Developed and implemented a non-invasive method to determine bananas' ripeness via measuring bananas' fluorescent chlorophyll catabolite levels through UV optical spectroscopy
- Awarded the UCSD Gordon Engineering High School Fellow by the UCSD Bernard and Sophia Gordon Engineering Leadership Center
  - Selected by UCSD ECE professors as the best research project at California State Summer School for Mathematics & Science (COSMOS) UCSD

## **WORK EXPERIENCE**

**NVIDIA**, Santa Clara, CA

Computer Vision Intern, Autonomous Vehicles LiDAR Perception Group

05.2023 – 08.2023

- Implemented a grid – based tracking and mapping algorithm utilizing particle filters to track low level freeform obstacle detections of static and dynamic boundaries
  - Implementation simultaneously estimates the static and dynamic environment, uncertainties, velocities, and free space information without requiring a binary pre-classification of sensor measurements
- Developed corresponding visualization system to track particle movement and display a 2D BEV occupancy grid with estimates for static, dynamic, and free space evidences
- Technologies: C++, Dempster-Shafer Evidences

**Cepton**, San Jose, CA

Software Engineering Intern, Perception Group

05.2022 – 08.2022

- Designed and implemented an object detection and tracking algorithm with Kalman filtering to monitor angles of towed trailer using Cepton's LiDAR sensors
- Developed visualization system to alert driver regarding sway level + display safety warnings in live time if jack-knifing and trailer detachment are at risk
- Collaborated with Test Engineering team to create in-vehicle test scenarios and perform data collection drives to assess the algorithm's real-time performance against live data
- [https://dev-stage.cepton.com/blog/trailer\\_sway\\_detection](https://dev-stage.cepton.com/blog/trailer_sway_detection)
- Technologies: Python, C++, DBSCAN, ICP, OpenCV, Sklearn

**Stryd**, Boulder, CO (Remote)

Software Engineering Intern, Backend Team

05.2021 – 08.2021

- Compiled daily developer sale numbers across all platforms organized by distributor, region, top countries, product, and user numbers
- Automated daily email with revenue information to entire company and important stakeholders
- Deployed internal time series dashboard with user-friendly system to analyze live revenue
- Technologies: Golang, StripeAPI, Datastore, Docker, Insomnia, Google Cloud, Kubernetes, HTTP clients

## **PRESENTATIONS**

- **Chen E.Y.**, Lualdi C.P., Vayninger M, Arnold N.T., Kwiat P.G. Working Towards an Active Stabilization System for a Low-loss, Free-space Optical Quantum Memory. Poster presented at: American Physical Society CuWiP Conference, January 2023; Urbana, IL. <https://tinyurl.com/apsposteremily>.

## **ON-CAMPUS INVOLVEMENTS:**

### **Women in Electrical and Computer Engineering**

- External Vice President (2022-2023)
  - Managed corporate sponsorships, serves as a liaison to the ECE department and sponsors, coordinates recruiting events with corporate recruiters, and handles room reservations and catering
- Software Technical Chair (2021-2022)
  - Reached out to ECE/CS professor for lunch chats aimed at encouraging underrepresented undergraduates to pursue research opportunities

### **Engineering Council:**

- Engineering Outreach Bureau (2022 – Present)
  - Organize full-day Engineering Days for prospective and admitted students/parents
  - Coordinates event logistics, reservations, lead campus tours, and participate in student panels
- Publicity Committee (2022 – 2023)
  - Designed marketing material and promotions for events targeting the engineering population.
- Engineering Freshman Council Vice President (2021-2022)
  - Oversaw Engineering Freshman Council Committee consisting of ~50 members