

ERIC JI

[in](#)LinkedIn \diamond [G](#)itHub \diamond [ericji150.github.io](https://github.com/ericji150)

PERSONAL INFORMATION

Citizenship: U.S. Citizen

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EDUCATION

University of Illinois Urbana-Champaign

August 2024 - Present

Ph.D. in Electrical and Computer Engineering

Advisor: Professor Minh N. Do

University of Illinois Urbana-Champaign

August 2020 - May 2024

B.S. in Computer Engineering with Highest Honors

GPA: 3.91/4.0

Relevant Courses: Digital Signal Processing, Embedded DSP Laboratory, Applied Machine Learning, Data Science and Engineering, Deep Learning for Computer Vision, Computational Photography

PUBLICATIONS

E. Ji, B. Dong, B. Samanthula, N. Zhou, "2D-FACT: Dual-Domain Fake Image Detection Against Text-to-Image Generative Models" - MIT Undergraduate Research Technology Conference (URTC 2023).

S. K. Kamtikar, **E. Ji**, N. K. Uppalapati, G. Krishnan, G. Chowdhary. "Realistic Simulation Environments to Achieve Visual Servoing on Soft Continuum Arms in Constrained Environments" - Fourth International Workshop on Machine Learning for Cyber-Agricultural Systems (MLCAS 2022).

RESEARCH EXPERIENCE

Vision Group

August 2023 - May 2024

Advised by Svetlana Lazebnik at University of Illinois Urbana-Champaign

- Worked to develop a multi-class classifier capable of detecting synthetic images generated by multiple state-of-the-art GANs and Diffusion Models
- Utilized the phase response from an image's Fourier response to study its effects on classification
- Trained with established datasets to benchmark performance against methods from reputable papers
- Analyzed the effectiveness of various state-of-the-art approaches for classification and in-painting

NSF Research Experiences for Undergraduates

June 2023 - August 2023

Advised by Boxiang Dong at Montclair State University Site

- Designed a data collection algorithm to compile a comprehensive dataset containing 12,500 images from MSCOCO and 12,500 corresponding images generated using Stable Diffusion 2.1
- Developed multiple ResNet models and other Convolutional Neural Networks to distinguish AI-generated images from real images
- Analyzed the accuracy, robustness, and efficiency of classifiers in both the spatial and frequency domains by evaluating the effects of dataset size, model complexity, and image perturbations

Distributed Autonomous Systems Laboratory

May 2022 - August 2023

Advised by Girish Chowdhary at University of Illinois Urbana-Champaign

- Trained an object detection algorithm (YOLO) to detect Japanese Beetles for autonomous mobile robots that survey crop fields
- Generated realistic simulation environments using Blender to assist with visual servoing on soft arms
- Designed a path planning algorithm to generate a series of waypoints on a point cloud from a starting point to a target while avoiding obstacles

ACADEMIC PROJECTS

Active Lane Assist with Pedestrian Avoidance

Developed and implemented algorithms in ROS and Python to enable an electric GEM vehicle to autonomously navigate roads while avoiding pedestrians. Utilized computer vision techniques including perspective transformations, Canny edge detection, filtering, and object detection on real-time frames from a stereo camera.

Detecting Diffusion Model-Generated Images Through Vanishing Points

Engineered a model-free method in Python for detecting diffusion model-generated images by exploiting geometric inconsistencies between estimated and human-perceived vanishing points. Applied Canny edge detection, Hough transform, and RANSAC to calculate vanishing points and identify discrepancies in single-point perspective images.

MNIST Classification through Edge Boxes

Developed a Python notebook with an Android app that employs a series of image processing and machine learning techniques such as Canny edge detection, bilinear interpolation, PCA, and multi-layer perception to efficiently detect, bound, and classify handwritten digits anywhere within an image.

TEACHING

ECE 484: Principles of Safe Autonomy

Fall 2024 Semester

Teaching Assistant

ECE 120: Introduction to Computing

Fall 2023 Semester

Course Grader

CS 125: Introduction to Computer Science

Spring 2021 Semester

Course Assistant

LEADERSHIP

Eta Kappa Nu Alpha Chapter (Outreach Committee Member)

August 2022 - May 2024

Host both one-on-one and group tutoring sessions, mentor students on their academic/career goals, and plan activities that introduce engineering concepts to local students

Illini Bass Fishing Club (fTreasurer)

August 2022 - Present

Recruit new members to join a community of 100+ anglers, collaborate with other universities and sponsors to host collegiate tournaments, and organize recreational events

TECHNICAL SKILLS

Languages

C, C++, Java, Python, SystemVerilog, LaTeX