Zheyang Qin

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Unit 1509, 4500 Centre Ave, Pittsburgh, PA 15213

Education

Carnegie Mellon University, College of Engineering   Aug. 2023 – May 2025
Master of Science in Electrical and Computer Engineering

- GPA: 4.0/4.0
- **Courses:** Introduction to Machine Learning, Visual Learning and Recognition, Physics-Based Rendering

University of Putra Malaysia, Faculty of Engineering   Aug. 2019 – July 2023
Bachelor of Computer and Communication Systems Engineering with Honours

- GPA: 3.99/4.0
- **Courses:** Engineering Algorithms, Engineering Statistics, Engineering Mathematics, Artificial Intelligence

Publications

Video Diffusion Alignment via Reward Gradients

Mihir Prabhudesai*, **Zheyang Qin***, Russell Mendonca*, Katerina Fragkiadaki, Deepak Pathak
In Submission to ICLR 2025 | arXiv:2407.08737 | Project Website

Leveraging Generative AI for Cross-Regional Small Object Detection in Satellite Imagery

Zheyang Qin, Stanislav Panev, Celso de Melo, Shayok Chakraborty, Jessica Hodgins, Fernando De la Torre
In Submission to SPIE Defense + Commercial Sensing 2025

Research Experience

Pathak Research Group, Carnegie Mellon University   July. 2024 – Present
Advisor: Prof. Deepak Pathak

Video Diffusion Alignment via Reward Gradients

- Co-led VADER, a sample-efficient framework that fine-tunes video diffusion models using reward gradients, enabling alignment for task-specific objectives such as text-to-video and image-to-video generation.
- Achieved superior performance over baseline methods by incorporating differentiable reward models, resulting in improved video quality, temporal consistency, and text alignment.
- Open-sourced on GitHub with **200+ stars**.
- In submission to ICLR 2025.

Solving Physics Olympiad Problems Without Human Demonstrations (Ongoing)

- Designed and implemented a framework for automated experimentation pipelines in MuJoCo, enabling large-scale data collection by randomly generating and simulating diverse physical scenes.
- Implemented and validated symbolic regression methods, ensuring accurate convergence to equations that reliably represent underlying physical phenomena.
- Aiming to produce results suitable for submission to a high-tier journal.

Human Sensing Laboratory, Carnegie Mellon University   Feb. 2024 – Aug. 2024
Advisor: Prof. Fernando De la Torre

Leveraging Generative AI for Cross-Regional Small Object Detection in Satellite Imagery (Ongoing)

- Fine-tuned Stable Diffusion models to generate high-quality satellite imagery for creating synthetic datasets.
- Designed a framework utilizing cross-attention and self-attention mechanisms within a diffusion model to automatically generate annotated datasets, enhancing object detection performance by over 20% in target environments.
- In submission to SPIE Defense + Commercial Sensing 2025.

Multimedia System Engineering Laboratory, University of Putra Malaysia   Oct. 2022 – July. 2023
Advisor: Prof. Sharifah Mumtazah binti Syed Ahmad Abdul Rahman
Intelligent Traffic Control Management

- Conceived a novel model integrating multi-agent deep reinforcement learning and graph attention networks to optimize traffic signal control across up to 200 intersections, achieving a 10% performance improvement over the state-of-the-art model, CoLight.
- Honored with the Best Final Year Project award.

Work Experience

Machine Learning Engineer Intern, Loranet Technologies PLT – Shah Alam, Malaysia   July 2022 – Oct. 2022

- Designed and implemented optimization algorithms integrated with fuzzy logic models to control traffic networks, achieving a 70% improvement in traffic efficiency compared to fixed-time traffic lights.
- Deployed object detection models for enhanced traffic supervision and monitoring.

Course Projects

Elevating Dense SLAM with 3D Gaussian Splatting   Mar. 2023 – May 2023
Carnegie Mellon University

- Designed and implemented a novel SLAM framework integrating 3D Gaussian Splatting, achieving superior scalability and rendering efficiency compared to state-of-the-art methods such as NICE-SLAM and MonoGS.
- Achieved $10\times$ faster runtime than SplaTAM and competitive reconstruction quality on Replica and TUM datasets, showcasing its potential for real-time applications.

Blind Source Separation for High-Density Electromyography Signals   Oct. 2023 – Dec. 2023
Carnegie Mellon University

- Proposed a method combining Convolution Kernel Compensation, FastICA, and a higher-order Newton method for motor unit decomposition, improving accuracy by 5% and largely accelerating convergence.

IoT-based Smart Vehicle Plate Recognition System   Oct. 2022 – Dec. 2022
University of Putra Malaysia

- Collected and annotated data to fine-tune a YOLO model for license plate detection, achieving 98% accuracy, and integrated OCR technologies for license plate recognition.
- Led a team of 5 to develop and deploy an MQTT-based embedded system for efficient wireless image transmission.

Honors & Awards

Best Final Year Project, University of Putra Malaysia   Aug. 2023
Vice Chancellor's List, University of Putra Malaysia   2019 - 2023

Skills

Languages: Python, C++, MATLAB, Verilog HDL, SQL, JavaScript, PHP
Frameworks: Pytorch, Tensorflow, HuggingFace Transformers, Scikit-learn, Pandas, NumPy, Matplotlib
Tools: MuJoCo, Weights & Biases, TensorBoard