# Shen Zheng

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## Education

**Carnegie Mellon University** Aug. 2022 — Dec. 2023

*Master of Science in Computer Vision (MSCV), The Robotics Institute (RI)* *Pittsburgh, PA*

- Director: Dr. Kris Kitani
- Core Courses: Introduction to Computer Vision, Mathematical Fundamentals for Robotics, Visual Learning and Recognition, Robot Localization and Mapping

**Wenzhou-Kean University** Sep. 2017 — Jun. 2021

*B.A. in Mathematical Sciences, Minor in Economics* *Wenzhou, China*

- Major GPA: 3.944/4.000 (Rank: 1/29)
- Cumulative GPA: 3.800/4.000 (Rank: 2/29)
- Advisor: Dr. Gaurav Gupta

## Research Interests

- **Image**: Restoration; Enhancement; Generation; Detection; Segmentation; Domain Adaptation.
- **Point Cloud**: Shape Classification; Part Segmentation; Semantic Segmentation.

## Publications

- **Shen Zheng**, Jinqian Pan, Changjie Lu, and Gaurav Gupta (2022), "PointNorm: Normalization is All You Need for Point Cloud Analysis". Under Review.
- Changjie Lu, **Shen Zheng**, Zirui Wang, Omar Dib, and Gaurav Gupta (2022), "AS-IntroVAE: Adversarial Similarity Distance Makes Robust IntroVAE". Under Review.
- Changjie Lu, **Shen Zheng**, and Gaurav Gupta (2022), "Unsupervised Domain Adaptation for Cardiac Segmentation: Towards Structure Mutual Information Maximization". Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition **(CVPR)** Workshops. IEEE.
- **Shen Zheng** and Gaurav Gupta (2022), "Semantic-Guided Zero-Shot Learning for Low-Light Image/Video Enhancement". Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision **(WACV)**. IEEE.
- **Shen Zheng**, Changjie Lu, Yuxiong Wu, and Gaurav Gupta (2022), "SAPNet: Segmentation-Aware Progressive Network for Perceptual Contrastive Deraining". Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision **(WACV)**. IEEE.
- **Shen Zheng**, Yuxiong Wu, Shiyu Jiang, Changjie Lu, and Gaurav Gupta (2021), "Deblur-YOLO: Real-Time Object Detection with Efficient Blind Motion Deblurring", International Joint Conference on Neural Networks (**IJCNN**). IEEE. (**Oral Presentation**)
- **Shen Zheng**, Liwei Wang, and Gaurav Gupta (2020), "Efficient Ensemble Sparse Convolutional Neural Networks with Dynamic Batch Size", International Conference on Computer Vision and Image Processing (**CVIP**). Springer.

## Industry Experience

**Momenta (An Autonomous Driving Company)** Sep. 2021 – Feb. 2022
*Computer Vision Engineer — Director: Dr. Wangjiang Zhu* *Suzhou, China*

- Responsible for long-tailed data augmentation, training data auto-labeling and cleaning, and model evaluation for traffic light detection algorithms.
- Implemented CycleGAN to conduct unsupervised data augmentation, converting traffic light bulbs from left arrow to round & leftUturn arrow.
- Constructed a traffic light auto-label model using quantized VoVNet-57, filtering 14,618 incorrect annotations from 1,160,513 labeled frames.
- Increased the classification accuracy for leftUturn traffic light from 78.41% to 87.27%, and the mean average precision from 93.01% to 94.80%.

## Academic Experience

**AI-Lab, Wenzhou-Kean University** May. 2022 – July. 2022
*Research Leader — Advisor: Dr. Gaurav Gupta, Wenzhou-Kean University* *Wenzhou, China*

- Introduced PointNorm, a point analysis framework that addresses the irregularity of point cloud by normalizing the sampled and the grouped points to each other using local mean and global std.
- Proposed AS-IntroVAE, a image generation framework with Adversarial Similarity Distance based upon 2-Wasserstein distance and kernel trick to address posterior collapse and vanishing gradient.

**University of Notre Dame** Jul. 2021 – Aug. 2021
*Research Assistant — Advisor: Dr. Chaoli Wang, University of Notre Dame* *Remote*

- Constructed a fully convolutional neural network with Siren activation function, Greene's bisection method, and Jacobian eigenvalue to render isosurfaces with image resolution, viewpoints and isovalue.

**Depart. of Mathematics, Wenzhou-Kean University** Apr. 2020 – Jun. 2021
*Research Assistant — Advisor: Dr. Gaurav Gupta, Wenzhou-Kean University* *Wenzhou, China*

- Introduced UDA-VAE++, an unsupervised domain adaptation framework with a compact loss function lower bound for cardiac segmentation.
- Proposed SGZ, a semantic-guided, zero-shot, low-light image enhancement network that consolidates high-level semantics into low-level enhancement.
- Built a real-time deraining network that integrates supervised rain removal, unsupervised semantic segmentation, and perceptual contrastive loss.
- Invented Deblur-YOLO, a Generative Adversarial Network (GAN) with a dilated feature pyramid generator, a pair of multi-scale discriminators, and a YOLO discriminator performing real-time object detection with fast blind motion blur removal.
- Developed an Electromagnetism-inspired dynamic batch size algorithm for accumulating the learning rate, momentum coefficient, and batch size.

## Technical Skills

**Programming Languages**: Python, R, Java, C++, Matlab, Mathematica, Shell, LaTeX, Markdown
**Frameworks & Platforms**: Pytorch, TensorFlow, Keras, Ubuntu, Docker, Git, ONNX, CUDA
**Libraries**: Scikit-Learn, SciPy, NumPy, OpenCV, Matplotlib, Pandas