

Shilong Lei

3903 Campus Suites Blvd, West Lafayette, 47906 IN

+1 765 775 7952 ◊ lei105@purdue.edu

EDUCATION

Ph.D. student in Computer Science

Jul 2022 - Present

Department of Computer Science, Purdue University

Bachelor of Engineering in Automation

Aug 2018 - Jul 2022

School of Information Science and Technology, Tsinghua University

PROFESSIONAL EXPERIENCE

Research Scientist Intern, ByteDance(Tiktok) Seed-Foundation

May 2024 - Sep 2024

- Built a LLM training simulator to simulate and profile the training performance of Large Video Generation Model (especially diffusion transformer models) on 1k - 10k GPUs.
- Optimizing LLM training efficiency using Bytedance LLM training framework veScale (machine learning infrastructure) to support Doubao large language model.

RESEARCH EXPERIENCE & PROJECTS

AI System for Drones

Jan 2024 - Nov 2024

Skills: Android, Java, Computer Vision

Advisor: Dr.Chunyi Peng, CS, Purdue University

- Developed an app on Android to track cars and estimate car speed in real-time from DJI drone view.
- Implemented a WebRTC streaming framework to stream raw video from drone to edge server, and stream processed frames to client web browser. Presented a demo to view real-time speed monitoring video and results from a website.
- A poster paper is accepted by MobiCom 2025(Best Poster Award).

Mixture of Experts and Offloading Optimization for LLMs

May 2023 - Dec 2023

Skills: PyTorch, CUDA, DeepSpeed, Megatron-LM

Advisor: Dr.Xuehai Qian, CS, Purdue University

- Developed an Efficient Out-of-GPU-Core LLM training system for training distributed large language model based on DeepSpeed ZeRO and Megatron-LM.
- The proposed system is fully aware of the LLMs' execution pattern and hardware resources, which runs models larger than GPU memory by offloading and speeds up training by better utilizing GPU memory and reducing CPU-to-GPU communication.
- Responsible for the framework and MoE model optimization and lead two interns.

CPU ML Inference System

Oct 2022 - Apr 2023

Skills: PyTorch, C++

Advisor: Dr.Xuehai Qian, CS, Purdue University

- Developed sparse optimizations in a inference system for machine learning models on CPU, similar as DeepSparse, speeding up CPU model inference by forwarding in depth direction instead of layer by layer to better fit in large CPU core cache.

Multi-Camera 3D Pedestrian Detection & 3D Human Pose Reconstruction

Oct 2021 - Jun 2022

Skills: Python, Computer Vision, ML

Advisor: Dr.Jianjiang Feng, Tsinghua University

- Developed a model based on camera projection, probability estimation, clustering and CNN to estimate the position of each person with multiple cameras.
- Developed a model to reconstruct 3D human pose by processing videos including multiple people interaction.

Video Classification & Video Denoising

Jan 2021 - Sep 2021

Skills: Python, C++, CV, LaTeX

Advisor: Dr.Ram Nevatia, Dr.Guoqing Xiang, USC,PKU

- Developed a novel model based on teacher-student model leveraging temporally consistent spatial augmentation with pytorch and MMAAction2 toolkit of OpenMMLab.

- Applied the space-time adaptive processing technique to establish an algorithm for video denoising, solved failures occurred in scene change detections of the time domain denoising.
- Published a paper "A Spatio-temporal Adaptive Video Denoising Algorithm".

POSITION OF RESPONSIBILITY

Teaching Assistant & Research Assistant

Aug 2022 - Present

Department of Computer Science, Purdue University

- Teaching Assistant in Computer Architecture (24Spring) and Data Communication and Computer Networks(23&24Fall).
- Research Assistant in machine learning system.

PUBLICATIONS

Du, Jiaxin; **Shilong Lei**; Chunyi Peng. "D-AirPatrol: A Dual-Layer Architecture for Traffic Patrol From the Sky" MobiCom 2025 Best Poster Award. Sep 2024

Lei, Shilong. "A Spatial-Temporal Adaptive Video Denoising Algorithm." Computing and Data Science: Third International Conference, CONF-CDS 2021, Virtual Event, Aug 12-17, 2021, Proceedings 3. Springer Singapore, 2021. May 2021

CONTESTS & AWARDS

- MobiCom'25 Best Poster Award Oct 2024
- Technological Innovation Scholarship of Tsinghua University Oct 2021
- 2019 & 2020 Hage Foundation Scholarship Apr 2019 & Apr 2020
- AI Competition of Tsinghua University Third Award Jun 2021
- Winning Prize of Electronics Design Contest of Tsinghua University Aug 2020

SKILLS

Chinese Mandarin (Native), English (TOEFL 99, Purdue OEPP Certificate)

C/C++, MATLAB, Python, PyTorch, Java, Verilog, LaTeX

LLM, DeepSpeed, Megatron, Distributed Machine Learning