Bo Shang

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Applied AI engineer focused on deploying AI systems in complex, real-world domains. Years of experience training, evaluating, and iterating on models for infrastructure inspection, autonomous-vehicle perception, and traffic monitoring. Comfortable with the full loop: problem scoping → data collection & curation → model training & evaluation → field deployment & iteration. Domain depth in transportation and infrastructure.

Experience

- **City University of New York — AI & Mobility Research Lab** New York, NY
  Applied AI Engineer — Autonomous Vehicles *Jul 2025 – Present*
  - Owning the end-to-end AI pipeline for **vulnerable road user (VRU) detection** from fixed roadside LiDAR: data collection, curation, model evaluation, and deployment
  - Evaluating and tuning **CNN-based 3D object detectors** on fixed-LiDAR highway data covering vehicles, motorcycles, bicycles, and vulnerable road users
  - Built a **configuration-portable training/inference pipeline**: train on one site's sensor configuration, infer on another with different beam counts and frame rates
  - Multi-frame point-cloud reconstruction to densify per-vehicle representations for downstream classification
  - Co-authored two MobiSPC 2025 papers: LiDAR beam-count requirements for VRU detection, and a sensing-perspectives survey
- **City University of New York — Robotics Lab** New York, NY
  Applied AI Engineer — Infrastructure Inspection *Dec 2022 – Dec 2024*
  - Trained and deployed **CNN models for structural defect detection** (crack, spalling, stain) from robot-collected bridge imagery; pushed models to AWS for scalable cloud inference
  - Contributed to a **contrastive-learning approach for robust defect mapping** using impact-echo data, robust across acquisition conditions
  - Owned model evaluation and iteration: defined metrics, established ground-truth labeling, and analyzed failure modes against real-world imagery
  - Integrated trained models into a **WebODM-based platform** with interactive visualization and crack measurement for delivery to end users (city engineers, inspectors)
  - Equal-first-author IROS 2025 paper (IEEE T-ASE 2025) on robotic inspection and analytics for structural defects
- **Missouri University of Science and Technology** Rolla, MO
  Applied AI Engineer — Robotics Perception *Jan 2020 – Nov 2022*
  - Designed image-processing algorithms for **girder detection** (OpenCV, C++) on NVIDIA Jetson (Nano/TX2/Xavier) edge hardware for an autonomous bridge-inspection drone
  - Built a **visual-odometry data-quality evaluation** for an indoor flying-robot perching task; integrated VICON motion capture for GPS-denied flight stability
- **Vaughn College of Aeronautics and Technology** New York, NY
  Technical Instructor *2023 – 2024*
  - Taught applied AI systems, research methodology, and robotics control; mentored students on real-world deployment of autonomous systems
- **University of California, Merced** Merced, CA
  Applied AI Engineer — Autonomous Robotics *Sep 2015 – Sep 2017*
  - Co-led **SmartCaveDrone** (ICUAS'17): a SLAM platform for GPS-denied cave exploration; fused IMU with KinectFusion-style dense visual SLAM
  - Computer-vision-aided localization on embedded Linux UAVs; object detection with OpenCV/Python; DroneKit for autonomous navigation

Applied AI Projects

- **VRU Detection on Roadside LiDAR (2024–present)**: Evaluating and tuning 3D CNN detectors on fixed roadside LiDAR for vulnerable road user classification (vehicles, motorcycles, bicycles, pedestrians). Configuration-portable pipeline across sensor variants differing in beam count and frame rate.
- **CNN-based Structural Defect Detection (2022–present)**: Trained CNN models for crack/spalling/stain detection from drone imagery, deployed on AWS for scalable inference and integrated into a WebODM-based platform used by city engineers and inspectors.
- **Contrastive Learning for Impact-Echo Defect Mapping (2024)**: Contributed to a contrastive-learning approach for robust defect localization on concrete slabs using impact-echo data, robust across acquisition conditions.
- **Visual SLAM for GPS-Denied Autonomous Flight (2015–2017)**: Fused IMU with KinectFusion-style dense visual SLAM for UAV localization in GPS-denied environments (caves), validated against VICON motion-capture ground truth.

Core Skills

- **AI/ML**: PyTorch, TensorFlow, CUDA, 2D/3D CNN object detection, contrastive learning, multimodal fusion
- **Model Evaluation**: Metrics design, ground-truth curation, failure-mode analysis, cross-configuration validation, robustness testing
- **Real-World Deployment**: AWS (S3, EC2, SageMaker), Docker, model serving, edge inference (NVIDIA Jetson), model packaging
- **Computer Vision**: OpenCV, 3D point clouds (LiDAR), multi-modal sensor fusion (LiDAR + RGB + thermal), image preprocessing, data augmentation
- **Data Pipelines**: ROS/ROS 2, MCAP, Protobuf, dataset versioning, format conversion, data quality assurance, labeling workflows
- **Robotics & Autonomy**: Vision-based control, visual servoing, autonomous navigation, embedded systems, edge computing
- **Programming**: Python (primary), C++, MATLAB; Linux, Docker, GitHub Actions, CI/CD

Education

- **Northeastern University & University of California, Merced** — Shenyang, China / Merced, CA
  Ph.D. in Pattern Recognition & Intelligent Systems — *Aug 2013 – Dec 2020*
- **Northeastern University** — Shenyang, China
  M.Eng. in Pattern Recognition & Intelligent Systems; B.Eng. in Automation — *Aug 2007 – Dec 2013*

Selected Publications & Patents

- **Bo Shang**, Y. Li. *Roadside LiDAR for Cooperative Safety Auditing at Urban Intersections: Toward Auditable V2X Infrastructure Intelligence.* CVPR 2026 Workshops (DriveX). *[first author]*
- J. Feng, **B. Shang**, et al. *Robotic Inspection and Data Analytics to Localize and Visualize the Structural Defects of Concrete Infrastructure.* IEEE T-ASE 2025. *[equal first author; selected for IROS 2025]*
- **US 12,296,994** (granted May 2025) — Unmanned vehicle system design with flight and surface traverse configuration
- **Best System Control** & **Best Mission Planning** Awards — International Aerial Robotics Competition (AUVSI), 2014