Bo Shang

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Machine Learning Engineer | Computer Vision & Multimodal Perception +1-929-520-0488
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Applied ML engineer with field-deployment depth in **computer vision, 3D point-cloud detection, and multimodal sensor fusion**. Trained and deployed CNN models on AWS for NYC infrastructure inspection and traffic monitoring. Comfortable owning the full loop from raw multi-sensor data → labeled datasets → model → cloud / edge deployment.

Experience

- **City University of New York — AI & Mobility Research Lab** New York, NY
  Postdoctoral Scholar *Jul 2025 – Present*
  - Evaluating and tuning **CNN-based 3D object detectors** on fixed-LiDAR highway data covering vehicles, motorcycles, bicycles, and vulnerable road users
  - Built **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 on (a) LiDAR beam-count requirements for VRU detection and (b) a sensing-perspectives survey
- **City University of New York — Robotics Lab** New York, NY
  Postdoctoral Researcher *Dec 2022 – Dec 2024*
  - Trained **CNNs for crack, spalling, and stain detection** on robot-collected bridge imagery; pushed models to **AWS** for scalable cloud inference
  - Built custom **WebODM-based platform** integrating automated segmentation, 3D reconstruction, interactive visualization, and crack measurement for end-user delivery
  - Contributed to contrastive-learning approach for robust defect mapping on concrete slabs using impact-echo data
  - 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
  Postdoctoral Fellow *Jan 2020 – Nov 2022*
  - Designed image-processing algorithms for **girder detection** (OpenCV, C++) on the NVIDIA Jetson edge platform as part of bridge-inspection drone
  - Built visual-odometry data-quality evaluation for indoor flying-robot perching task; integrated VICON motion capture for GPS-denied flight stability
- **Vaughn College of Aeronautics and Technology** New York, NY
  Instructor / Adjunct *2023 – 2024*
  - Taught *Principles of AI* (SBC 012), *Principles of Research — AI* (SBC 014A), and *Robotics, Mechanics and Control* (MCE 355)
  - Instructor for Computer Engineering Summer Academy AI module (Jun–Aug 2024)
- **University of California, Merced** Merced, CA
  Junior Specialist & Lecturer *Sep 2015 – Sep 2017*
  - Co-led **SmartCaveDrone** (ICUAS'17): SLAM platform for GPS-denied cave exploration; fused IMU with KinectFusion-style dense visual SLAM
  - Computer-vision aided localization on embedded Linux UAV; object detection with OpenCV / Python; DroneKit for autonomous navigation

Selected ML Projects

- **CNN-based 3D Detection on Highway LiDAR (2024–present)**: Evaluating and tuning 3D detectors on fixed roadside LiDAR for VRU classification (vehicles, motorcycles, bicycles, pedestrians). Configuration-portable pipeline across sensor variants.
- **Bridge Defect Detection & AWS Deployment (2022–present)**: Trained CNNs for crack/spalling/stain detection from drone imagery, deployed at scale on AWS, integrated into WebODM-based inspection platform.
- **Contrastive Learning for Defect Mapping (2024)**: Contrastive learning approach for robust impact-echo defect mapping on concrete slabs, robust across acquisition conditions.
- **Vision-Based Robotic Control (2015–2022)**: Drone visual servoing with fractional-order controllers on edge hardware; CNN girder detection on NVIDIA Jetson for BIRDS inspection drone.

Programming & Tools

- **Languages**: Python (primary), C++, MATLAB, Fortran, Swift
- **ML & CV**: PyTorch, TensorFlow, CUDA, OpenCV, 2D/3D CNN object detection, contrastive learning, multimodal fusion (LiDAR + RGB + thermal + hyperspectral)
- **Cloud & Edge**: AWS (S3, EC2, SageMaker), Docker, NVIDIA Jetson (Nano/TX2/Xavier), embedded Linux, WebODM
- **Data Pipelines**: ROS / ROS 2, MCAP, Protobuf, end-to-end ingestion from real sensors, dataset versioning and format conversion across configurations
- **Infrastructure**: Git/GitHub Actions, CI/CD, Linux/Ubuntu, AWS, model packaging and serving

Education

- **City College of New York (CUNY)** — New York, NY
  Ph.D. in Civil Engineering (Transportation) — Fellowship — *Aug 2025 – Present*
- **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

- **Bo Shang** et al. *Sensing Perspectives on Vulnerable Road User Monitoring for Traffic Safety: A Survey.* MobiSPC 2025.
- **Bo Shang** et al. *How Many Beams of LiDAR is Enough for Detecting Vulnerable Road Users?* MobiSPC 2025.
- 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. *[Selected for IROS 2025; equal first author]*
- E. Hoxha, J. Feng, …, **B. Shang**, et al. *Contrastive Learning for Robust Defect Mapping in Concrete Slabs using Impact Echo.* 2024.

Patents & Awards

- **US 12,296,994** (granted May 2025) — Unmanned vehicle having flight configuration and surface traverse configuration
- **Best System Control** & **Best Mission Planning** Awards — International Aerial Robotics Competition (AUVSI), 2014 *[team lead]*
- **Meritorious Prize**, International Mathematical Contest in Modeling (USA), 2010