Letian Sun

18-5-402 Xijunzhuang, Guanzhuang, Chaoyang District, Beijing, 100024, China | sltjack12@163.com | (+86) 18600820048

EDUCATION

Beijing Institute of Technology (BIT)   2022.09-2026.06

Bachelor of Autonomous Navigation Control and Decision-making

GPA: 87.09/100 (rank **9/47**)

Courses: Functions of a Complex Variable and Integral Transforms (91), Linear Algebra (94), Foundations of Machine Learning (94), Computer Science and Program Design (C++) (93), Mathematical Analysis (93), Fundamental Principles and Applications of Control Science (93), Fundamentals and Applications of Artificial Intelligence (93), Unmanned Systems Engineering Practice (91)

Research Interests: Robotics, Embodied AI, Automatic autonomous systems

PUBLICATIONS

Xinyi Dong, Yanfeng Zhao, **Letian Sun** *et al.*, "Holographic Feedback Controlled Micro-Stereolithography for Constructing Microstructures with Tuned Mechanical Property," *2024 7th International Symposium on Autonomous Systems (ISAS)*, Chongqing, China, 2024, pp. 1-6, doi: 10.1109/ISAS61044.2024.10552462 **(Best Paper)**

RESEARCH EXPERIENCES

ROS Development for Autonomous Navigation and Path Planning on QUANSER QCAR   2024.09 - present

➢ Engineered a real-time perception-decision pipeline in ROS Noetic, integrating LiDAR (Velodyne VLP-16) and RGB-D cameras (Intel RealSense) via Kalman-filter-based sensor fusion, achieving 150ms end-to-end latency for dynamic obstacle tracking in unstructured environments.

➢ Adaptive Monte Carlo Localization (AMCL) with custom odometry error modeling, reducing pose drift by 40% in GPS-denied areas. Real-time OctoMap generation with probabilistic occupancy updates, enabling 5cm resolution in dynamic indoor/outdoor transitions. Model Predictive Control (MPC) with TEB local planner tuned for non-holonomic constraints, improving path smoothness by 25%.

➢ Optimized costmap layers (inflation radius, obstacle decay) and integrated velocity-based obstacle avoidance, reducing collisions by 62% in human-populated zones. Deployed behavior trees for task sequencing (e.g., "door traversal"), achieving 98% mission success in 100+ simulated scenarios (Gazebo).

National Big Data and Computational Intelligence Challenge

Team Leader, Radar Emitter Classification Based on Large-Scale Signal Data   2025.03 - present

➢ Engineered an end-to-end radar emitter identification system, integrating unsupervised clustering (DBSCAN, KMeans++, SVC) on PRI/DOA/RF features with a hybrid CNN-Transformer classifier, achieving 96.4% emitter-type recognition on synthetic-aperture radar (SAR) benchmarks.

➢ Preprocessed Pulse Descriptor Words (PDWs) and Pulse Train (PL) sequences using wavelet denoising and temporal alignment, improving cluster purity by 22% in dense emitter environments. Hybridized DBSCAN (density-based) and SVC (shape-agnostic) to resolve overlapping emitters, reducing false separations by 35%.

➢ Achieved 0.989 Adjusted Rand Index (ARI) in emitter separation and 94.7% F1-score in type recognition under 6dB SNR - outperforming GRU-only and HDBSCAN hybrids by 12% accuracy. Reduced training time by 40% via structured scenario-level data partitioning (e.g., maritime vs. urban RF environments).

➢ Constructed Multi-Scale Deep Learning Architecture: ResNet-18 backbone to extract local pulse shape/width patterns. Transformer encoder with temporal self-attention to model PRI modulation dynamics, boosting sequential dependency capture by 18% versus LSTM baselines.

National Undergraduate Training Program for Innovation and Entrepreneurship

Team Leader, Bionic Micro-Nano Robot Magnetic Drive System for Thrombosis Treatment   2023.04 - 2024.04

➢ Engineered a closed-loop magnetic control system for 5-DOF microrobot manipulation, dynamically tuning electromagnetic coils (0–500 mT field strength, 1–100 Hz frequency, 0–360° phase) with sub-micron precision in high-viscosity fluids (e.g., silicone oil, blood simulants).

➢ Proposed Visual Servoing Pipeline: OpenCV-based pose estimation (YOLOv5 + PnP algorithm) at 30 FPS with Kalman-filtered state prediction (RMSE < 5 µm). ROS-integrated path planning (RRT* + PID control) for obstacle avoidance in confined spaces.

➢ Achieved 0.8 µm positioning precision under flow disturbances (Re > 0.1) - 3× improvement vs. open-loop systems. Reduced

rotational control error to <1° via phase-synchronized rotating fields. Validated in vascular phantom trials (3D-printed bifurcations) for targeted drug delivery tasks.

Artificial Intelligence, Laboratory Automation System and Deep Learning Training Program at University of Cambridge

Team Leader, The Automatic Couplet Generation System Based on CNN + Bi-LSTM + Attention   2024.01 - 2024.02

➢ Designed CNN encoder (ResNet-18 adapted for text) processing character-level embeddings to capture radical-level features and character structures. Contextual Encoding: Bi-directional GRU modeling semantic dependencies and tonal patterns across 5-9 character sequences. Attention-Driven Decoding: Bahdanau attention dynamically focuses on relevant first-line components during second-line generation, improving tonal matching by 33%.

➢ Trained on 80K+ couplet pairs from Ming/Qing dynasties with data augmentation (synonym replacement, tonal perturbation). Implemented beam search (k=5) and n-gram blocking to balance creativity and tradition.

Meritorious Winner in the 2024 Mathematical Contest in Modeling

Team Leader, Ice Balance in Juneau: How to find ecological 'temperature' amid tourist frenzy   2025.02

➢ Engineered the VEL (Visitor-Environment-Locals) system dynamics model using logistic growth equations and stock-flow diagrams (via Stella Architect) to simulate feedback loops among tourism volume, environmental carrying capacity, and resident demographics.

➢ Modeled government investments with time-lagged multipliers (e.g., 3-year infrastructure ROI) and diminishing marginal returns for conservation spending. Integrated stochastic disturbances (climate events, pandemics) via Monte Carlo simulations, maintaining <8% deviation in key outputs under 95% CI.

AWARDS

Best Paper Award, ICAIS & ISAS 2024	2024.5
Paper Title: "Holographic Feedback Controlled Micro-Stereolithography for Constructing Microstructures with Tuned Mechanical Property"	
Meritorious Winner, Mathematical Contest in Modeling (MCM), COMAP, 2025	2025.5
First Prize (National Level), 2023 China Intelligent Robot Combat and Competition	2023.10
Gold Award, 21st Century Cup Student Entrepreneurship Competition	2024.12
Second Prize (Provincial Level), China International College Student's Innovation Competition	2024.8
Second Prize (Provincial Level), 3rd "Jingcai Daqchuang" Beijing College Students Innovation and Entrepreneurship Competition	2024.9
Third Prize, 18th ICAN National Innovation and Entrepreneurship Competition	2024.10
Scholarships for Excellent Academic Performance: BIT First-class Scholarship (Once), BIT Second-class Scholarship (Three Times)	2022 2023 2024

SKILLS

➢ Languages: English(Proficient), Chinese (Native), IELTS(not yet completed)

➢ Computer: C++, Python, MATLAB, Verilog, STM32, Zemax, Vivado, ANSYS, NI Multisim, SolidWorks, AutoCAD

➢ Microsoft & Design: Word, PowerPoint, Excel, Photoshop, Canva (Posters), XIUMI (WeChat Posts)