

RENYUAN LIU

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EDUCATION

- **Guangzhou University** Sept. 2022 – Jun. 2026 (Expected)
B.Eng. in Computer Science (Information Security); **GPA: 89.81/100.00**; **Ranking: Top 8%**
Curriculum: Machine Learning 100*, Data Structure and Algorithm Laboratory 99*, Operating System 98* (Course Project 95*), Programming Practice 98*, Data Structure and Algorithm 97*, Programming Laboratory I 95*, Computer Network (Course Project 95*), Principles of Computer Composition, Higher Mathematics, Discrete Mathematics, Linear Algebra, Probability and Mathematical Statistics (*: rank 1st in all students of the course).
- **The University of Hong Kong/University of Macau** (Summer Camp) Nov. 2023
GPA: 97.50/100.00 (Interdisciplinary Programme)
Honor: Commendation Letter for Outstanding Performance in the Winning Team

MANUSCRIPTS UNDER REVIEW

- **R. Liu**, H. Zhou, C. Fang and Q. Fu, [How Fly Neural Perception Mechanisms Enhance Visuomotor Control of Micro Robots](#). *Under review in 2026 International Conference on Robotics and Automation (ICRA)(CCF-B)*.
- M. Wang*, **R. Liu*** and Q. Fu, [Enhancing Collision-Selectivity in Autonomous Micro-Robots by Elevated Temporal Derivatives in Neuronal Assembly Framework](#). *Under review in IEEE Transactions on Cognitive and Developmental Systems (JCR Q1, IF = 4.9)*.

ACADEMIC PUBLICATIONS

- **R. Liu** and Q. Fu, [Attention-Driven LPLC2 Neural Ensemble Model for Multi-Target Looming Detection and Localization](#). *The 2025 International Joint Conference on Neural Networks (IJCNN)(CCF-C, AR ≈ 38%)*.
- G. Gao*, **R. Liu**, M. Wang and Q. Fu*, [A Computationally Efficient Neuronal Model for Collision Detection with Contrast Polarity-Specific Feed-Forward Inhibition](#). *Biomimetics, vol.9, no.11, p.650, 2024 (JCR Q1, IF = 3.9)*.
- C. Fang*, H. Zhou, **R. Liu**, and Q. Fu*, [A Neuromorphic Binocular Framework Fusing Directional and Depth Motion Cues Towards Precise Collision Prediction](#). *Neurocomputing, 131660 (JCR Q1, CCF-C, IF = 6.5)*.
- H. Zhou, C. Fang, **R. Liu**, and Q. Fu, [A Bio-Plausible Neural Network Integrating Motion and Disparity Pathways for Looming Perception](#). *Acta Electronica Sinica, p.1-16, 2025 (CCF-A in Chinese Category)*.
- J. Huang*, Z. Qin, M. Wang, **R. Liu**, and Q. Fu*, [A Biomimetic Collision Detection Visual Neural Model Coordinating Self-and-Lateral Inhibitions](#). *The 14th International Conference on Biomimetic and Biohybrid Systems (Oral)*.

HONORS AND AWARDS

- **First Prize (Provincial; Top 3%)**, Chinese Collegiate Computing Competition (4C) May 2025
- **Honorable Mention (International)**, Mathematical Contest in Modeling (MCM) Jan. 2025
- **First Prize (National; Top 5%)**, Asia and Pacific Mathematical Contest in Modeling (APMCM) Nov. 2024
- **First Prize & Innovation Silver Award (Provincial; Top 2 out of 1,167 Teams)**,
“Greater Bay Area Cup” Guangdong-Hong Kong-Macao Financial Mathematics Modeling Competition Nov. 2024
- **Second; Third; First-Class Scholarship (Top 8; 12; 5%)**, *Guangzhou University* Dec. 2025; 2024; 2023

SKILLS

- **Language:** IELTS 6.5 (R8.0, L6.5, W6.0, S5.5), CET-6 564 (R242/248.5)
- **Programming Skills:** C/C++, Python, Matlab, ROS, Webots, STM32-Chip Robot Development

RESEARCH EXPERIENCE

Computational Autonomous Learning Systems Lab Advisor: Prof. Pengcheng Liu
Department of Computer Science, University of York, York, UK (On-Site)

- **Biologically Plausible Mechanisms for Long-Term Motion Learning.** Jun. 2025 – Sept. 2025
 - **Robotic arm motion planning:** Learned expert-guided trajectory optimization via Learning from Demonstration (**LfD**) and applied biologically inspired probabilistic movement primitives (**ProMPs**) for push-grasping with the *Franka Emika Panda*.
 - **Navigation and manipulation:** Working on developing a **lifelong learning** navigation-manipulation system on *TurtleBot 3* with *OpenMANIPULATOR-X* that adapts to new environments while **retaining** performance in previously learned ones.

Machine Life and Intelligence Research Centre Advisor: Prof. Qinbing Fu
School of Mathematics and Information Sciences, Guangzhou University, Guangzhou, China

- **Real-time Visual Processing Systems Development of Micro-Mobile Robot** Mar. 2023 – Present
 - Deployed visual neural network models inspired by insect neurons onto the **STM32-based micro-robot *Colias***, achieving real-time collision perception and avoidance. Optimized model memory usage to fit within the **62 KByte** SRAM capacity of *Colias*; developed and refined algorithms to enable real-time execution under extreme computational constraints (processing time < **33 ms** on the STM32F427 micro chip); performed debugging, tuning, and conducted both offline and online experiments.
 - **Fly-Inspired Ultra-selective Looming Perception and Avoidance on Resource-Constrained Micro-Robots**, poster presentation at *the 26th Towards Autonomous Robotic Systems (TAROS 2025) Conference*.
 - Selected code can be accessed below:
[Fly Visuomotor-Inspired Attention-LPLC2 Model \(independently, 2k lines of code in C\)](#);
[Locust Vision-Inspired Optimized-LGMD Model \(independently, 1k lines of code in C\)](#).
- **Attention-Driven LPLC2 Neural Ensemble Model for Multi-Target Looming Detection and Localization**, paper accepted at *IJCNN 2025, first author.* Jul. 2024 – Nov. 2024
 - **Conducted full-cycle research** on modeling the lobula plate/lobula columnar type 2 (LPLC2) neural ensemble in the fruit fly *Drosophila*, known for its **ultra-selectivity** to looming stimuli.
 - Developed the multi-attention LPLC2 (mLPLC2) neural network model inspired by the visual system of the fly by leveraging a **bottom-up attention** mechanism driven by motion-sensitive neural pathways (**independently, 3k lines of code in C/C++**).
- **A Computationally Efficient Neuronal Model for Collision Detection with Contrast Polarity-Specific Feed-Forward Inhibition**, article published at *Biomimetics, second author.* Mar. 2024 – Jul. 2024
 - Participated in the entire research on modeling the optimized locust lobula giant movement detector neuron with detailed **feed-forward inhibition** (oLGMD) to enhance processing speed and robustness.
 - Implemented the oLGMD model into the embedded system of *Colias*, and conducted closed-loop arena comparative experiments, achieving the highest success ratio of collision avoidance at **97.51%** while nearly **halving** the processing time compared with previous LGMD models; designed criteria to assess time efficiency and collision selectivity.
 - Led the initial writing of the paper; participated in revising the submitted paper.
- **Bio-Inspired LGMD Collision Detection Model Leveraging Optical Flow and Learning-Based Method, Provincial Key College Students' Innovative Entrepreneurial Training Plan Program.** May 2024 – Present
 - Developed neuromorphic **binocular** models for collision prediction which combines **directional** and **depth** motion cues; optimized directional-selective neuron parameters using a genetic algorithm; collected stereo and RGB-D datasets across varied indoor-outdoor collision scenarios for model training and evaluation. conducted online collision avoidance experiment on the *TurtleBot 4* robot.
 - Designed detailed figures illustrating the models and experiments; drafted manuscripts introductions, and contributed to manuscripts revisions.