RENYUAN LIU

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EDUCATION

- **Guangzhou University**   Sept. 2022 - Jun. 2026 (Expected)
  B.Eng. - Information Security; **GPA: 90.13/100**; **Ranking: Top 10%**
  Curriculum Highlights: Machine Learning 100*, Data Structure And Algorithm Laboratory 99*, Operating System 98*, Programming Practice 98*, Data Structure And Algorithm 97*, Programming Laboratory I 95, Computer Operating System Course Project 95, Computer Network Course Project 95, Selected Topics in Higher Mathematics I 96, Higher Mathematics I 94, Discrete Mathematics 93 (*: rank 1st in all students of the course).

- **The University of Hong Kong/University of Macau** (Summer Camp)   Nov. 2023
  GPA: 97.5/100 (Interdisciplinary Programme)
  Honor: Commendation Letter for Outstanding Performance in the Winning Team

  IELTS 6.5 (R8.0, L6.5, W6.0, S5.5); **CET-6 564**

PUBLICATIONS

- **R. Liu** and Q. Fu, Attention-Driven LPLC2 Neural Ensemble Model for Multi-Target Looming Detection and Localization. *Accepted at 2025 International Joint Conference on Neural Networks.*

- 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.*

HONORS AND AWARDS

- **National First Prize (Top 5%)**, 2024 Asia and Pacific Mathematical Contest in Modeling   Nov. 2024

- **Provincial First Prize & Innovation Silver Award (Top 2 out of 1,167 Teams)**, the 5th "Greater Bay Area Cup" Guangdong-Hong Kong-Macao Financial Mathematics Modeling Competition   Nov. 2024

- The Third-Class Scholarship, *Guangzhou University*   Nov. 2024

- **The First-Class Scholarship (Top 5%)**, *Guangzhou University*   Nov. 2023

RESEARCH EXPERIENCE

Machine Life and Intelligence Research Centre, Guangzhou University.   Advisor: Prof. Qinbing Fu

- **Attention-Driven LPLC2 Neural Ensemble Model for Multi-Target Looming Detection and Localization**, paper accepted at IJCNN, *first author.*   Jul. 2024 - Nov. 2024
  - Conducted a full-cycle research on modeling the ultra-selective lobula plate/lobula columnar, type 2 (LPLC2) neural ensemble in *Drosophila* for robust perception and localization of multiple looming objects by leveraging a bottom-up attention mechanism to generate attention fields driven by motion sensitive neural pathways.
  - Developed the multi-attention LPLC2 (mLPLC2) neural network model inspired by the visual system of fly (**independently, 3k lines of code in C/C++**). Our current work focus on implementing mLPLC2 model into the embedded system of micro ground robot *Colias* in real physical world (**independently, 2k lines of code in 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 the robustness towards translating movement.

- ○ Implemented oLGMD model into embedded micro robot system (**independently, 1k lines of code in C**), and conducted closed-loop arena comparative experiments to evaluate performance of oLGMD, achieving the highest success ratio of collision avoidance at 97.51% while nearly **halving the processing time** compared with previous LGMD models; conducted all online experiments of this paper, analyzing the results using real-world data collected by the *Colias* robot; designed criteria to assess time efficiency and collision selectivity; led the initial writing of the introduction and experimentation sections; participated in revising the submitted paper.

- **Research on Computational Neuroscience for Collision Detection**   Mar. 2023 - Present
  - ○ Reading and giving reports of research articles during research seminars on a weekly bases.
  - ○ **Provincial Key** College Students' Innovative Entrepreneurial Training Plan Program: Bio-Inspired LGMD Collision Detection Model Leveraging Optical Flow and Learning-Based Optimization.
  - ○ Modeling self-inhibition in neural networks for collision perception against translating motion; developed neuromorphic binocular models for collision prediction, combining directional and depth motion cues; optimized directional-selective neuron parameters using a genetic algorithm; collected an indoor-outdoor dataset with a stereo RGB-D camera for collision modeling; conducted online robotic experiments with *Colias* and *TurtleBot* robots; designed detailed figures illustrating the LGMD-based collision detection model; drafted the introduction section of manuscripts; **Three manuscripts of results to be submitted**.

SKILLS

- Programming Languages: C/C++, Python, Matlab

- Others: LaTeX, Keil, Webots, Linux, Git, Markdown, MS Office/Visio, Adobe Photoshop/Premiere Pro

  Hobbies: Movie, Music, Photography, Basketball, Jogging, Badminton.