

# STEVEN GONG

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## 🎓 EDUCATION

**Australian National University** (QS TOP 30)

Feb.2024 - Nov.2025

*M.S. Computing (Advanced), GPA:6.67 / 7.0*

**Beijing Institute of Technology** (Project 985)

Sep.2018 - Jun.2022

*B.S. Computer Science and Technology*

## 📖 SELECTED PUBLICATIONS

- **Manuscript on photonic computing systems, *HaiLong Gong***, Haibo Zhang, Amanda S. Barnard, Matt Woolley, Rajkumar Buyya (*Submitted*).
- **Leveraging Multi-Stream Information Fusion for Trajectory Prediction in Low Illumination Scenarios: A Multi-channel Graph Convolutional Approach, *HaiLong Gong***, ZiRui Li, Chao Lu, GuoDong Du, JianWei Gong, IEEE Transactions on Intelligent Transportation Systems (T-ITS).
- **Towards Online Risk Assessment for Human-robot Interaction: A Data-driven Hamilton-Jacobi-Isaacs Reachability Approach, *HaiLong Gong***, ZiRui Li, Chao Lu, JianWei Gong, 26th IEEE International Conference on Intelligent Transportation Systems (ITSC2023).
- **Towards Safe, efficient and Co-operative Decision-making for CAVs in Mixed Autonomy: An Attention-Enhanced Graphic Reinforcement Learning Approach *HaiLong Gong***, ZiRui Li, RunHao Zhou, Qi Liu, Chao Lu, JianWei Gong, The 4th Symposium on Management of Future Motorway and Urban Traffic Systems 2022 (MFTS 2022).
- **Fast and Accurate: Perception System of a Formula Student Driverless Car *HaiLong Gong***, Yunji Feng, TaiRan Chen, ZuoOu Li, YunWei Li, 2022 6th International Conference on Robotics, Control and Automation (ICRCA 2022).

## 🔗 ACADEMIC SERVICE

- **Reviewer**, *IEEE Transactions on Intelligent Transportation Systems (T-ITS)*
- **Reviewer**, *IEEE Internet of Things Journal (IEEE IoT-J)*

## ⚙️ SKILLS

- **Programming Languages**: Python, C/C++, Java, Verilog, CUDA
- **Hardware & Tools**: Vivado, Vitis, PYNQ, Intel Advisor, Roofline Model
- **Parallel Computing**: MPI, OpenMP, AVX/SSE, CUDA Programming, Roofline
- **Tools for AI & ML**: Pytorch, TensorFlow, Keras, OpenCV, Scikit-learn
- **Languages**: English - Fluent (PTE 81), Mandarin - Native speaker

## 👥 RESEARCH EXPERIENCE

**Ultra-fast Photonic Computing for Deep Learning Acceleration on FPGA**

Jan. 2025 - now

*Supervisor: Prof. Haibo Zhang, Prof. Amanda Barnard, AM*

- Conducting research on a novel computing paradigm that integrates photonic computing with FPGA-based electronic systems to achieve high-throughput and low-power neural network acceleration.
- Designed a hybrid photonic-electronic architecture based on the ZCU111 RFSoc platform, leveraging multi-channel DACs and ADCs for high-bandwidth analog signal modulation and acquisition.
- Successfully implemented and verified the electrical data path (DMA → DAC → ADC → DMA) using AXI-DMA and RFDC interfaces, establishing the foundation for integrating the photonic computing module.

- Employed Vivado, PYNQ, and Verilog to configure FPGA logic, manage data streams, and control DDS, DAC, and ADC blocks for system-level prototyping.
- Currently in the system integration and testing phase, with planned evaluations of throughput and latency; targeting publication in top-tier journals in computer architecture or optoelectronic systems.

### Parallelized Advection Solver on GPU and Multicore CPU

Feb. 2025 – May. 2025

*Course Project | ANU COMP8300 Parallel Computing, Instructor: Prof. John Taylor*

- Developed a high-performance 2D advection solver using CUDA and OpenMP, effectively targeting both shared-memory and GPU-based parallelism architectures for fluid dynamics simulation.
- Designed optimized GPU kernels with shared-memory tiling, warp-level parallelism, and loop unrolling, significantly reducing latency and improving overall computational throughput on CUDA-enabled devices.
- Applied spatial decomposition with OpenMP and evaluated scheduling strategies (static/dynamic/guided) on the Gadi supercomputer to maximize thread utilization and reduce synchronization overhead.
- Analyzed performance bottlenecks using NVIDIA Nsight and Linux perf tools, guiding refinements in memory alignment, load balancing, and thread-level parallel efficiency.
- Compared 1D vs 2D decomposition strategies and tuned thread-block and grid configurations, adapting implementations for varying cache behavior and memory hierarchy depths.
- Additionally implemented and thoroughly analyzed a distributed-memory version using MPI, integrating deadlock-free, halo exchange techniques, wide-halo buffering, and communication-computation overlap schemes.

### Multi-Source Sensor Fusion-based Trajectory Prediction

May.2022 - Jun.2023

*Instructor: Prof. Jianwei Gong, Prof. Chao Lu, Collaborator: Zirui Li*

- Proposed a trajectory prediction model based on multi-stream heterogeneous data fusion to enhance accuracy.
- Developed a novel ST-GCN-based embedding method to generate temporal and spatial features of traffic participants' trajectories, along with an LSTM-based image feature extraction for self-adaptive attention capture.
- Implemented a flexible and versatile multi-stream heterogeneous data system.

## INDUSTRY EXPERIENCE

### Shenzhen Yimeizhi Technology Co., Ltd Shenzhen, China

Mar.2023 - Dec.2023

*Computer Vision Algorithm Engineer* HR Manager: Wenxian Gan

- Designed and developed the front-end interface using QT according to the design document, including control layout and window response, improving the operability and practicality of the software.
- Optimized Automatic Optical Inspection module performance through debugging, tuning, and introducing advanced algorithms, achieving a 10% reduction in missed detection rate and 12% in false detection rate.
- Researched and developed parallel computing solutions using CUDA Programming, leading to a 40% reduction in detection efficiency and significantly improving software performance.

### ByteDance, Quality Lab Beijing, China

Oct.2021 - Feb.2022

*Algorithm Engineer Intern* Supervisor: Zhao Zhang

- Optimized reinforcement learning algorithms in the software testing tool *Fastbot*.
- Enhanced test coverage and problem interception rate, significantly improving efficiency and quality.

## HONORS AND AWARDS

<b>Champion</b> , Formula Student Autonomous China (FSAC), Nation Level	2020
<b>1<sup>st</sup> Prize</b> , ByteDance Summer Camp, Nation Level	2021
<b>1<sup>st</sup> Prize</b> , "Century Cup" Extracurricular Academic Competition, School Level	2021
<b>Excellent Oral Presentation</b> , 2022 6th International Conference on Robotics and Machine Vision	2022
<b>2<sup>nd</sup> Class Scholarship</b> , Beijing Institute of Technology, School Level	2022
<b>3<sup>rd</sup> Class Scholarship</b> , Beijing Institute of Technology, School Level	2019
<b>3<sup>rd</sup> Prize</b> , 17th "Century Cup" Competition, City Level	2020
<b>3<sup>rd</sup> Prize</b> , "Century Cup" Extracurricular Academic Competition, School Level	2021