Shuai Liu

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EDUCATION

Laurentian University **CA**
Master of Computational Science *2024–2025(Expected)*

Oakland University **US**
Bachelor of Computer Science, Exchange Student *2017–2018*

Zhengzhou University of Light Industry **CN**
Bachelor of Computer Science *2015–2019*

EXPERIENCE

Hazel *Full-Stack ML Engineer* *July 2025 – Present*

- Onboarded as a volunteer engineer for the Hazel Engine's upcoming machine-learning module.

Freelancer *Full-Stack ML Engineer* *Jan 2023 – Present*

- Designed and developed Beast Engine, a high-performance C++ game engine optimized for **machine learning training**, with integrated **PyTorch** models.
- Built an ImGui-based visual editor for designing and exporting **OpenAI Gym–compatible** environments, enabling seamless integration between simulation frontends and machine learning inference backends.

bilibili *Machine Learning Engineer* *Jan 2021 – Dec 2022*

- Boosted data utilization efficiency by **1.5x** and **halved** training cycle time by developing a scalable, efficient **distributed training framework** with modular code structures and comprehensive documentation, deployed on bilibili's **internal cloud platform** to support diverse research needs.
- Leveraged optimized **PPO**, integrated **attention mechanism** into the network architecture, and engineered **heuristic rewards** to secure **1st place** in IJCAI2022 Neural MMO Challenge and top placements in multiple RL competitions—demonstrating the framework's effectiveness in single-agent, **multi-agent**, and self-play scenarios.
- Developed and integrated AI bots with **human-like behavior** in Unity games, enabling advanced gameplay with demonstrated human-level competencies.
- Collaborated with the live streaming team to design, develop, and successfully **launch live interactive games** for live streaming platform.

CreateAmind *Machine Learning Engineer* *Jul 2019 – Jan 2021*

- Optimized futures trading strategies for sub-5ms execution using **PPO** algorithms with **XGBoost**, achieving **expert-level performance** in real-world trading conditions.
- Enhanced football strategy modeling with Soft Q Network using entropy for exploration, and deployed distributed training via **Ray** on **Azure**, achieving **3× training efficiency** gains.
- Leveraged curriculum learning, self-play, and n-step solutions to achieve a **top 1% ranking** (11th of 1,138 teams) in Kaggle Google Research Football.

CATL *Intern* *Oct 2018 – Dec 2018*

- Participated in **ETL** processes and collaborated across departments to explore and prototype **machine learning applications** in manufacturing, identifying opportunities for automation and predictive modeling.

PROJECTS

VSLAM Navigation *2025*

Developed a **ROS2** node on LIMO Robot using OpenCV ArUco, LiDAR, and wheel odometry to localize markers and autonomously navigate to their centroid.

***Blasting Evaluation Demo**, Full-Stack ML System for Mining* *2024*

- Designed and deployed a **multi-stage ML pipeline** to evaluate blast performance from drone footage, enabling data-driven decision-making in mining operations.
- Applied **Mask R-CNN** for smoke plume **segmentation** and engineered features for blast quality prediction using **decision trees**.
- Developed the **full-stack** system: back-end model pipeline, data processing, and interactive Streamlit front-end for domain experts.

***Beast Engine**, AI-native Game Engine* *2023*

- Designed for seamless **AI integration**, enabling the natural loading and referencing of AI models within games.
- Built on **Entity Component System (ECS)**, allowing easy creation, saving, and loading of scenes with dynamic runtime script loading.
- Designed for **high performance**, with Python bindings for C++ code wrapped as a standard Gym environment.

Large-scale Distributed Training Framework *2022*

- Enabled high scalability across single machines to clusters (up to **10,000 CPU cores and 80 GPUs**).
- Designed a modular architecture with a stable core and adaptable project-specific modules, enabling simultaneous multi-project research without core disruptions.

LastOrder-Dota2**, https://github.com/bilibili/LastOrder-Dota2 **412 GitHub stars *2021*

The inference component of our Dota2 agent **outperforms 98%** of Dota players.

***Distributed-RL**, https://github.com/LiuShuai26/Distributed-RL* *2019*

Implemented a distributed deep reinforcement learning framework using **Ray** and **TensorFlow**.

AWARDS

2022: **1st Place** - IJCAI2022 Neural MMO Challenge (110 teams)

2022: **2nd Place** - CoG Football AI Competition (57 teams)

2022: **3rd Place** - IJCAI-ECAI AI Olympics (119 teams)

2020: **11th Place** - Kaggle Google Research Football (1,138 teams)

2017: CSC Scholarship - **State-financed** studying abroad

PUBLICATIONS

2025: **Shuai Liu**, Meng Cheng Lau. *Reduced-Order Model-Guided Reinforcement Learning for Demonstration-Free Humanoid Locomotion*. arXiv:2509.19023 (preprint).

2023: Yangkun Chen, Joseph Suarez, Junjie Zhang, **Shuai Liu**, et al. *Benchmarking Robustness and Generalization in Multi-Agent Systems: A Case Study on Neural MMO*. AAMAS 2023 (poster).

2020: Jingbin Liu, **Shuai Liu**, and Xinyang Gu. *Soft Q Network*. arXiv:1912.10891 (preprint).

2020: Jingbin Liu, Xinyang Gu, and **Shuai Liu**. *Policy Optimization Reinforcement Learning with Entropy Regularization*. arXiv:1912.01557 (preprint).

SKILLS

Programming: Python, C++, C#, Go, SQL, Bash, ROS2

Machine Learning: PyTorch, TensorFlow, Scikit-learn, ONNX, Pandas, NumPy, Jupyter

Cloud & Deployment: AWS, Azure, GCP, Docker, Git, Horovod, Ray, ZeroMQ, Linux