

Shuai Liu

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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 – Jan 2025*

- 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 **3x 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

2026: **3rd Place** - Booster Soccer Showdown (34 teams)

2025: **1st Place** - Franka Golf Competition (59 teams)

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).

EDUCATION

Laurentian University

Master of Computational Science

CA

2024–2025

Oakland University

Bachelor of Computer Science, Exchange Student

US

2017–2018

Zhengzhou University of Light Industry

Bachelor of Computer Science

CN

2015–2019

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, CI/CD, Linux