

# Heyuan Liu

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GitHub | LinkedIn

## EDUCATION

### École Polytechnique

Paris, France

*Master of Science and Technology in Artificial Intelligence and Advanced Visual Computing*

*Sep. 2023 - Oct. 2025*

- Graduation Certificate will issue in June 2026
- Coursework: Machine and Deep Learning, Image Analysis and Computer Vision, Constraints programming, Computer Animation, Advanced Machine Learning.
- Scholarship: SEMG Scholarship.

### École Polytechnique Fédérale de Lausanne (EPFL)

Lausanne, Switzerland

*Exchange Master Student in IPESE Lab*

*Mar. 2024 - Sep. 2024*

- Coursework: ME602 - Modelling, Optimization, Design and Analysis of Integrated Energy Systems.
- Research Title: Identify optimal configuration with a machine learning method in multi-criteria decision analysis.
- Supervisor: Prof. François Maréchal.

### Macau University of Science and Technology

Macao SAR, China

*Bachelor of Science in Software Engineering*

*Sep. 2019 - Aug. 2023*

- Coursework: OOP in Java, Algorithms, Mobile Application Development, Data Science, Artificial Intelligence, Data Structures, Software Engineering, Numerical Computation.
- Supervisor: Prof. Rubing Huang.

## PUBLICATIONS

### Conference Proceedings

- H. Liu, Y. Zhao and F. Maréchal. “On the role of Artificial Intelligence in Feature oriented Multi-Criteria Decision Analysis.” 35<sup>th</sup> European Symposium on Computer Aided Process Engineering (ESCAPE-35), 2025.

## RESEARCH AND WORK EXPERIENCE

### ENS-PSL/INRIA/CNRS

Paris, France

*Research Engineer*

*Dec. 2025 - Now*

- Focusing on Mathematical Machine Learning and Formal Explanation of the Neural Networks
- Exploring Formal analysis for Neural Predicates and Neural Specifications.

### OVGU MathOpt Group

Magdeburg, Germany

*Research Intern (Doctoral Studies Financing)*

*Apr. 2025 - Sep. 2025*

- Supervisor: Prof. Dr. rer.nat. habil. Sebastian Sager (MPI-Magdeburg)
- Exploring mathematical optimization methods to simplify ReLU networks after training to reduce MILP solver complexity.
- Reviewing recent methods for function-preserving and approximate transformations without retraining.
- Focused on structure-preserving transformations to improve optimization performance.

### École Polytechnique & IDEMIA, France

Paris, France

*Transverse Industry Project - 3D Luggage Detection with IDEMIA*

*Sep. 2024 - Mar. 2025*

- Reconstructed 3D geometry of luggage from multi-view images captured at airport conveyor systems.
- Addressed the challenges in feature extraction and multi-view matching with robust geometric reasoning.
- Worked in collaboration with IDEMIA, a leading company in biometric security and identity verification.
- Project Report: [https://github.com/MisFiT5/Reports/blob/main/3DLuggageDetection\\_IDEMIA.pdf](https://github.com/MisFiT5/Reports/blob/main/3DLuggageDetection_IDEMIA.pdf)

### EPFL IPESE Lab

Sion, Switzerland

*Research Intern - Identify Optimal Configuration with Machine Learning in MCDA*

*Mar. 2024 - Sep. 2024*

- Publication: ESCAPE 35, 2025.
- Applied advanced clustering and dimensionality reduction algorithms to preprocess datasets.
- Designed ML models and deployed a self-iterative LLM to extract optimal solutions.
- Analyzed data-driven results and offered decision-making support with LLM explanation tools.
- Project GitHub Link: <https://github.com/MisFiT5/IPESEinternship>

### Roland Berger (Remote)

Beijing, China

*Chatbot Engineer (PTA Intern)*

*Feb. 2024 - Apr. 2024*

- Developed specialized sales/service chatbots using Coze and Dify platforms.
- Designed, tested and maintained 3 agents: Sales, After-Sales, and Service.
- Improved response accuracy and reduced hallucinations.

**Volkswagen-Mobvoi Info. Tech.***Software Quality Intern Engineer*

- Participated in internal review and quality system upgrade (v2.0 to 3.0).
- Solved 36 software quality issues in Volkswagen ID6 and Audi A6 projects.

Beijing, China  
*Jun. 2022 – Aug. 2022*

**Chinese Academy of Science Software Center***AI + Autonomous Driving Researcher*

- Participated in CAS Summer Research Camp on Self-driving.
- Improved Artificial Potential Field method for path planning.
- Awarded Best Performance in optimization.

Beijing, China  
*Jun. 2020 – Aug. 2020*

**SELECTED PROJECTS****Generative Image Editing via Inversion (DDIM/Null-Text)**

Feb. 2025 – Mar. 2025

*CSC\_53449\_EP Course Project at École Polytechnique*

- Report Link: <https://github.com/MiSFiT5/Reports/blob/main/Diffusion.Inversion.Report.pdf>
- Modified source images using DDIM and Null-Text inversion based on target prompts.
- Preserved key features of the original image while integrating semantic edits from prompts.

**3D Simulation of Population and Animal Animation in EcoSystem**

Sep. 2024 – Dec. 2024

*CSC\_53433\_EP Course Project at École Polytechnique*

- Demo Video : [https://drive.google.com/file/d/1gOjvvbWmTL18TTcY3dBOND7Sk6uTLlcN/view?usp=drive\\_link](https://drive.google.com/file/d/1gOjvvbWmTL18TTcY3dBOND7Sk6uTLlcN/view?usp=drive_link)
- Constructed a dynamic 3D ecosystem scene in Unity from a flat terrain.
- Created tools and scripts for terrain editing, object animation, and crowd simulation.

**Navi-UAV: Deep RL for Dynamic Path Planning**

Jan. 2024 – Mar. 2024

*INF581 Course Project at École Polytechnique*

- GitHub Link: [github.com/172698691/INF581-Project](https://github.com/172698691/INF581-Project)
- Implemented DDPG-based reinforcement learning to train UAVs navigating dynamic obstacle environments.
- Simulated multi-agent behavior under uncertainty and evaluated policy robustness.

**Extractive Summarization with Discourse Graphs**

Oct. 2023 – Dec. 2023

*INF554 Course Project at École Polytechnique*

- GitHub Link: <http://github.com/MiSFiT5/INF554.Project>
- Built a summarization model based on graph neural networks leveraging discourse structure.
- Implemented and compared GCN, GAT, GraphSAGE, and LSTM for multi-turn conversation extraction.

**VTuber-Genshin: Real-Time Face Tracking Avatar**

Oct. 2023 – Dec. 2023

*INF573 Course Project at École Polytechnique*

- GitHub Link: [github.com/172698691/VTuber-Genshin](https://github.com/172698691/VTuber-Genshin)
- Integrated Unity and MediaPipe to create a real-time face-tracking virtual character system.
- Supported multiple facial expressions and streaming avatar response in real time.

**Dynamic Detection of Oscillating Loss in Deep Neural Nets**

Sep. 2022 – May. 2023

*Final Year Project at Macau University of Science and Technology*

- GitHub Link: [github.com/MiSFiT5/Dynamic-AUTOTRAINER](https://github.com/MiSFiT5/Dynamic-AUTOTRAINER)
- Developed AUTOTRAINER, a system for automatic detection and repair of oscillating loss bugs during DNN training.
- Achieved 50%+ reduction in training time and debugging cost. Rated A+ by faculty review.

**SCHOLARSHIP & AWARDS**

Finanzierung des Promotionsstudiums (Financing of Doctoral studies) provided by OVGU

*Apr. 2025*

Erasmus Scholarship Honored by École Polytechnique

*Mar. 2025*

SEMG Scholarship Honored by EPFL

*Mar. 2024*

National College Students E-commerce Innovation, Creativity, and Entrepreneurship Challenge (Provincial Second Price)

*May 2022*

## SKILLS

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**Programming:** Python, R, Java, C/C++, MATLAB, SQL, Bash

**Data Science / ML fields:** NLP, CV, Vision, Multi-modal, Reinforcement Learning, LLM,...

**Tools & Others:** Git, LaTeX, Unity, Blender, Docker, Google Colab, VS Code

**Languages:** Chinese (native), English (fluent), French (Beginner), German (Beginner)



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