

Peter/Zheyuan HU

University of Cambridge | Jardine Scholar | Research Assistant | Challenge Solver

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Looking forward to research around Visual Computing (Graphics / Vision).

TECHNICAL SKILLS

Data Sci: Prob and Stat, Python, NumPy, ML&DL, PyTorch, Computer Vision.

Visual: Computer Graphics, OpenGL, GLSL, XR (AR/VR/MR), Unity, Unreal Engine, 3D Modelling (Blender).

Prog: C/C++, Java, OOP, CMake, gdb, Algorithms and Data Structure, OCaml (Functional Programming).

Dev Tools: bash/shell, git, CI/CD pipeline, Docker, VS Code, Pycharm, IntelliJ IDEA.

EDUCATION

🏠 **University of Cambridge**, United Kingdom

Oct 2025-Jun 2026

M.Eng. (Hons) Computer Science.

Jardine Scholarship

Selected from top undergrads, on par with the M.Phil in research depth and assessment rigor, stated by [the department](#).

Graphics and Image Processing, ML and the Physical World, Mobile Health, Seminars (Architecture, Network), etc.

🏠 **University of Cambridge**, United Kingdom

Oct 2022-Jul 2025

B.A. (Hons) Computer Science | First-Class (72.4) | Dissertation (93.5).

Jardine Scholarship

OS, DB, Architecture, Graphics, XR, Network, BioInfo, Quantum Computing, Information Theory, etc | [detailed notes](#).

🌐 **Universitas Amoiensis**, **Project 985** & Top 1 in Southern China

Sep 2021-Jun 2022

B.Eng. undergrad in Software Engineering | Rank 1/173 (1st term) | Yearly (88.2) | **Transcript**. Withdrew after 1st year

C and C++, Object-Oriented Programming, Calculus and Linear Algebra, University Physics, Presentation, ACM, SSE.

LIST OF PUBLICATIONS

Under the supervision of *italic*, † indicates equal contribution.

@ **Cambridge Open Reality and Visual AI Lab**, directed by Prof. **Cengiz Öztireli**.

May 2024-Present

M³ashy: Multi-Modal Material Synthesis via Hyperdiffusion

arXiv * * * * 2024-2025

Chenliang Zhou, *Zheyuan Hu*, *Alejandro Sztrajman*, Yancheng Cai, Yaru Liu, Cengiz Öztireli.

Accepted by **AAAI'26** (Annual Conference on Artificial Intelligence) Main Technical Track (acceptance rate: 13.4%).

- Computer Graphics (SVBRDF, real-world materials), Vision (generation via PCA, VAE, diffusion).
- Adapted from my undergrad **dissertation project** (93.5, rank 1/133). Previously known as NeuMaDiff: **Neural Material Synthesis via Hyperdiffusion**, which was accepted by NeurIPS'25 UniReps Workshop, withdrawn for resubmission.

FreNBRDF: A Frequency-Rectified Neural Material Representation

arXiv * * * * 2024-2025

Zheyuan Hu†, *Chenliang Zhou*†, Cengiz Öztireli.

Accepted by **IEEE MLSP'25** (International Workshop on Machine Learning for Signal Processing).

- Computer Graphics (BRDF, real-world materials), Frequency Rectification (Spherical Harmonics).
- Evolved from my individual project in the **Machine Visual Perception** module (rank 2/15).

CHORD: Generation of Collision-Free, House Scale, and Organized Digital Twins for 3D Indoor Scenes with Controllable Floor Plans and Optimal Layouts

In review * arXiv * 2025

Chong Su†, Yingbin Fu†, *Zheyuan Hu*, *Jing Yang*, Cengiz Öztireli, *Fangcheng Zhong*, et al.

- Indoor Scene Synthesis, Generative Models, Digital Twin Generation. Mentored by Dr **Fangcheng Zhong**.

RESEARCH OUTPUTS

Scheduling, DVFS, idle management, *Zheyuan Hu*.

review * 2023

Hair modelling, rendering and simulation, *Zheyuan Hu*.

survey * 2024

Network architecture, *Zheyuan Hu*, supervised by **Prof Jon Crowcroft**.

review * 2025

INDUSTRY RESEARCH

Long-term Rotational Internship @ **Industry Research Center, Cambridge Science Park**, UK.

Research Engineer: **Graphics Algorithm/GPU Architecture**

Jun 2023-Jan 2024

- Linear Algebra, Convolution (Bilateral Filter Kernel on Monte Carlo Samples using GBuffer), spatial-temporal locality.
- NN (PyTorch): Train (lr decay, shuffle data 5GB+, dropout) and Infer (conservative loss), 3D Data Encoding, etc.
- Graphics: Key developer for **Ray Tracing simulation** (OpenGL, GLSL, OpenMP, CMake). Host **sharing sessions**.
- Performance Engineer / Data structure design, targeting micro-benchmarks (performance counters, cache hit rate, etc.)
- Supervised by PhD graduate, senior AI researcher and senior GPU Architects.

Research Intern: **CPU/Operating System Architecture**

Jun-Oct 2023

- Energy-efficient CPU Scheduling, DVFS policy, Idle Management [review](#). Convex Optimisation, Duality, LP, Pareto Optimality, Stanford CVX, Online Algorithms, Competitive Analysis, Disjoint Set Union-find, etc.
- Set up simulation, event-driven architecture with state machine, taking in runtime profiled task model. Compare different algorithms w.r.t complexity, performance, energy (temperature, thermal), Memory Contention, floor-plan, applications. Python (Numpy, Matplotlib, Networkx, Pandas, DAG, TopologicalSorter, etc.).

Software Engineer: **GPU Driver**

Dec 2022-May 2023

- GPU industry workflow, Linux, Vulkan; GPU driver and verification, Game Engines (UE4), shader debug (RenderDoc).
- Introducing independent full [automation tools](#) in the CI/CD, reducing error rate to nearly 0.

- Highest Scoring Undergrad Dissertation**, Computer Lab., University of Cambridge *Cert.* * Aug 2025
ranked first out of 133 candidates, following dual marking and a viva examination with two more professors.
- Cambridge Summer Internship and Research Award**, the Browning fund *Cert.* * Jun-Oct 2025
supporting my research at *Cambridge Open Reality and Visual AI lab*.
- College Scholarship & Prize for Computer Science**, *Magdalene College* Governing Body *Cert.* * Aug 2025
awarded *College Scholar* in recognition of the excellent performance in the *Computer Science Part II*.
- Gold Medal**, 3D Data Compression Algorithm, *national Tech Arena '22*, UK 🏆 * 📅 * 10 Oct-26 Nov 2022
engineering + research, digesting papers and source code, like *RFC1951*, etc.
- Responsible for implementation & improvement of LZSS. 6-level / concurrent LZSS Compression.
 - C with bitwise operators & hash tables, optimization via branch prediction and concurrency.
 - In a team of 4, leading the team and engaging in pre-processing, serialization with teammates.
- Top 2 Team**, Maritime Data Science, *Mercuria Hackathon '22*, Switzerland 🏆 * 📅 * 16 Dec-18 Dec 2022
regression for Route-Planning and reduce the carbon emissions of the maritime industry.
- Jardine Scholarship**, the Jardine Foundation *Cert.* * Oct 2022-Jun 2026
merit-based, fully-funded *Scholarship* while pursuing my four-year studies at the University of Cambridge.
- Third Place**, High school Science and Technology Innovation Contest '20, Shanghai *Cert.* * Apr 2020
deep research thesis into the phenomenon of tire-locking, including pros and cons using Force Analysis.
- Self-made physical simulation test. Introduce Anti-lock braking system into our research with help from mentor.
- Accepted for Publication twice**, Shanghai Students' Post '18 & '19, Shanghai Oct 2018, May 2019
topic: Effective Ways to Overcome Obstacle in Study, Campus Life without Snack Stores.
- Participant**, Chinese Physics/Mathematical Olympiad (ChPO, CMO) Oct 2019

LIST OF PROJECTS



- Machine Learning and its applications** Oct 2022-Jan 2024
- DNN in CV *Stanford CS231n* kNN, Softmax, SVM, MLP, CNN. Caption: RNN, Attention. Gen: GAN, VAE. 🏆 | 📅
 - ML *Stanford CS229* Linear classifiers (Logistic Regression, GDA), SGD, Regularization, PCA, SVM. 🏆
 - kaggle** DataSci practice & ML model (Regression, MLP, etc), PyTorch DNN Debugging, Visualization, Validation.
 - Text Classification via Naive Bayes, HMM, NLP; Social Network and Graph. 🏆 | 📅
- Graphics Renderer (C++, OpenGL)** 🏆 * 📅 * Jul-Sep 2022
real-time simulation, composite design pattern for 3D objects class hierarchy with transformation.
- MIT6.837 ray casting, normal visualization, rendering, voxel rendering, super sampling.
 - large OOP project, with 3D objects, light, camera classes, building over 20 C++ source files from scratch.
- System**
- Operating System (MIT 6.S081)** 🏆 * Oct-Dec 2022
user-mode and kernel programming of Unix V6 RISC-V multiprocessor.
- implement Unix utilities, System Call. Process Scheduling, Memory (Segment, Page, VM), I/O, File.
- Database Design Management System (CMU15-445 Project)** 🏆 * 📅 * Aug-Oct 2022
engineering and code style: using C++ STL, Google C++ Style Guide.
- Memory Management, including Buffer Pool Management System, Replacement policy: LRU.
 - Concurrency: implement the Parallel Buffer Pool Manager.
- C, C++, OOP**
- Multifunctional Supermarket Management System (C++)** 🏆 * 📅 * Apr 2022
inheritance polymorphism, operator overloading, read/write files, etc.
- Typing Game (C, EasyX)** 🏆 * 📅 * Dec 2021
a standard keyboard layout, where different modes are provided.
- Front/Back-end**
- Weather App (Flutter)** 🏆 * April-May 2023
collaborating with team members on an App integrating weather forecast with daily calendar events. I am responsible for:
- Frontend: Beautiful design with UI components, written in Flutter, with Object-oriented programming.
 - Backend: Integration of iCalendar API, asynchronous IO, Computer Networking: HTTP request, get.
- 🏠 **Personal Website and Blog (HTML, CSS, React)** 📅 * Aug 2022-Present
project blogs, files, etc; built up from scratch using HTML/ CSS. Deployed by React, with high code reuse.
- Game Dev**
- Interactive AR block tower (AR foundation, Unity)** 🏆 * 📅 * Demo * Jan-Mar 2025
Extended Reality (XR) module video-based AR project.
- Priest-Beneath (Unity, C#)** 🏆 * 📅 * WebGL * Feb 2023
2023 Cambridge Game Jam (Group Project).

Utility Tools

URL Finder (Web Crawler, Python, Go)

 * Apr 2023

download the web page available at the input URL and extract the URLs of other distinct pages linked to from the HTML.

- Data Structure: Lists, Sets; Computer Networking: HTTP request, like get; Synchronous File IO.

Trace File Parser (Java)

 * May 2023

parsing trace files and generate a unique and sorted list in Java.

INVITED TALKS



Speeding up real-time Ray Tracing, Churchill College Tech talk '23, University of Cambridge

[Slides](#) * Nov 2023

Sharing of my industry research topic on Intersection, Acceleration, also presented at internal R&D group.

3D graphics asset compression, national Tech Arena '22, UK

[Slides](#) * Nov 2022

Sharing of my exploration on 3D obj. compression, with novel 6-level algorithmic improvements.

Facebook datacenter for social network, Network Architecture Seminar, University of Cambridge

[Slides](#) * Oct 2025

Sharing session of my review of the Facebook datacenter network architecture, experimental implication.

From Jardine Scholar to Journey-Maker, Shuping Foundation

[Slides](#) * Aug 2025

Sharing of my journey as a Jardine Scholar at the University of Cambridge for prospective applicants.

🏠 Personal Portfolio

[Slides](#) * Present

REVIEWING EXPERIENCE

Peer Reviewer in the [UniReps Workshop](#), 39th Conference on Neural Information Processing Systems (NeurIPS'25).

EXTRACURRICULAR INTEREST

[Photography](#), Music, Gym | *Society*: [Ethics in Science](#) | *Econ*: Macro & Micro, Money Banking | [Volunteering](#)

APPENDIX: REFERENCE

“Zheyuan Hu, together with AI team researcher, proposed the ray-prediction algorithm. According to the test results, the ray intersection latency in reflection scenarios can be reduced by 33%, RTU energy consumption can be reduced by 15%, or RTU throughput can be improved by 20%. The results achieved are recognized by the hardware team. This algorithm will be the official delivery technology of the X project. They have demonstrated strong algorithmic capabilities and have shown typical examples of cross-team collaboration. Well done and congratulations!”

Source: [Research Center](#)

“This project is exceptional in scope, depth, and originality. It shows independent research capability, deep technical implementation, and significant scientific contribution. This work is well beyond the undergraduate standard, and is comparable to a strong MSc or even early-stage PhD project.”

Source: Dissertation supervisor report ([Chenliang Zhou](#))

“During our time working together, I found Peter to be a highly collaborative and supportive colleague who consistently demonstrated a willingness to share his knowledge and expertise with others. Peter’s ability to problem-solve complex C/C++ development issues was invaluable, and his commitment to learning and staying up-to-date with the latest advancements in his field is truly impressive. His passion for ray-tracing is contagious, and I have learned so much from his knowledge sharing.”

Source: [LinkedIn](#)