

Curriculum Vitae

PERSONAL DETAILS

Name: *Cao, Ge*

Nationality: *China*

Birthday: *01/07/1998*

EDUCATION

08/2023 - present

University of Illinois Urbana-Champaign, USA
PhD. Electrical and Computer Engineering
Advisor: Prof. Dr. Zhen Peng.
Research Interest: Wireless Communication, Computational Electromagnetics, Machine Learning.

09/2020 - 04/2023

ETH Zurich, Switzerland
MSc. Computational Science and Engineering
Advisor: Prof. Dr. Markus Gross.
Research Interest: Computer Graphics, Applied Mathematics.

09/2016 - 07/2020

University of Science and Technology of China (USTC), Hefei, China
BSc. Theoretical and applied Mechanics
BEng. Computer science and Technology (dual major)
Advisor: Prof. Dr. Fengchao Wang, Prof. Dr. Yun Xu
Research Interest: Computational Fluid Dynamics.

ACADEMIC EXPERIENCES

ACES 2025 best student paper (2nd place);
EuCAP 2025 best paper final list;
Excellence Fellowship from UIUC (2023-2024);
Hsue-Shen Tsien Talent Program in Mechanics (2016-2020 in USTC);

RESEARCH EXPERIENCES

2024/10 – present

Photon Splatting: Real-Time Neural Representation for Predicting 3D Indoor Radio Channels
Advisor: Prof. Dr. Zhen Peng.
Designed a novel neural surrogate inspired by photon mapping and Gaussian splatting, delivering accurate predictions of channel impulse responses (CIRs) with millisecond-level latency. The framework efficiently handles dynamic changes in antenna patterns and user mobility without retraining.

ECE,
UIUC

2023/09 – 2024/09

RayProNet: A Neural Point Field Framework for Radio Propagation Modeling
Advisor: Prof. Dr. Zhen Peng.
Developed a scalable neural framework for 3D radio propagation modeling that leverages point clouds and spherical harmonics to predict path loss maps in wireless environments. RayProNet integrates electromagnetic wave physics with neural representations, enabling rapid and accurate predictions adaptable to dynamic transmitter and receiver configurations.

ECE,
UIUC

2022/10 - 2023/02

Augmented BEM for Acoustic Transmission
Advisor: Prof. Dr. Ralf Hiptmair.
We investigated the spurious quasi-resonance problem, where, for certain

Applied Mathematics,
ETH Zurich

geometries, the norms of the inverses of the boundary integral operators grow dramatically as the wave number increases. Our research focused on both analytical and numerical aspects of this phenomenon.

2022/01 - 2022/07
Computer Science,
ETH Zurich

Differentiable Ferrofluid Simulations and Optimizations (Master Thesis)

Advisor: Prof. Dr. Markus Gross.

We proposed a differentiable grid-based ferrofluid approach to optimize the magnetic field for controlling ferrofluid with keyframes, enabling greater flexibility for artistic design purposes.

2020/01 - 2022/07
Modern Mechanics,
USTC

Molecular Dynamics Simulation of the Interaction Between Petroleum Component of Rock (Bachelor Thesis)

Advisor: Prof. Dr. Fengchao Wang.

Characterizing the surface morphology of rocks in crude oil environments using atomic force microscopy (AFM) is a critically important subject. We employed molecular dynamics to simulate, track and analyze this process.

PROFESSIONAL EXPERIENCE

2021/11 - 2023/05

Internship: Taichi Graphics (Now Meshy), Remote

I interned at Taichi Graphics as a Graphics Engineer, where I contributed to the development of Taitopia, their proprietary web renderer. My work involved implementing advanced computer graphics techniques into the product, including skeleton animation, texture systems, ray tracing, depth of field, and geometry systems, etc.

2020/07 - 2020/09

Internship: NetEase Games, Guangzhou, China

I was working as an intern on Game engine developing with Zen-group, NetEase Games. I was devoted on fundamental implementation of their self-developed Game Engine: Messiah.

SKILLS

Programming: C/C++, Python, R, CUDA;

Algorithms: Fluid Simulation (FVM, LBM, BEM, SPH), Computational Soft/Rigid Body (FEM, PD), Rendering (Real-time Rasterizer, Ray-Tracing & Photon Mapping), Machine Learning (Computer Graphics and 3D Vision), High Performance Computing.

RESEARCH INTERESTS

Computational Science, Machine Learning and Multi-Physics Simulation.

PUBLICATIONS

- [1] **Cao G**, Gradoni G, Peng Z. Photon Splatting: A Physics-Guided Neural Surrogate for Real-Time Wireless Channel Prediction[J]. arXiv preprint arXiv:2507.04595, 2025.
- [2] **Cao G**, Gradoni G, Peng Z. Photon Splatting: Real-Time Propagation and 4D Channel Modeling for Wireless Digital Twins[C]//2025 International Applied Computational Electromagnetics Society Symposium (ACES). IEEE, 2025: 1-2 (**2nd Best Student Paper**).
- [3] Qian P, **Cao G**, Muñoz M, et al. Scanning Electrochemical Microscopy for Kinetic Investigations in Viscous Deep Eutectic Solvents: Identifying Practical Approach Curves and Deviations from Electron Transfer Models[J]. Analytical Chemistry, 2025.
- [4] **Cao G**, Peng Z. RayProNet: A neural point field framework for radio propagation modeling in 3d environments[J]. IEEE Journal on Multiscale and Multiphysics Computational Techniques, 2024.
- [5] **G. Cao** and Z. Peng, "A Novel Neural Point Field Framework for End-to-End Wireless Channel Modeling," 2024 International Applied Computational Electromagnetics Society Symposium (ACES), Orlando, FL, USA, 2024, pp. 1-2.
- [6] **G. Cao** and Z. Peng, "A Scalable Multi-Physics Simulation of Dancing Ferrofluid," 2024 International Applied Computational Electromagnetics Society Symposium (ACES), Orlando, FL, USA, 2024, pp. 1-2.