

# YUANZHI ZHU

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Zurich, Switzerland



**RESEARCH INTERESTS:** Machine Learning, Computer Vision, Inverse Problems

## EDUCATION BACKGROUND

- 09/2016-06/2020 **Beihang University**
- Bachelor of Engineering in **Electrical Engineering**
  - GPA: 3.762/4.0 (90.73/100)
- 10/2019-04/2020 **Technical University of Munich**
- Exchange Program in **Electrical and Computer Engineering**
  - GPA: 4.0/4.0 (1.0/1.0)
- 10/2020-now **Swiss Federal Institute of Technology in Zurich**
- Master in **Electrical Engineering and Information Technology**
  - Signal processing and machine learning

## SKILLS & HIGHLIGHTS

- ★★★★★ **Python:** Excellent foundations with data structure and algorithms; rich experience with deep learning framework PyTorch and other modules
- ★★★★★ **MATLAB:** Data processing and visualization; signal processing and communication related tasks
- ★★★★★ **C/C++:** Setting up basic Heisenberg lattice point computing system and calculating excited state of energy
- ★★★★★ **Physics & Math:** Great intuition enabling faster and better understanding of new concepts

## PUBLICATION

- ◇ Yuanzhi Zhu, Kai Zhang, Jingyun Liang, Jiezhong Cao, Bihan Wen, Radu Timofte, Luc Van Gool. [Denoising Diffusion Models for Plug-and-Play Image Restoration](#), *CVPRW-NTIRE* (2023)
- ◇ Zixiang Zhao, Haowen Bai, Yuanzhi Zhu, Jianshe Zhang, Shuang Xu, Yulun Zhang, Kai Zhang, Deyu Meng, Radu Timofte, Luc Van Gool. [DDFM: Denoising Diffusion Model for Multi-Modality Image Fusion](#), *ICCV oral* (2023).
- ◇ Zhizhong Zhang\*, Yuanzhi Zhu\*, Yue Zhang, Weisheng Zhao, et al. [Skyrmion-based Ultra-low Power Electric-field-controlled Reconfigurable \(SUPER\) Logic Gate](#), *IEEE Electron Device Letters* (Published as cover in 2019) (\* These authors contributed equally to this work)
- ◇ Hayato Mizuno, Hironari Isshiki, Kouta Kondou, Yuanzhi Zhu, and Yoshichika Otani. [Influence of planar Hall effect on the output signal in a T-shaped spin conversion device](#), *Appl. Phys. Lett.* 119, 092401 (2021)

## RESEARCH EXPERIENCES

- 03/2023-09/2023 **Text-driven NeRF Editing with Diffusion Models**, Supervisor: Prof. Siyu Tang; Advisor: Dr. VLG, ETH Zurich Anpei Chen
- Investigated NeRF generation/editing framework that bypasses the need for extensive 3D data and instead utilizes 2D generative prior
  - Studied algorithms such as Score Distillation Sampling (SDS) and Variational Score Distillation (VSD) and proposed a better explanation of how they work
  - Apply several 2D editing approaches to NeRF editing
- 05/2022-02/2023 **Denoising Diffusion Models for Plug-and-Play Image Restoration**, Supervisor: Prof. Luc Van Gool; Advisor: Dr. Kai Zhang, Jingyun Liang, Jiezhong Cao CVL, ETH zurich
- Investigated general image restoration tasks with score-based diffusion models
  - Combined the diffusion sampling algorithm (e.g. DDIM) with Half-Quadratic Splitting (HQS) algorithm for conditional generation with less than 100 sampling steps
  - Image restoration with details for severely ill-posed image restoration tasks, including image inpainting, image deblurring and super resolution
- 10/2021-03/2022 **Using Affordances to Understand Fan-Idol Interaction on Social Media**, Supervisor: Disco, ETH zurich Prof. Roger Wattenhofer; Advisor: Dr. Ye Wang

- Collected data from the social medias using Python
- Pre-processed all the data collected and using several natural language models together with word embeddings for sentiment analysis of the posts from idols
- Designed an interview protocol and conducted interviews with fans of SNH48

07/2019-10/2019  
University of Tokyo

**Logic Device based on Inverse Spin Hall Effect (ISHE), Supervisor: Prof. Yoshichika Otani**

- Studied and used the spin transport property in different materials to get a clear Inverse Spin Hall Effect signal
- Built a model using OOMMF and GetDP to study the magnetization reversal and spin transport property of different material with complex structure
- Utilized the ISHE to propose logic device, performed current and harvested the logic output like 0 and 1 based on the magnetization direction of the ferromagnetic layer

08/2017-06/2019  
Beijing Advanced  
Innovation Center  
for Big Data and  
Brain Computing  
(BDBC)

**Skyrmion-based Ultra-low Power Electric-field-controlled Reconfigurable (SUPER) Logic Gate, Supervisor: Prof. Yue Zhang**

- Proposed a novel designed skyrmion-based logic gate for high-performance computing, and extended it for ultra-low power parallel computing and brain-like computing
- Introduced artificial fishtail-shaped hollows for implementing skyrmion divisions, and performed micro-magnetic simulations to validate the logic operations and divisions
- Enabled re-configurable logic operations including AND, OR, XOR, NOR, NAND to be implemented in single logic gate by leveraging Voltage-Controlled Magnetic Anisotropy (VCMA) effect

## SELECTED HONORS & AWARDS

02/2018	Meritorious Winner in The Mathematical Contest in Modeling
09/2017, 09/2018	Second Prize in China Undergraduate Mathematical Contest in Model (Twice)
09/2017	First Prize in Beijing Undergraduate Mathematics Competition (Ranked 87/1276, Beijing)
12/2017	First Prize in Beijing Undergraduate Physics Competition (Ranked 59/1023, Beijing)
03/2018	China Undergraduate Physics Tournament (CUPT) (Ranked 47/305)
11/2018, 11/2019	Academic Competition Scholarship, Beihang University (Twice)
11/2018, 11/2019	Academic Excellence Scholarship, Beihang University (Twice)
10/2017	First-Class Scholarship, Beihang University

## COMPETITIONS & COURSE PROJECTS

02/2018 Meritorious Winner	<b>2018 MCM Problem A: Multi-hop High Frequency (HF) Radio Propagation</b> <ul style="list-style-type: none"> <li>• Described the turbulent sea surface as combination of superimposed sine waves, considered shadow effect &amp; signals unable to be transmitted after reflection</li> <li>• Introduced Monte Carlo method (MCM) to eliminate the error caused by the diffraction, and constructed simulated annealing method to simulate the diffraction scene</li> <li>• Built modified Miller-Brown model to describe rough sea surface, identify how surface roughness factor varies along with changing HF's incident angle</li> </ul>
03/2018-05/2018 First Prize for Overall Performance (Ranked 6/150)	<b>3<sup>rd</sup> Beihang Undergraduate Physics Tournament</b> Project: Oiled Ring <ul style="list-style-type: none"> <li>• Conducted theoretical study on axial movement and experimented using a cardboard ring traveling on the oiled and rotating horizontal cylindrical shaft</li> <li>• Studied ring's movement when tilting, verified by numerical simulation in MATLAB</li> </ul> Project: Radiant Lantern <ul style="list-style-type: none"> <li>• Generated cross diffraction patterns through rectangular diffraction patterns, performed Fourier transform to obtain diffraction pattern of the mesh diffraction model</li> <li>• Simulated the diffraction pattern with MATLAB and conducted the experiment with a self-made diffraction grating</li> </ul>
09/2017 2nd Prize in China Undergraduate Mathematical Contest in Model	<b>2017 CUMCM Problem A: Calibration and Imaging of CT System Parameter</b> <ul style="list-style-type: none"> <li>• Solved parameters such as center of rotation through plane geometry &amp; function fitting</li> <li>• Established the contour reconstruction optimization model and reconstructed the scanned data according to Radon transform and the inverse Radon transform</li> <li>• Built a high-precision calibration model based on the level of goodness of fit</li> </ul>