

# Zhen HUANG

PHONE: (+86) 15779883778

EMAIL: [zhenhuang@zju.edu.cn](mailto:zhenhuang@zju.edu.cn)

WEBSITE: <https://zhenhuang.top>

## EDUCATION

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### Tsinghua University

PhD student, Biology track of CLS program, School of Life Science

Beijing, China

AUG. 2024 - PRESENT

### Zhejiang University

B.S. (GPA: 3.98/4.00, Rank: 1/44)

Hangzhou, China

SEP. 2020 - JUN. 2024

## RESEARCH INTEREST

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cryo-EM/ET methodology development, image/signal processing; *in situ* high-resolution structure analysis of membrane proteins; combination of various methods such as single particle analysis and cryo-ET to achieve high-resolution visualization of flexible regions, macromolecules, dynamic protein complexes, and even whole cell *in situ*; cellular-level molecular interaction landscape, molecular sociology.

## SELECTED PUBLICATIONS

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Liu X, Chang Y, Xu Q, Zhang W, **Huang Z**, Zhang L, Weng S, Leptihn S, Jiang Y, Yu Y, Hua X. 2023. Mutation in the two-component regulator BaeSR mediates cefiderocol resistance and enhances virulence in *Acinetobacter baumannii*. *mSystems* 8:e01291-22. doi:[10.1128/mSystems.01291-22](https://doi.org/10.1128/mSystems.01291-22)

## SELECTED EXPERIENCE

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### High-resolution Structure Analysis of Membrane Proteins *in situ* JUL. 2023 - OCT. 2023

Visiting Undergrad Research. *Advisor: Jack (Kai) Zhang* SCHOOL OF MEDICINE, YALE UNIVERSITY

- Motivation: the intense membrane signal in the native membrane environment severely interferes with alignment; reducing the dominance of membrane signals will aid in picking membrane particles and achieving high-resolution structures of membrane proteins *in situ*.
- Method: parallel programming with CUDA was utilized to analyze and simulate membrane signals through various image processing methods and analytical methods, and to remove the membrane signals from micrographs. *CryoSPARC* was used to determine high-resolution structures of membrane proteins.
- Results: developed a software *MemXTerminator* for removing the membrane signals; for membrane proteins that previously couldn't obtain initial models *de novo* due to the influence of membrane signals, accurate initial models could now be directly obtained, and finally the resolution improved significantly.

### Methodology Optimization for Membrane Protein Analysis in cryo-ET JUN. 2022 - JUN. 2023

Lab member. *Advisor: Yunjie Chang, Xing Zhang* SCHOOL OF MEDICINE, ZHEJIANG UNIVERSITY

- Motivation: in cryo-ET, accurately segmenting, modeling, and locating membranes enables us to determine the positions and orientations of membrane proteins, facilitating the picking of membrane proteins.
- Method: wrote Python and MATLAB programs, employing image processing methods such as skeletonization; various existing scripts and software, including *EMAN2*, *Relion*, *MemBrain*, *Isonet*, etc., were proficiently used.
- Results: developed two scripts: *imod2relion* and *tbl2star*; the *EMAN2* segmentation script was modified to reduce the training time of the CNN model by five times while enhancing accuracy; a reliable workflow for more accurate membrane segmentation and picking membrane proteins was developed.

### Brain Tumor Segmentation Based on U-net (Best CV project) JAN. 2023 - FEB. 2023

The leader of Group 2 in winter school. *Advisor: Chengliang Dai* IMPERIAL COLLEGE LONDON

- Method: Convolutional Neural Network, using data augmentation methods, improved loss function (adding MSE penalty term) and learning rate (using warm-up and cosine annealing scheme).
- Results: I did most of the code and gave the presentation. We developed the best-performing deep learning model in the brain tumour segmentation task by excellent teamwork, whose accuracy reached 93%.

### Purification and Application of Plant CUL1 Antibody OCT. 2021 - JUN. 2022

Group leader in the competition. *Advisor: Jie Dong* COLLEGE OF AGRI AND BIOTECH, ZJU

- Motivation: purify antibodies of CUL1 to study the difference in the proportion of activated CUL1.
- Method: prokaryotic expression and purification, SDS-PAGE, Western Blotting.
- Results: by exogenous expression of *CUL1* and purification of CUL1 using rabbit serum, polyclonal antibodies with higher specificity and potency were obtained. Preliminary applied research was conducted using these antibodies, focusing on the ratio of activated CUL1 under various stress conditions.

## COURSES

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- **Mathematics:** Calculus I/II, Probability Theory, Biostatistics and Experiment Design
- **Physics:** University Physics I/II, College Physics Experiment, Biophysics and instrumental analysis, Microscopy Technique and Ultramicroscopy
- **Chemistry:** General Chemistry, General Chemistry Experiment, Analytical Chemistry, General Chemistry Experiment, Organic Chemistry, Organic Chemistry Experiment, Biochemistry, Experiments of Biochemistry
- **Biology:** Structural Biology and modern Pharmaceutical Sciences, Molecular Biology and Experiments, Microbiology and Experiments, Cell Biology and Experiments, Immunology, College Biology, Experiment in College Biology, Botany and Experiments, Environmental Biology
- **Computer Science:** Fundamentals of Computer Science, Python Programming, Basics of Machine Learning and Data Analysis, Computer and Problem Solving, Biological Information and Data Management, Data Science Online Winter School(Imperial College London)

## HONOR AND AWARDS

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<b>Best Computer Vision Project</b>	JAN. 2023 - FEB. 2023
• <i>Imperial College London 2023 Data Science Online Winter School</i>	
<b>National Third Prize</b>	OCT. 2021 - JUN. 2022
• <i>The Chinese National College Students' Life Science Competition</i>	
<b>Top Ten Outstanding Club Presidents of Zhejiang University</b>	SEP. 2021 - JUL. 2022
<b>Zhejiang University Outstanding Student</b>	SEP. 2022 - JUL. 2023
<b>Zhejiang University Outstanding Student</b>	SEP. 2020 - JUL. 2021
<b>Zhejiang University Outstanding Senior</b>	APR. 2022
<b>Second Prize of the 2nd Astrophotography Competition</b>	AUG. 2022
• <i>Deep Space Category (Professional Equipment), hosted by Hangzhou Astronomical Alliance</i>	
<b>School Third Place Winner</b>	DEC. 2020
• <i>Zhejiang University Freshman Debate Competition</i>	

## SCHOLARSHIPS

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<b>China National Scholarship (Top 0.2% among all undergraduates)</b>	SEP. 2022 - JUL. 2023
<b>China National Scholarship (Top 0.2% among all undergraduates)</b>	SEP. 2020 - JUL. 2021
<b>Zhejiang Provincial Government Scholarship</b>	SEP. 2021 - JUL. 2022
<b>The First Prize Scholarship of Zhejiang University (Top 3%)</b>	SEP. 2022 - JUL. 2023
<b>The First Prize Scholarship of Zhejiang University (Top 3%)</b>	SEP. 2020 - JUL. 2021
<b>The Second Prize Scholarship of Zhejiang University (Top 8%)</b>	SEP. 2021 - JUL. 2022

## EXTRACURRICULAR ACTIVITIES

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<b>President of the Club</b>	SEP. 2021 - JUL. 2022
<i>Amateur Astronomer Association of Zhejiang University</i>	
• I led the members to work together as the head of the association, held various creative activities, and facilitated the science popularization of astronomy at the university.	
<b>Class President</b>	SEP. 2020 - PRESENT
<i>Horticulture Class 2002</i>	
• I organize class activities and assist the headmaster in implementing class affairs.	
<b>Member of Media Publicity Team</b>	SEP. 2020 - JUL. 2021
<i>Student Union of Zhejiang University</i>	
• I worked as a photographer for major events and was responsible for media publicity.	

## PERSONAL SKILLS AND HOBBIES

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**English:** Fluent. CET-4: 620, CET-6: 586, TOEFL: 103.

**Programming:** Proficient in Python, MATLAB, Linux, CUDA, R, and Deep Learning.

**Astrophotography:** Skilled in deep sky observation and advanced image processing with *Pixinsight*.

**Sports:** Daily fitness enthusiast with a focus on weight training. Active in badminton, swimming, and running.

**Travelling:** Keen on exploring new places, with a passion for photography and social outings.

**Others:** Enjoy cooking, pop music, anime, and karaoke; love reading, especially science fiction.