

# LIU YUHUI

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## EDUCATION

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### The University of Hong Kong

PhD in Electrical and Electronic Engineering

*Dec. 2023 - Present*

### The University of Hong Kong

MSc in Electrical and Electronic Engineering

GPA 4.03/4.30 (top 2%)

Graduate with Distinction

*Sep. 2022 - Nov. 2023*

### Nankai University, China

BA in Opto-electronic information engineering in college of Physics

GPA 3.6/4.0 (top 20%)

*Sep. 2018 - Jun. 2022*

## PROFESSIONAL SKILLS

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### Languages

Python (PyTorch, Keras), MATLAB, C++, R, LaTeX, Markdown

### Software & Tools

AutoCAD, Solidworks, COMSOL, Typora, Mathematica, Microsoft Office

### Personal strengths

Solid foundation of physics and optics, enough knowledge of mathematics

Good command of Python, MATLAB and deep-learning frameworks

## RESEARCH EXPERIENCE

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### Depth Estimation with Learned Optics

November 2022 - Present

*Team leader*

- Developed an innovative hybrid model for high-fidelity 3D imaging, combining the coded PSF engineering and advanced attention concatenation volume method for stereo matching.
- Processed and augmented mixed datasets for training: FlyingThings3D and DrivingStereo.
- Jointly optimized the optical system, image sensing system and stereo matching algorithm in an end-to-end manner with a learnable coded diffractive optical element, which is lightweight and low cost. Built the image recovery deep network using Pytorch-lightning framework
- Recovered the defocused image into all-in-focus and estimated the depth information in high accuracy.
- Achieved higher accuracy and higher resolution with lower computation compared with pure-algorithm methods in simulation.

### Grafted Optical Vortex with Controllable OAM Distribution

November 2021 - June 2022

*Graduate Reseach*

- Designed and created various spatial intensity profiles of a grafted optical vortex(GOV), based on the technique of computer generated holography
- Generated by the corresponding phase map by “cake-cutting and assembly” of two or more optical vortex with different topological charges and a synthetic phase
- Used a Dirac function to restrict the intensity of the vortex beam to a single ring.
- GOV can be used in the controllable distribution of orbital angular momentum, which has a wide range of applications in the field of particle manipulation.

## New-Pattern Optical Trapping under the Longitudinal Field

April 2020 - May 2021

*Team leader*

- Analyzed the capture characteristics of double-layer spheres by Gaussian beam under geometric model
- Designed a new manipulation pattern using the chromatic aberration with different ratio of different lasers (650nm and 405nm).
- Manipulated on axial trap position continuously using designed double-wavelength Gaussian beam on micro target. Position of this compound optical trap will shift when changing the ratio of beam.

## PROFESSIONAL COURSES

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<b>Optics &amp; Engineering</b>	Optics (3.7/4), Optoelectronic Imaging Technology (4/4), Mechanical Drawing (4/4), Modern Application Optics(4/4), Principle of Laser (3.7/4), <i>Energy Saving Lighting</i> (4/4.3 <b>in HKU</b> ) <i>Digital Signal Processing</i> (4.3/4.3, <b>in HKU</b> )
<b>Physics &amp; Maths</b>	Mechanics(99/100), Multivariable Calculus(95/100), Method of Mathematical Physics (98/100), Quantum Mechanics (90/100)
<b>Algorithm &amp; Software</b>	Fundamentals of Computer for Science and Engineering (4/4) Statistical Learning and Data Mining (3.7/4) Fundamental of Software Science and Computational Physics (4/4) <i>Neural Networks, Fuzzy Systems</i> (4.3/4.3, <b>in HKU</b> )

## ACHIEVEMENTS

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Graduation Academic Scholarship in HKU (Top 3 in 180)	<i>Nov 2023</i>
Distinguished Dissertation Scholarship in HKU (Top 10%)	<i>Nov 2023</i>
Winner of “Pitching your innovative ideas 2023” by Innovation Wing in HKU (3 in 20; Achieved 75k HKD innovation funding support)	<i>Apr 2023</i>
Academic Scholarship in HKU (Top 10%)	<i>Mar 2023</i>
Academic Excellence Scholarship in Nankai University (2.5%)	<i>Nov 2020</i>
Outstanding Student in the college of Physics, Nankai University	<i>Nov 2019</i>
Third Prize of Physics Academic Competition in Nankai University	<i>May 2019</i>
Centennial Anniversary Volunteer Special Contribution Award in Nankai University	<i>Oct 2019</i>
First Prize of Theory Star Speech Contest in the college of Physics, Nankai University	<i>Sep 2018</i>