# Hung-Hsiang (Eric) Chiu

eric.chiu.work.study@gmail.com | (+886)-988077954 | hhchiu.github.io

## Education

### National Taiwan University (NTU) — Taipei, Taiwan

B.S. in Electrical Engineering (EE) — 09/2019-06/2023

- Overall GPA: **4.23/4.30**, Rank: **8/189 (4%)**, Scholarship: Fu Bell Scholarship (USD 3,300) x 7
- Research Interests: **Optics, Photonics, Computational Displays, Metasurfaces, nanoLEDs, microLEDs**

## Publications

[1] K.-H. Chang, J.-H. Lai, M.-S. Tsai, **Hung-Hsiang Chiu** et al., "In-situ study of multi-wavelength NIR OPOs and yellow-orange lasers from monolithic nonlinear photonic crystal," *Optics & Photonics Taiwan International Conference*, 2023.

[2] **Hung-Hsiang Chiu***, Yu Fu*, Homer H. Chen, "A space-variant lighting representation for photorealistic rendering of augmented content," *IEEE Transactions on Visualization and Computer Graphics*. **(Under Review) (* indicates equal contribution)**

## Research Experience

### Ferroelectric Photonics and Electronics Device (FePED) Lab, NTU — Taipei, Taiwan

Undergraduate Researcher, supervised by Prof. Lung-Han Peng — 09/2022-Present

- Multi-wavelength Yellow-orange Laser Generation by Dual Optical Parametric Oscillations (OPOs) [1]
  - Proposed a **dual-OPO design** followed by serial upconversions that generate yellow-orange lasers, achieving **33% and 25% slope efficiencies** for signals and idlers, respectively
  - Explained the change in cavity mode due to different pump beam intensity profiles on dual-OPO gain structures
  - Performed MATLAB simulations of the slope efficiencies and optical field by Fourier and nonlinear optics methods
- LED Epitaxial Wafer Thickness Measurement by Conoscopy
  - Established and experimentally verified correspondence between thickness and conoscopic interference patterns
  - Designed and set up low-cost conoscopes to measure LED wafer thickness
- A Red Laser Implementation
  - Sputtered ZnO to create a planar waveguide, polished glass, and designed a cavity structure

### Multimedia Processing and Communications (MPAC) Lab, NTU — Taipei, Taiwan

Undergraduate Researcher, supervised by Prof. Homer H. Chen — 03/2022-Present

- Photorealistic Rendering for Augmented Reality [2]
  - Proposed a novel lighting representation for photorealistic AR rendering by parametrizing light sources with Bézier curves, outperforming a common representation qualitatively and quantitatively **(44% perceptual loss drop)**
  - Designed **transformer-based DL models** to predict lighting given by our representation from a single RGB image

## Selected Projects

### A Spectrometer for Optical Coherence Tomography (OCT) with a Diffraction Grating

- Derived the dispersion formula for a diffraction grating and implemented an OCT spectrometer with Zemax, achieving no vignetting, low aberrations, and diffraction-limit-approaching spot radii

### Acceleration Algorithms for Synthesizing Binary Computer-Generated Holograms (CGH)

- Proposed three acceleration strategies for Direct Binary Search, a binary CGH synthesis method, achieving **6.5x speed-up** without a magnitude RMSE increase

## Honors and Awards

**3rd Place**, NTUEE Undergraduate Innovation Award (A competition between NTUEE research projects) — 07/2022

**Dean's List Award** (Given to the top 5% of students), Dept. of EE at NTU — 11/2021

**Best Solver Award**, MakeNTU (the largest nationwide student hardware hackathon in Taiwan) — 10/2020

## Teaching and Work Experience

### Department of Electrical Engineering, NTU
Taipei, Taiwan

TA for *Electrical Engineering Lab (photonics)*, lectured by Prof. Lung-Han Peng et al. 02/2023-06/2023

- Designed a new experiment on light intensity measurement under different voltages applied to liquid crystals
- Wrote course materials and delivered lectures about the experiment's principles and workflow

### Department of Electrical Engineering, NTU
Taipei, Taiwan

Programming Tutor 02/2021-06/2021

- Held weekly seminars to assist NTU students having trouble with programming and algorithms

### VIA Technologies
New Taipei City, Taiwan

Software Engineer - Deep Learning / Computer Vision 07/2020-08/2020

- Proposed and implemented an anchor-free object detection method using generative adversarial networks

## Leadership Experience

### Table Tennis Team, Dept. of EE at NTU
Taipei, Taiwan

Captain 09/2021-06/2022

- Led a team of 30+ members and won 1st and 3rd place in the NTU Cup and the National EE Cup, respectively
- Held interdepartmental tournaments, organized weekly practice, and gave personalized instructions
- Maintained a venue booking system that automated and accelerated the workflow of renting table tennis courts online

## Skills

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|---|---|
| **Programming** | C++, Python, MATLAB, JavaScript, Verilog |
| **Optical System Design Tools** | Zemax |
| **Toolbox / Libraries** | PyTorch, NumPy, scikit-learn, React, LaTeX |
| **Languages** | Chinese (Native), English (TOEFL: 111/120), French (Basic), Russian (Basic) |