CURRICULUM VITAE

Hengyu Lian | lianhy0@cs.unc.edu | https://lianhy000.github.io | 201 S Columbia St, Chapel Hill, NC 27599

ACADEMIC EDUCATION

08/2024-Present **University of North Carolina at Chapel Hill** *Chapel Hill, NC*
Advisor: Prof. Praneeth Chakravarthula
Major: Computer Science
Doctor of Computer Science expected in May 2029

09/2021-06/2024 **Shanghai Jiao Tong University** *Shanghai, China*
Advisors: Prof. Yuan Qu and Prof. Jiamiao Yang
Major: Electronic and Information Engineering
Master of Science in Engineering acquired in June 2024

09/2017-07/2021 **Tianjin University** *Tianjin, China*
Advisors: Prof. Min Lai
Major: Electrical Engineering
Bachelor of Engineering acquired in July 2021

CORE COURSEWORK:

- Matrix Theory, Advanced Mathematics, Probability Theory and Mathematic Statistics, College Physics, Engineering Optics (Geometrical Optics & Wave Optics), Vision Measurement (Deep Learning), Computer Vision, Digital Signal Processing, Modern Intelligent Optical Instrument and Design.

SKILLS:

- Python, MATLAB, PyTorch, SolidWorks, Toefl (best score: 103), Optical Experimental Skills

HONORS & AWARDS:

- Guo Xie Birong Scholarship rewarded by Shanghai Jiao Tong University, 10/2023 (Rank: 1/62)
- The 1st Scholarship rewarded by Shanghai Jiao Tong University, 11/2023 (top30%)
- The 1st Scholarship rewarded by Shanghai Jiao Tong University, 11/2022 (top30%)

PUBLICATION

- Yuan Qu*, **Hengyu Lian***, Chunxu Ding, et al., “High frame-rate reconfigurable diffractive neural network based on superpixels”, *Optics Letters,* 2023, 48(19):5025-5028.
- Yuan Qu*, **Hengyu Lian***, Rongjun Shao, et al., “Time series analysis for financial indices using optical reservoir computing”, *Optical Engineering,* 2024, 63(5): 054108-054108.

ACADEMIC RESEARCH

10/2022-06/2024 ***Research on Optical Encryption System based on Diffractive Neural Network***
Supervisor: Prof. Yuan Qu

- Learned about the progress of optical encryption system and the theory of traditional AES encryption method
- Leveraged **PyTorch** framework to simulate optical encryption system on the basis of diffractive neural network

- Verified the feasibilities of the system's different aspects through simulation models, and calculated ideal phase patterns of the diffractive neural network
- Constructed an optical experimental system with **Digital Micro-Mirror Devices (DMD)** and **Spatial Light Modulators (SLM)**
- Carried out **precise pixel matching** between DMD and SLM
- Anticipate to achieve each function of classic AES electrical encryption algorithm by optical means, which exploits the parallelism of spatial light to realize a faster and more secure encryption method

6/2023-01/2024 ***Time Series Analysis for Financial Indices using Optical Reservoir Computing***
Supervisor: Prof. Yuan Qu

- Simulated the Optical Reservoir process to analyze the time series using **Python**
- Constructed the optical experimental system with **scatter medium**
- Used the system to predict the future data with financial indices and finished the experiments with different reservoir states & step size
- Related work is accepted by *Optical Engineering*

10/2022-5/2023 ***High Frame-Rate Reconfigurable Diffractive Neural Network based on Superpixels,*** Supervisor: Prof. Yuan Qu and Prof. Jiamiao Yang

- Had a literature review to understand the current progress of diffractive neural network, and concluded its strengths and weakness
- Learned about the basic knowledge about the **Fourier Optics**
- Constructed a diffractive neural network model with **PyTorch** based on the **angular spectrum method** and optimized the model to acquire the optical field expected
- Designed and constructed the experimental optical path, and compensated the curvature caused by Digital Micro-Mirror Devices (DMD) with the **phase-shifting interference method**
- Modulated the light field with DMD and applied adaptational methods to correct the error between the experiment and simulation
- Classified the image datasets (MNIST) and video datasets (Weizmann) with various structures of the diffractive neural network, verified the experimental results and launched data analysis
- Accepted and posted in *Optics Letters* on August 29, 2023

9/2021-9/2022 ***Scanning System based on Super Pixel Encoding Wavefront Engineering***
Supervisor: Prof. Jiamiao Yang

- Had a initial understanding of the optical field
- Learned about the theory and details of the superpixel encoding method and debugged the corresponding code implemented by **Python**
- Constructed the whole scanning system and verified the scanning experiment

WORK EXPERIENCE

08/2024-12/2024 **University of North Carolina at Chapel Hill** *Chapel Hill, NC*
Teaching Assistant
Course: COMP 590-059 Programming Methods, Models, Languages and Analysis
Advisors: Prof. Paul Stotts