YINGJIE LI

https://lyj1201.github.io/yingjieli/

(435) 695-3478 ⋄ yingjie.li@utah.edu

EDUCATION & EMPLOYMENT

University of Utah *2020-present*
Doctor of Philosophy, Computer Engineering
Advisor: Cunxi Yu

DELL EMC, Shanghai, China *2019-2020*
Hardware Engineer

Cornell University *2018-2019*
M.Eng, Electrical and Computer Engineering

Huazhong University of Science and Technology *2014-2018*
B.S., Electrical and Computer Engineering (Honor)

AWARDS

DAC Young Student Fellow, 2020 (**winning post presentation**), 2021, 2022

Outstanding Graduates, Huazhong University of Science and Technology, 2018

TEACHING EXPERIENCE

ECE/CS 3700 – Digital System Design, Teaching Assistant, Fall 2020, Fall 2021, Fall 2022.

PROJECTS

- **LightRidge: End-to-end photonic compiler framework for optical neural networks**
  This work is the first effort in building modern Physics Compiler, specifically, a *photonic compiler* framework to deal with fundamental optical physics and emerging optical computing system emulations(`https://ycunxi.github.io/lightbridge/index.html`). **It features with a) heterogeneous HPC accelerated physics engines, b) highly versatile and flexible optical physics modelling, c) user-friendly front-end APIs, d) and backend hardware deployment supports.** This enables a complete full-stack design and exploration from ML algorithms, to hardware-software codesign, finally to the hardware and device level.
  Publications: *ROAD4DNN@DAC21*

- **Discrete and Differentiable Device-to-System Co-Optimization using Gumbel-Softmax**
  This work realizes quantization with arbitrary digits in Hardware-Software Codesign in Optical Neural Networks. Exploring the best algorithm for Gumbel-Softmax with LightRidge, we can train the model with quantization for the hardware to close the gap between simulation and experiments.
  Publications: ICCAD'22

- **Real-world All-optical Multi-task Learning with Physics-aware training** We explore two research directions in realizing cost-efficient multi-task learning (MTL) problems using D2NNs – **1)** the first one focuses on real-time MTL with single optical detectors and **2)** the second one introduces a first-of-its-kind *physical rotation aware* training to enable weights sharing in post-fabrication system, all performed with our LightRidge compiler.
  Publications: *Springer Nature Scientific Report* 2021.

- **Physical Adversarial Attacks of Diffractive Deep Neural Networks** To study vulnerability and robustness of optical neural networks, we develop the first adversarial attack formulations over optical physical meanings, and provide a comprehensive analysis of adversarial robustness of D2NNs under practical adversarial threats over optical domains. This is also the first work on analyzing adversarial

robustness of complex-valued neural networks.
Publications: *DAC'21, ROAD4NN@DAC'22, LPR'July 2022.*

PUBLICATIONS

Pre-print

- **Yingjie Li**, Weilu Gao, Cunxi Yu. *Rubik's Optical Neural Networks: Multi-task Learning with Physics-aware Training.* Design, Automation and Test in Europe Conference (DATE 2023). (submitted)

- Jiaqi Yin, **Yingjie Li**, Daniel Robinson, Cunxi Yu. *RESPECT: Reinforcement Learning based Edge Scheduling on Pipelined Coral Edge TPUs.* Design, Automation and Test in Europe Conference (DATE 2023). (submitted)

2022

- Walter Lau Neto, **Yingjie Li**, Pierre-Emmanuel Gaillardon, Cunxi Yu. *FlowTune: End-to-end Automatic Logic Optimization Exploration via Domain-specific Multi-armed Bandit. IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD).*

- Ruiyang Chen (co-first), **Yingjie Li (co-first)**, Minhan Lou, Jichao Fan, Yingheng Tang, Berardi Sensale-Rodriguez, Cunxi Yu, Weilu Gao. *Physics-aware Complex-valued Adversarial Machine Learning in Reconfigurable Diffractive All-optical Neural Network.* Laser & Photonics Reviews. Vol 16, July 2022.

- **Yingjie Li**, Ruiyang Chen, Weilu Gao, and Cunxi Yu. *Physics-aware Differentiable Discrete Codesign for Diffractive Optical Neural Networks.* The International Conference on Computer-Aided Design (ICCAD'22).

- **Yingjie Li**, Ruiyang Chen, Minhan Lou, Jichao Fan, Yingheng Tang, Berardi Sensale-Rodriguez, Cunxi Yu, Weilu Gao. **Invited:** *Physics-aware Adversarial Machine Learning: An Experimental Study in Diffractive Optical Neural Networks.* 3rd ROAD4NN Workshop @ Design Automation Conference *(DAC'22 ROAD4NN)*. San Francisco, July 2022.

- **Yingjie Li**, Ruiyang Chen, Minhan Lou, Berardi Sensale-Rodriguez, Weilu Gao and Cunxi Yu. *An Open-source Compiler Framework for Diffractive Optical ML Architectures.* Invited poster at 1st OSCAR 2022 @ International Symposium on Computer Architecture (ISCA'22). New York City, June 2022.

- Jiaqi Yin, **Yingjie Li**, Cunxi Yu. *Combinatorial RL-based Scheduling for Pipelined Edge TPUs.* TinyML Research Symposium 2022 (TinyML'22). San Francisco, March 2022.

2021

- **Yingjie Li**, Minhan Lou, Ruiyang Chen, Jichao Fan, Berardi Sensale Rodriguez, Weilu Gao and Cunxi Yu. *LightRidge: End-to-end Photonic Compiler Framework for Diffractive Optical Neural Networks.* 2nd ROAD4NN Workshop @ Design Automation Conference *(DAC'21 ROAD4NN)*. San Francisco, December 2021.

- **Yingjie Li**, Cunxi Yu. *Late Breaking Results: Physical Adversarial Attacks of Diffractive Deep Neural Networks.* IEEE/ACM 58th Design Automation Conference (DAC'21).

- **Yingjie Li**, Ruiyang Chen, Berardi Sensale Rodriguez, Weilu Gao, and Cunxi Yu. *Multi-task Learning in Diffractive Deep Neural Networks via Hardware-software Co-design.* Spinger Nature *Scientific Reports*, 11, 11013 (2021).

- Walter Lau Neto, Matheus Trevisan Moreira, **Yingjie Li**, Luca Amaru, Cunxi Yu, and Pierre-Emmanuel Gaillardon. *SLAP: A Supervised Learning Approach for Priority Cuts Technology Mapping.* IEEE/ACM 58th Design Automation Conference (DAC'21).

SERVICES

Reviewers: DAC 2021, ICCAD 2022, MLCAD 2022