YINGJIE LI

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EDUCATION & EMPLOYMENT

University of Utah *2020-present*
Doctor of Philosophy, Computer Engineering
Advisor: Cunxi Yu
Selected courses: Adv Digital VLSI, Deep Learning Systems, Graduate Algorithms, CAD of Digital Circuits, Computer Architecture

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 presentation**) and 2021

Outstanding Graduates, Huazhong University of Science and Technology, 2018

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, ISCA22* (to be submitted)

- **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: ICLR'22 (under review)

- **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: *AAAI'22 (under review), 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.*

PUBLICATIONS

- **Yingjie Li**, Ruiyang Chen, Weilu Gao, and Cunxi Yu. *Differentiable Discrete Device-to-System Codesign for Optical Neural Networks via Gumble-Softmax.* The International Conference on Learning Representations (ICLR'22) (under review)
- **Yingjie Li**, Weilu Gao, and Cunxi Yu. *Rubik's Optical Neural Networks: Multi-task Learning with Physics-aware Training.* Thirty-Sixth AAAI Conference on Artificial Intelligence (*AAAI'22*). (under review)
- **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.* Design Automation Conference *(DAC'21)* ROAD4NN Workshop. 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).

SKILLS

Programming skills: Python, BASH, LaTeX

Platforms: Linux (RHEL, Ubuntu)