Yubo Luo

Homepage
Google Scholar

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Github

Education

Aug 2017 - May 2023 (expected) **University of North Carolina**, Chapel Hill, NC
- Ph.D. in Computer Science
- Advisor: Shahriar Nirjon
- Research Area: **On-device ML, Edge Computing, Embedded Systems, IoT**

Sept 2014 - July 2017 **Tsinghua University**, Beijing, China
- M.S in Electronic and Communications Engineering
- Advisor: Yongfeng Huang

Sept 2010 - July 2014 **Central South University**, Changsha, China
- B.S in Communications Engineering
- **Course Ranking 1st/151**

Research Experience

Jan 2021 - present **Efficient Multi-task Learning on Resource-constrained Systems**
- Exploited task affinity to build a compact execution graph for vision and audio based tasks
- Leveraged task dependencies to decrease model context switching and inference overhead
- Built dedicated hardware systems to facilitate multi-task context switch

Dec 2018 - Dec 2020 **Use Reinforcement Learning to Improve Energy Efficiency**
- Leveraged reinforcement learning to optimize energy consumption on batteryless systems
- Built an energy harvesting system to do on-device learning and online adaptation

Dec 2018 - Dec 2020 **Enable Machine Learning on Intermittent Systems**
- Implemented on-device training of ML algorithms on intermittent systems
- Leveraged early termination of DNNs to schedule time-sensitive tasks on intermittent systems

May 2018 - present **Hardware/Software Co-design and On-device ML**
- Six years of hands-on experience with HW/SW co-design on embedded sensor systems
- Developed a automated Python-to-C tool for fast ML models deployment on 16-bit MCU
- Built customized hardware to tackle various system constraints, e.g, energy or memory

Professional Experience

May 2022 - Aug 2022 **Meta**, Marketplace, Machine Learning Engineer Intern
- Leveraged data downsampling strategies to decrease necessary training data by 20%
- Leveraged Scaling User Models to improve model evaluation metrics by 1% - 2%
- Implemented multiple data ingestion pipelines to automate data extraction and delivery

May 2020 - Aug 2020 **Amazon**, Alexa, Applied Scientist Intern
- Studied active learning approaches for acoustic event classification
- Proposed and implemented reinforcement learning based active learning approaches
- Re-implemented and compared with a state-of-the-art clustering based active learning approach

June 2019 - Aug 2019 **Nokia Bell Labs**, Research Intern
- Conducted control analysis of virtual network functions

Selected Publication

Conference and Journal

SenSys 2023 (in submission)
Exploiting Task Affinity for Efficient Multitask Learning on Low-Resource Systems
Yubo Luo, Le Zhang, Zhenyu Wang, and Shahriar Nirjon
Proceedings of the 21th Conference on Embedded Networked Sensor Systems

MobiSys 2023 (under review)
Seconds-Long Audio Event Recognition on Intermittently-Powered Systems
Mahathir Monjur, **Yubo Luo**, Zhenyu Wang, and Shahriar Nirjon
The 21st ACM International Conference on Mobile Systems, Applications, and Services

IoTDI 2023
Amalgamated Intermittent Computing Systems
Bashima Islam, **Yubo Luo**, and Shahriar Nirjon [paper]
The 8th ACM/IEEE Conference on Internet of Things Design and Implementation

DCOSS 2021
SmartON: Just-in-Time Active Event Detection on Energy Harvesting Systems
Yubo Luo, and Shahriar Nirjon [paper][code][slide]
The 17th Annual International Conference on Distributed Computing in Sensor Systems

Ubicomp 2020
Intermittent Learning: Machine Learning on Intermittent System
Seulki Lee, Bashima Islam, **Yubo Luo**, and Shahriar Nirjon [paper][code][slides][talk]
Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies

RTAS 2019 (WIP)
Just-in-Time Active Event Detection on Energy Autonomous Sensing Systems
Yubo Luo, and Shahriar Nirjon [paper][code]
25th IEEE Real-time and Embedded Technology and Applications Symposium

IHMMSEC 2017
Text Steganography with High Embedding Rate: Using Neural Networks to Generate Chinese Classic Poetry
Yubo Luo, and Yongfeng Huang [paper]
The 5th ACM Workshop on Information Hiding and Multimedia Security

2016
Text Steganography Based on Ci-poetry Generation Using Markov Chain Model
Yubo Luo, Yongfeng Huang, Fufang Li, and Chinchen Chang [paper]
KSII Transactions on Internet and Information Systems

Demo and Poster

IPSN 2022
(Demo) Capuchin: A Neural Network Model Generator for 16-bit Microcontrollers
Le Zhang, **Yubo Luo**, and Shahriar Nirjon [paper][code][slides][talk]
The 21th ACM/IEEE International Conference on Information Processing in Sensor Networks

IPSN 2019
(Poster) On-Device Training from Sensor Data on Batteryless Platforms
Bashima Islam, **Yubo Luo**, Seulki Lee, and Shahriar Nirjon [paper]
The 18th ACM/IEEE International Conference on Information Processing in Sensor Networks

Awards

Ubicomp 2020 Best Presentation, Judge's Award
2016 The Huawei Scholarship (**top 5%**)
2014 The Honor of Excellent Graduate in Hunan Province (**top 2%**)
2014 Central South University Outstanding Award (**top 1%**)
2013 **1st** Prize in American International Mathematical Contest in Modeling
2012 **2st** Prize in China Undergraduate Mathematical Contest in Modeling
2012 The National Scholarship (**top 1%**)

Professional Services

Journal Review	IOTJ: IEEE Internet of Things Journal CSSE: Computer Systems Science and Engineering IASC: Intelligent Automation & Soft Computing CMC: Computers, Materials & Continua

Teaching Assistantship

Spring 2023	COMP380: Introduction to Digital Culture
Spring 2018	COMP455: Models of Languages and Computation
Fall 2017	COMP411: Computer Organization

Skills

Programming	Python, C/C++, Matlab, SQL
ML Framework	TensorFlow