

XIANZHONG DING

Ph.D. Candidate
xding5@ucmerced.edu

EDUCATION

University of California, Merced Ph.D. Candidate in Electrical Engineering and Computer Science	<i>August 2018 - present</i>
Shandong University, China M.S. student in Computer Science and Technology	<i>August 2015 - June 2018</i>
Taishan University, China B.S. student in Computer Science and Technology	<i>August 2010 - June 2014</i>

RESEARCH INTERESTS

Internet of Things, Edge Computing, Wireless Networking, Machine Learning/Deep Learning and Deep Reinforcement Learning (DRL).

SKILLS

Programming languages: Python, C/C++, Java, Matlab
Deep learning framework: Tensorflow, Pytorch
Tools and Libraries: Keras, Scikit-learn, OpenAI gym, Pandas, Jupyter, OpenCV

WORKING EXPERIENCE

Research Intern, ByteDance Infrastructure System Lab, Mountain View, United States
May - Nov 2022

- Deep Reinforcement Learning for Virtual Machine (VM) Scheduling in Cloud Datacenter:*
 - Propose a DRL-based method to optimally place incoming VM requests.
 - Design action as candidate pool of heuristic methods to solve high dimensional action space.
 - Compared with state of the art, reducing fragment rate by 58.9%.
- Deep Reinforcement Learning for Virtual Machine Rescheduling (VMR) in Cloud Datacenter [1]:*
 - Propose a DRL-based VMR framework towards a better trade-off between solution quality and speed.
 - Design an attention-based agent architecture for sequential decisions on the migrated VM and PM.
 - Incorporate imitation learning of the heuristic methods as a warm start to accelerate training.
 - Achieve solution quality close to MIP method and computation speed close to heuristic methods.
- ByteLife: Machine Learning algorithms for Ventricular fibrillation (VF) on Edge Device:*
 - Design different machine learning techniques including ensemble learning and hyper-parameter tuning to balance the detection accuracy, inference latency and memory occupation on edge device-NUCLEO.
 - Achieve 32th over 150 teams on the 1st ICCAD TinyML Contest with 83% accuracy, 55.71ms latency and 68.92 KiB memory.

RESEARCH EXPERIENCE

Research Assistant, EECS, UC Merced <i>1. Deep Reinforcement Learning for Water Resource Optimization [3]:</i> <ul style="list-style-type: none">Propose a DRL-based irrigation framework for agricultural water usage saving.Design a safety irrigation module to evaluate whether the RL algorithm outputs a safe action.Build an irrigation testbed with customized sensing and actuation nodes, and irrigation system.	<i>August 2018 - present</i>
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2. *Model-Based Deep Reinforcement Learning for Multi-zone Building Control* [5]:

- Propose an efficient model-based DRL building control system.
- Develop a weighted ensemble learning to solve building neural network model uncertainty.
- Adopt a model predictive path integral control method to perform building control.

3. *Real-Time Object Detection on Mobile Devices* [6]:

- Build a deep neural network-based object detection method on mobile devices without offloading.
- Propose a parallel detection and tracking pipeline to fully utilize the computation resource on current mobile devices for high detection accuracy.
- Design an algorithm to adapt the DNN models according to the change rate of video content.

4. *DRL for Holistic Smart Building Control* [7]:

- Leverage DRL to balance the trade-off between energy use and human comfort for smart buildings.
- Adopt a special reward function and a novel neural network architecture to tackle the challenges imposed by the combined joint control of four subsystems with a very large action space.
- Tackle data training requirements by adopting a simulation strategy for data generation, and spending effort in calibrating the simulations to make them as close as possible to the target building.

Research Assistant, EECS, Shandong University

August 2016 - May 2017

5. *Improve Packet Matching Performance for Software-Defined Networking Switch* [8, 9]:

- Propose a hybrid TCAM Storage architecture to make full use of high density of nvTCAM and efficient access of sTCAM.
- Design a novel rule migration strategy to improve the rule update performance.
- Contribute a replacement value algorithm to choose the best rules to be evicted in both nvTCAM and sTCAM Storage to further improve packet matching performance.

PUBLICATIONS

1. [Under Submission] **Xianzhong Ding** and Wan Du, “Reinforcement Learning for Virtual Machines Rescheduling in Cloud Data Centers”, 2022.
2. [E-Energy’22] Hamid Rajabi, Zhizhang Hu, **Xianzhong Ding**, Shijia Pan, Wan Du, Alberto Cerpa, “MODES: Multi-sensor Occupancy Data-driven Estimation System for Smart Buildings”, ACM International Conference on Future Energy Systems, 2022.
3. [IPSN’22] **Xianzhong Ding** and Wan Du, “DRLIC : Deep Reinforcement Learning for Irrigation Control. The International Conference on Information Processing in Sensor Networks, 2022.
4. [BuildSys’21] Devanshu Kumar, **Xianzhong Ding**, Wan Du and Alberto Cerpa, “Building Sensor Fault Detection and Diagnostic System, ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation, Coimbra, Portugal, 2021.
5. [BuildSys’20] **Xianzhong Ding**, Wan Du, and Alberto Cerpa, “MB²C : Model-Based deep reinforcement learning for Multi-zone Building Control”, ACM BuildSys, 2020.
Best Paper Runner-Up Award, Best Presentation Award
6. [ICDCS’20] Miaomiao Liu, **Xianzhong Ding**, Wan Du, “Continuous, Real-Time Object Detection on Mobile Devices without Offloading”, IEEE International Conference on Distributed Computing Systems, 2020.
7. [BuildSys’19] **Xianzhong Ding**, Wan Du, and Alberto Cerpa, “OCTOPUS: Deep Reinforcement Learning for Holistic Smart Building Control”, ACM BuildSys, 2019.
8. [LCTES’17] **Xianzhong Ding**, Zhiyong Zhang, Zhiping Jia and others, “Unified nvTCAM and sTCAM Architecture for Improving Packet Matching Performance”, ACM SIGBED Conference on Languages, Compilers, and Tools for Embedded Systems, 2017.

9. [DAC'17] "Unified nvTCAM and sTCAM Architecture for Improving Packet Matching Performance", **Xianzhong Ding**, Zhiyong Zhang, Zhiping Jia, Lei Ju, Mengying Zhao, Huawei Huang, Design Automation Conference, Work in Progress, Austin, June 2017.
10. [GRMSE'16] "Energy Efficient Routing Algorithm Using Software Defining Network for WSNs via Unequal Clustering", Hang Yu, Zhiping Jia, Lei Ju, **Xianzhong Ding**, International Conference on Geo-Informatics in Resource Management and Sustainable Ecosystems, 2016.

HONORS AND REWARDS

Bobcat Summer Fellowship, EECS, UC Merced	<i>2021</i>
Bobcat Summer Fellowship, EECS, UC Merced	<i>2020</i>
Best Paper Runner-Up Award at BuildSys 2020	<i>2020</i>
Best Presentation Award at BuildSys 2020	<i>2020</i>
ACM SenSys 2019 NSF student travel grant	<i>2019</i>