

# ZHENGE JIA

University of Notre Dame • Department of Computer Science and Engineering

Email: [zjia2@nd.edu](mailto:zjia2@nd.edu)

## EMPLOYMENT

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### University of Notre Dame

Notre Dame, Indiana

Postdoctoral Research Associate, Computer Science and Engineering

Aug. 2022 - Now

Advisor: Prof. Yiyu Shi

Focus: Cross-Layer Co-Exploration for Personalized TinyML in Healthcare

### University of Pittsburgh

Pittsburgh, Pennsylvania

Teaching Assistant

Jan. 2018 - Dec. 2020

## EDUCATION

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### University of Pittsburgh

Pittsburgh, Pennsylvania

Ph.D., Electrical and Computer Engineering

Jan. 2018 - Aug. 2022

Advisor: Prof. Jingtong Hu

Dissertation: Personalized Deep Learning for IoT-Enabled Health Monitoring

### Australian National University

Canberra, Australia

B.S., Advanced Computing (Honours)

Jan. 2014 - Dec. 2017

Advisor: Prof. Weifa Liang

Dissertation: The Efficient Rule Caching and Replacement of TCAM in Software-Defined Networking

## RESEARCH INTERESTS

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### Personalized Deep Learning in Healthcare

- Meta-learning algorithm design to improve model generalization
- Prior-incorporated learning in regulating model personalization
- Personalized Federated learning for health monitoring

### On-Device Deep Learning in Healthcare

- Computing framework design for on-device model personalization
- Deep learning framework exploration for on-device inference

## SELECTED PUBLICATIONS

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### Journal:

#### The Importance of Resource Awareness in Artificial Intelligence for Healthcare

**Zhenge Jia**, Jianxu Chen, Xiaowei Xu, John Kheir, Jingtong Hu, Han Xiao, Sui Peng, Sharon Hu, Danny Chen, Yiyu Shi

*Nature Machine Intelligence*, 2023 (Impact Factor: 25.9).

**Life-Threatening Ventricular Arrhythmia Detection Challenge in Implantable Cardioverter Defibrillators**

**Zhenge Jia**, Dawei Li, Xiaowei Xu, Na Li, Feng Hong, Lichuan Ping, Yiyu Shi  
*Nature Machine Intelligence*, 2023 (Impact Factor: 25.9).

**Low-Power Object-Detection Challenge on Unmanned Aerial Vehicles**

**Zhenge Jia**, Xiaowei Xu, Jingtong Hu, Yiyu Shi  
*Nature Machine Intelligence*, 2022 (Impact Factor: 25.9).

**Personalized Neural Network for Patient-Specific Health Monitoring in IoT: A Meta-Learning Approach**

**Zhenge Jia**, Yiyu Shi, Jingtong Hu  
*IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, 2022 (Impact Factor: 2.8).

**Cooperative Communication Between Two Transiently Powered Sensor Nodes by Reinforcement Learning**

Yawen Wu, **Zhenge Jia**, Fei Fang, Jingtong Hu  
*IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, 2021 (Impact Factor: 2.8).

**Conference:**

**On-Device Prior Knowledge Incorporated Learning for Personalized Atrial Fibrillation Detection**

**Zhenge Jia**, Yiyu Shi, Samir Saba, Jingtong Hu  
*Proc. International Conference on Compilers, Architecture, and Synthesis for Embedded Systems (CASES) in conjunction with (ESWEEK). Also appears as part of the ESWEEK-TECS Special Issue, ACM Transactions on Embedded Computing Systems (ACM TECS)*, 2021 (Acceptance rate: 25%).

**Learning to Learn Personalized Neural Network for Ventricular Arrhythmias Detection on Intracardiac EGMs**

**Zhenge Jia**, Zhepeng Wang, Feng Hong, Lichuan Ping, Yiyu Shi, Jingtong Hu  
*Proc. The 30th International Joint Conference on Artificial Intelligence (IJCAI)*, 2021 (Acceptance rate: 13.9%).

**Enabling On-device Model Personalization for Ventricular Arrhythmias Detection by Generative Adversarial Networks**

**Zhenge Jia**, Feng Hong, Lichuan Ping, Yiyu Shi, Jingtong Hu  
*Proc. IEEE/ACM Design Automation (DAC)*, 2021 (Acceptance rate: 22.4%).

### **Personalized Deep Learning for Ventricular Arrhythmias Detection on Medical IoT Systems**

**Zhenge Jia**, Zhepeng Wang, Feng Hong, Lichuan Ping, Yiyu Shi, Jingtong Hu

*Proc. IEEE/ACM International Conference on Computer-Aided Design (ICCAD)*, 2020.

### **ICD-BAS: Detecting Ventricular Arrhythmia using Binary Architecture Search for Implantable Cardioverter Defibrillators**

Qing Lu, **Zhenge Jia**, Jingtong Hu and Yiyu Shi

*Proc. of IEEE/ACM international conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE)*, 2022.

### **Opportunistic Communication with Latency Guarantees for Intermittently-Powered Devices**

Kacper Wardega, Wenchao Li, Hyoseung Kim, Yawen Wu, **Zhenge Jia** and Jingtong Hu

*Proc. The ACM/IEEE Design, Automation and Test in Europe (DATE)*, 2022.

### **Lightweight Run-Time Working Memory Compression for Deployment of Deep Neural Networks on Resource-Constrained MCUs**

Zhepeng Wang, Yawen Wu, **Zhenge Jia**, Yiyu Shi, Jingtong Hu

*The 26th Asia and South Pacific Design Automation Conference (ASP-DAC 2021)*, 2021.

### **Intermittent Inference with Non-uniformly Compressed Multi-Exit Neural Network for Energy Harvesting Powered Devices**

Yawen Wu, Zhepeng Wang, **Zhenge Jia**, Yiyu Shi, Jingtong Hu

*Proc. The 57th IEEE/ACM Design Automation Conference (DAC 2020)*, 2020 (Acceptance rate: 23.2%).

## **Oral Presentations:**

### **Demo: Addressing Inter-Intra Patient Variability via Personalized Meta-Federated Learning in IoT-Enabled Health Monitoring**

**Zhenge Jia**, Yiyu Shi

*IEEE/ACM International Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE)*, 2023.

## **INTERNSHIP EXPERIENCE**

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**Algorithm Engineer**, Singular Medical (USA) Inc. (2020.04 - 2020.08)

- Investigated and explored the feasibility of deep learning in ventricular arrhythmia detection.
- Performed research work advancing the understanding of ventricular arrhythmia detection working flow and logic in the ICDs manufactured by Boston Scientific and Medtronic. Emulated ventricular arrhythmia detection algorithms on off-the-shelf ICDs.

## SERVICES

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### TPC Member

- International Conference on Computer-Aided Design (ICCAD'23)

### Journal Reviewer

- Nature Scientific Report
- IEEE Trans. On Circuits and System II (TCAS)
- ACM Trans. on Cyber-Physical Systems (TCPS)
- ACM Journal on Emerging Technologies in Computing Systems (JETC)
- IEEE Embedded Systems Letters (ESL)
- IEEE Access

### Competition Organizer

- [1<sup>st</sup> TinyML contest](#) collocated at ICCAD'22 (150+ registered teams).

### Judge

- Intel International Science and Engineering Fair (ISEF), 2018

## ACHIEVEMENTS AND AWARDS

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- 2022, Ph.D. Forum, ASP-DAC
- 2021, Student Grant, IJCAI
- 2021, Young Student Fellow Award, DAC
- 2020, Young Student Fellow Award, DAC