BIN-CHOU KAO

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EDUCATION

University of Illinois at Urbana-Champaign (UIUC), USA Aug 2019 - present
Doctor of Philosophy (Ph.D.)
Computer Science
Advisor: Dr. Sibin Mohan

National Chiao Tung University (NCTU), Taiwan Sep 2011 - Jul 2013
Master of Science
Computer Science
Advisor: Dr. W. J. Tsai

National Chiao Tung University (NCTU), Taiwan Sep 2007 - Jun 2011
Bachelor of Science
Computer Science

PROFESSIONAL EXPERIENCE

Visiting scholar Oct 2017 - May 2019
University of Illinois at Urbana-Champaign (UIUC)

- Build a system level digital twin for generating throughput, quality and cost from sensor data.
- Use symbolic execution to analyze Programmable Logic Controller (PLC) code and find safety issues from interactive PLC codes.
- Solve a routing problem with multiple digital twins and a decision maker in the central controller.

Software Engineer Aug 2013 - Dec 2016
Taiwan Semiconductor Manufacturing Company (TSMC), Taiwan

- Redesigned a new printing service, making it more secure and efficient.
- Applied a new Microsoft client/server solution in the company, improving stability and efficiency.
- Designed simple tools to make daily operations more efficient.
- Added functions to the company website to display monitored and logged data.

RESEARCH INTEREST

Distributed Systems, Cyber-Physical Systems, Real-Time Systems, Embedded Systems, Internet-of-Things (IoT)

RESEARCH PROJECTS

Live-migration enabled Real-Time container framework for IoT system Aug 2021 - present
University of Illinois at Urbana-Champaign (UIUC) *Information Trust Institute*

- Research Objective: to build a live-migration enabled Real-Time container framework to improve security and efficiency of IoT system

Software-defined control (SDC) for smart manufacturing systems Oct 2017 - present
University of Illinois at Urbana-Champaign (UIUC) *Information Trust Institute*

- Research Objective: to build up a global view central controller for manufacturing system.

PUBLICATIONS

1. **Towards Automated Safety Vetting of PLC Codein Real-World Plants**
   *M. Zhang, C. Y. Chen, **B. Kou**, Y. Qamsane, Y. Shao, Y. Lin, E. Shi, S. Mohan, K. Barton, J. Moyne and Z. Mao*

· Accepted By: IEEE Symposium on Security and Privacy (IEEE S&P), 2019.
· Main Contribution: VetPLC, an approach used for *automatic safety vetting* by producing *timed event sequences* based on temporal context-aware and program analysis.
· Keywords: application security, security and privacy for the Internet of Things, symbolic execution, anomaly detection.

2. **A Unified Digital Twin Framework for Real-time Monitoring and Evaluation of Smart Manufacturing Systems**
   *Y. Qamsane, C. Y. Chen, E. Balta, **B. Kou**, S. Mohan, J. Moyne, D. Tilbury and K. Barton*

· Accepted By: IEEE 15th International Conference on Automation Science and Engineering (IEEE CASE), 2019.
· Main Contribution: A Digital Twin(DT) framework for modern manufacturing system which provides a real-time extensible global view of a manufacturing system and helps to evaluate/improve business performance.
· Keywords: Digital Twin, Digital Twin platform, manufacturing system, industry 4.0.

THESIS

Master's thesis Sep 2012 - Jul 2013
Improving HEVC tile coding efficiency using adaptive tile boundary *NCTU*

· Adviced by: Assistant Professor W. J. Tsai.
· Main Contribution: Provided Adaptive Tile Boundary method on HEVC, to reduce rate distortion loss; this method makes simple use of information to predict the best tile boundary positions with multi-thread programming before encoding the frame.
· Result: improve 8% to 10% on BD-rate in average.

Bachelor's Thesis Feb 2005 - Sep 2006
Acceleration of H.264 encoding with OpenMP API *NCTU*

· Tested H.264 codec and found the location of a bottleneck.
· Rewrote the bottleneck location using the OpenMP syntax for acceleration.

TECHNICAL STRENGTHS

Computer Languages	Python, C/C++, C#, Java, Assembly, SQL, OpenMP, CUDA
Software & Tools	Linux kernel, HTML, LaTeX, Excel, MATLAB, R, UML
Research Skills	Data analysis, Machine learning

LANGUAGE SKILLS

Mandarin Chinese	(native)
English	(advanced)