

BIN-CHOU KAO

707 South Sixth street, Unit 509, Champaign, IL 61820

(217) 305-5316 ◊ kaobinchou@gmail.com

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

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

RESEARCH PROJECTS

- 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 Code in 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

- Advised 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	HTML, LaTeX, Excel, MATLAB, R, UML
Research Skills	Data analysis, Machine learning

LANGUAGE SKILLS

Mandarin Chinese	(native)
English	(advanced)