Zijiang Hao

CONTACT INFORMATION	Department of Computer Science College of William and Mary Williamsburg, VA 23187	*Phone*: (757) 603-5746 *E-mail*: `hebo@cs.wm.edu` *Website*: `http://www.cs.wm.edu/~hebo`

RESEARCH INTERESTS

Edge Computing; Blockchain; Internet of Things; Consensus in Distributed Computing; Security; Machine Learning

EDUCATION

College of William and Mary, Williamsburg, VA, USA

Ph.D. Candidate, Computer Science   08/2011 – 05/2019
- Advisor: Dr. Qun Li

Tsinghua University, Beijing, China

M.Eng., Computer Science and Technology   09/2004 – 07/2007
B.S., Computer Science and Technology   09/2000 – 07/2004

PROFESSIONAL EXPERIENCE

College of William and Mary, Williamsburg, VA, USA

Research Assistant   09/2013 – 05/2019

- **Deep Learning with Edge Computing**. Conduct research on how to utilize edge computing to improve the performance of deep learning applications. Investigate the security issues in this scenario. The project is still ongoing.

- **Consensus for Geo-Distributed Systems**. Investigate the drawbacks of the consensus algorithms in the literature, including Multi-Paxos, Mencius, and E-Paxos. Design a novel consensus protocol for geo-distributed systems. The project is still ongoing.

- **Secure IoT Payments via Blockchain**. Study how to use blockchain to support secure payments through the Internet of Things (IoT) devices. Investigate the countermeasures against the double-spending attacks in the IoT payment scenario.

- **Consensus in Edge Computing**. Study the consensus problem in an edge-cloud computing environment, aiming at achieving as low user-perceived latency as possible.

- **Edge Computing Middleware**. Design and implement an edge computing middleware, along with a concise programming interface. Developers can build edge applications with minimal implementation effort via the programming interface, and the middleware guarantees high performance and robustness of the edge applications.

- **Edge Computing Testbed**. Build a testbed for edge computing using OpenStack and Docker. Implement two applications on the testbed for research: a face-recognition application and a video-analysis application.

- **Secure Mobile Computing on Cloud**. Design and implement a mobile-cloud platform for mobile users, which performs secure computations even if the mobile operating system has been compromised. Deeply investigate the source code of the QEMU/KVM hypervisor and the Linux Virtual File System (VFS).

Teaching Assistant   09/2011 – 05/2018

- CSCI 141L Computational Problem Solving (Lab), Fall 2017 & Spring 2018.
- CSCI 663 Theory of Computation, Spring 2013.
- CSCI 304/504 Computer Organization, Fall 2012.
- CSCI 241 Data Structures, Fall 2011 & Spring 2012.

Intelligent Automation, Inc., Rockville, MD, USA

Research and Development Intern   04/2017 − 08/2017

– Design a machine-learning-based method to detect the Advanced Persistent Threat (APT) attacks in a government network.

– Participate in the design and implementation of the web front-end for the APT diagnosis tool mentioned above.

Hanvon Technology Co., Ltd., Beijing, China

Senior Software Engineer   02/2009 − 06/2011

– Modify the Android framework to support the new hardware for Hanvon WISEreader.

– Investigate the implementation of ADB and DDMS in Android and design/implement the Production Testing Platform for Hanvon WISEreader.

Rakuten Communications CORP., Tokyo, Japan

Software Engineer   08/2007 − 01/2009

– Work as a full stack software engineer for several industry-level web applications. Participate in designing and implementing the database models, the web user interfaces, and the business logic for the applications.

CONFERENCE PUBLICATIONS

- **FABA: An Algorithm for Fast Aggregation against Byzantine Attacks in Distributed Neural Networks**,

  Qi Xia, Zeyi Tao, Zijiang Hao, and Qun Li,

  to appear in the *Proceedings of the 2019 International Joint Conference on Artificial Intelligence* (**IJCAI '19**), Macao, China, August 2019. Acceptance ratio: 17.9% (850/4752)

- **Nomad: An Efficient Consensus Approach for Latency-Sensitive Edge-Cloud Applications**,

  Zijiang Hao, Shanhe Yi, and Qun Li,

  in the *Proceedings of the 2019 IEEE International Conference on Computer Communications* (**INFOCOM '19**), Paris, France, April 2019. Acceptance ratio: 19.7% (288/1464)

- **FastPay: A Secure Fast Payment Method for Edge-IoT Platforms using Blockchain**,

  Zijiang Hao, Raymond Ji, and Qun Li,

  in the *Proceedings of the 2018 ACM/IEEE Workshop on Security and Privacy in Edge Computing* (**EdgeSP '18**), pp. 410–415, Bellevue, WA, October 2018.

- **EdgeCons: Achieving Efficient Consensus in Edge Computing Networks**,

  Zijiang Hao, Shanhe Yi, and Qun Li,

  in the *Proceedings of the 2018 USENIX Workshop on Hot Topics in Edge Computing* (**HotEdge '18**), Boston, MA, July 2018.

- **LAVEA: Latency-aware Video Analytics on Edge Computing Platform**,

  Shanhe Yi, Zijiang Hao, Qingyang Zhang, Quan Zhang, Weisong Shi, and Qun Li,

  in the *Proceedings of the 2017 ACM/IEEE Symposium on Edge Computing* (**SEC '17**), pp. 15:1–15:13, San Jose/Fremont, CA, October 2017.

- **Towards User Re-Authentication on Mobile Devices via On-Screen Keyboard**,

  Zijiang Hao and Qun Li,

  in the *Proceedings of the 2016 IEEE Workshop on Hot Topics in Web Systems and Technologies* (**HotWeb '16**), pp. 78–83, Washington, DC, October 2016.

- **Fog Computing: Platform and Applications**,

  Shanhe Yi, Zijiang Hao, Zhengrui Qin, and Qun Li,

  in the *Proceedings of the 2015 IEEE Workshop on Hot Topics in Web Systems and Technologies* (**HotWeb '15**), pp. 73–78, Washington, DC, November 2015.

- **Physical Media Covert Channels on Smart Mobile Devices**,

  Ed Novak, Yutao Tang, Zijiang Hao, Yifan Zhang, and Qun Li,

  in the *Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing* (**UbiComp '15**), pp. 367–378, Osaka, Japan, September 2015. Acceptance ratio: 23.6% (93/394)

- **Reducing Smartphone Application Delay through Read/Write Isolation**,

  David T. Nguyen, Gang Zhou, Guoliang Xing, Xin Qi, Zijiang Hao, Ge Peng, and Qing Yang,

  in the *Proceedings of the 2015 Annual International Conference on Mobile Systems, Applications, and Services* (**MobiSys '15**), pp. 287–300, Florence, Italy, May 2015. Acceptance ratio: 13.2% (29/219)

- **SMOC: A Secure Mobile Cloud Computing Platform**,

  Zijiang Hao, Yutao Tang, Yifan Zhang, Ed Novak, Nancy Carter, and Qun Li,

  in the *Proceedings of the 2015 IEEE International Conference on Computer Communications* (**INFOCOM '15**), pp. 2668–2676, Hong Kong, China, April 2015. Acceptance ratio: 19.3% (316/1640)

JOURNAL &
MAGAZINE
PUBLICATIONS

- **A Survey of Virtual Machine Management in Edge Computing**,

  Zeyi Tao, Qi Xia, Zijiang Hao, Cheng Li, Lele Ma, Shanhe Yi, and Qun Li,

  Proceedings of the IEEE, in press.

- **Challenges and Software Architecture for Fog Computing**,

  Zijiang Hao, Ed Novak, Shanhe Yi, and Qun Li,

  IEEE Internet Computing Magazine, vol. 21, no. 2, pp. 44–53, March 2017.

POSTER
PUBLICATIONS

- **LAVEA: Latency-aware Video Analytics on Edge Computing Platform (Poster)**,

  Shanhe Yi, Zijiang Hao, Qingyang Zhang, Quan Zhang, Weisong Shi, and Qun Li,

  in the *Proceedings of the 2017 IEEE International Conference on Distributed Computing Systems* (**ICDCS '17**), pp. 2573–2574, Atlanta, GA, June 2017.

- **Poster Abstract: EdgeStore: Integrating Edge Computing into Cloud-Based Storage Systems**,

  Zijiang Hao and Qun Li,

  in the *Proceedings of the 2016 IEEE/ACM Symposium on Edge Computing* (**SEC '16**), pp. 115–116, Washington, DC, October 2016.

AWARDS &
GRANTS

- Honorable Mention Award, UbiComp '15.
- IEEE Student Grant, SEC '16 and INFOCOM '15.
- Arts & Sciences OGSR/Graduate Student Association Conference Funds, College of William and Mary, 2015.

PROFESSIONAL
SERVICES

- Conference reviewer: CNS '19, PerCom WiP '19, INFOCOM '18, CNS '18, ICDCS '18, IN-FOCOM '17, CNS '16, Globecom '16, INFOCOM '16, IWQoS '15, INFOCOM '15, ICNP '14, CNS '14, IWQoS '14, INFOCOM '14.
- Journal reviewer: Proceedings of the IEEE, IEEE Transactions on Network and Service Management, IEEE/ACM Transactions on Networking, IEEE Transactions on Wireless Communications, IEEE Transactions on Services Computing.

PROFESSIONAL
SKILLS

- Programming Languages: Java, C/C++, Python, Go, JavaScript, Solidity.
- Tools and Frameworks: Docker, Redis, OpenStack, Raft, Oracle DB, MySQL.
- System Experience: Android Framework, FUSE File System, Linux VFS, Ext4 File System.

REFERENCES

Dr. Qun Li (advisor), *Professor*, *IEEE Fellow*
Department of Computer Science
College of William and Mary
118 McGlothlin-Street Hall, Williamsburg, VA 23187
E-mail: liqun@cs.wm.edu
Phone: (+1) 757-221-3478

Dr. Weisong Shi, *Professor*, *IEEE Fellow*
Department of Computer Science
Wayne State University
5057 Woodward Ave. Ste. 14102.2, Detroit, MI 48202
E-mail: weisong@wayne.edu
Phone: (+1) 313-577-3186

Dr. Haining Wang, *Professor*
Department of Electrical and Computer Engineering
University of Delaware
312 DuPont Hall, Newark, DE 19716
E-mail: hnw@udel.edu
Phone: (+1) 302-831-6865

Dr. Ed Novak, *Assistant Professor*
Department of Computer Science
Franklin and Marshall College
550 College Avenue Room 231, Lancaster, PA 17603
E-mail: ed.novak@fandm.edu
Phone: (+1) 717-358-4824

Dr. Julia Deng, *Principal Scientist*, *Senior Director*
Networking and Cyber Security
Intelligent Automation, Inc.
15400 Calhoun Drive Suite 400, Rockville, MD 20855
E-mail: hdeng@i-a-i.com
Phone: (+1) 301-294-5209