Sisi Duan, Ph.D.

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Information Systems Department
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CURRENT POSITION	*University of Maryland Baltimore County* Assistant Professor, Information Systems Department	08/2017 - present

RESEARCH INTERESTS

Dependable Distributed Computing, Computer and Network Security, and Cyber Physical Systems

EDUCATION

University of California Davis, Computer Science   09/2010 - 12/2014
- *PhD. Thesis Title:* Building Reliable and Practical Byzantine Fault Tolerance
  Advisors: Karl N. Levitt and Sean Peisert

The University of Hong Kong   09/2006 - 06/2010
- *Bachelor of Electrical and Electronic Engineering*

Tsinghua University, Computer Science and Technology   09/2005 - 06/2006
- *First-Year Preparatory Study*

EXPERIENCE

Oak Ridge National Laboratory   10/2015 - 07/2017
Data Architectures Team, Computational Data Analytics Group
- Staff Research Associate, Weinberg Fellow

University of California, Davis   01/2015 - 07/2015
Security Lab, Computer Science
- Postdoctoral Researcher

University of Stavanger, Norway   01/2014 - 03/2014
Department of Electrical Engineering and Computer Science
- Visiting Scholar

HSBC, Hong Kong   06/2008 - 06/2009
Department of FX, MM, Balance Sheet Product
- FX/MM Product Solution Specialist

RESEARCH PROJECTS

Reliable Communication in Critical Infrastrature Networks, CSED, ORNL
- Analyzed the interdependency between heterogeneous critical infrastructure networks, e.g., smart grid.
- Built practical interdependency models.
- Designed and implemented solutions to handle failures and cyber attacks.
- Visualized data in Google Earth, Openlayers, and WorldWind.

Self-Adaptivity in Cyber Physical Systems, ORNL and UC Davis
- Studied and handled dynamic changes and failures in various cyber physical systems, e.g., residential energy systems, sensor networks, etc.
- Designed and implemented self adaptive middlewares and frameworks.

Fault Tolerance in Distributed Systems, Security Lab, UC Davis

- Designed and implemented practical fault-tolerant protocols.
- Implemented system reconfiguration and rejuvenation to enhance resilience.
- Experiments carried out in Emulab and DeterLab, written in C/C++.

Intrusion Detection Systems, Security Lab, UC Davis

- Designed specification-based detection and anomaly detection.
- Experiments carried out in Deterlab, using C/C++ and Bro-2.1.

Publish/Subscribe Systems, System Lab, University of Stavanger and UC Davis

- Designed reliable and practical pub/sub systems.
- Developed a framework of pub/sub systems based on a Paxos/BFT library.
- Experiments carried out in DeterLab, written in Java and Golang.

RESEARCH FUNDING

Data Integrity and Resilient Topologies in the Smart Grid   2015 - 2017

- PI funded by ORNL's Lab-directed Research & Development (LDRD) fund.
- Evaluating the resiliency of the smart grid topologies.
- Enabling data integrity in data transmission and collection in the grid.

BSID: Byzantine Fault Tolerance from Specification-Based Intrusion Detection 2014

- PI funded by Leiv Eiriksson Mobility Program, The Research Council of Norway.
- Designed and implemented specification-based intrusion detection.
- Studied the symbiosis of intrusion detection systems and Byzantine fault tolerance.

PUBLICATIONS

- Liangzhe Chen, Xinfeng Xu, Sangkeun Lee, Sisi Duan, Alfonso G. Tarditi, Supriya Chinthavali, and B. Aditya Prakash. *HotSpots: Failure Cascades on Heterogeneous Critical Infrastructure Networks*, CIKM 2017, to appear.

- Sisi Duan, Micheal K. Reiter, and Haibin Zhang. *Secure Causal Atomic Broadcast, Revisited*, pages 61–72, DSN 2017.

- Sisi Duan, Sangkeun Lee, Supriya Chinthavali, and Mallikarjun Shankar. *Best Effort Broadcast under Cascading Failures in Interdependent Networks*, ACM ICDCN 2017: 27. *One of the 3 best papers of the networking track.*

- Sisi Duan, Yun Li, and Karl Levitt. *Cost Sensitive Moving Target Consensus*, pages 272–281, IEEE NCA 2016.

- Sisi Duan, Lucas Nicely, and Haibin Zhang. *Byzantine Reliable Broadcast in Sparse Networks*, pages 175–182, IEEE NCA 2016.

- Sisi Duan, Sangkeun Lee, Supriya Chinthavali, and Mallikarjun Shankar. *Reliable Communication Models in Interdependent Critical Infrastructure Networks*, pages 152–157, IEEE RWS 2016.

- Sisi Duan and Haibin Zhang. *Practical Randomized and Confidential Byzantine Replication*, pages 187–196, IEEE SRDS 2016.

- Sisi Duan and Jingtao Sun. *Energy Management Policies in Distributed Residential Energy Systems*, pages 121–133, IEEE IDCS 2016.

- Sangkeun Lee, Supriya Chinthavali, Sisi Duan, and Malikarjun Shankar. *Utilizing Semantic Big Data for realizing a National-scale Infrastructure Vulnerability Analysis System*, ACM SBD@SIGMOD 2016:3.

- Sisi Duan and Jingtao Sun. *A Self-Adaptive Middleware for Efficient Routing in Distributed Sensor Networks*, pages 322–327, IEEE SMC 2015.

- Sisi Duan, Jingtao Sun, and Sean Peisert. *Towards a Self-Adaptive Middleware for Building Reliable Publish/Subscribe Systems*, pages 157–168, IEEE IDCS 2015.

- Sisi Duan, Sean Peisert, and Karl Levitt. *hBFT: Speculative Byzantine Fault Tolerance With Minimum Cost*, 12(1), pages 58–70, IEEE Transactions on Dependable and Secure Computing, 2015.

- Sisi Duan, Hein Meling, Sean Peisert, and Haibin Zhang. *BChain: Byzantine Replication with High Throughput and Embedded Reconfiguration*, pages 91–106, OPODIS 2014.

- Sisi Duan, Karl Levitt, Hein Meling, Sean Peisert, and Haibin Zhang. *ByzID: Byzantine Fault Tolerance from Intrusion Detection*, pages 253–264, IEEE SRDS 2014. *Best Paper Candidate Award*.

- Tiancheng Chang, Sisi Duan, Hein Meling, Sean Peisert, and Haibin Zhang. *P2S: A Fault-Tolerant Publish/Subscribe Infrastructure*, pages 189–197, ACM DEBS 2014.

ADVISING

Lucas Nicely   Summer 2016
- DOE's Science Undergraduate Laboratory Internship (SULI) program.
- Designed and implemented a practical failure detection algorithm in sparse networks.

TEACHING

Instructor: IS 410 Introduction to Database Design, UMBC   Fall 2017
Teaching Assistant   Winter 2011
- ECS 20 Discrete Mathematics for Computer Science, UC Davis, Instructor: Zhaojun Bai

PROFESSIONAL SERVICE

Program Committee
- CSIIRW 2013, CISRC 2015, CISRC 2016, CISRC 2017, IDCS 2016, NCA 2017

External Reviewer
- ICDCS 2014, DSN 2016, RecSys 2016, SRDS 2017

Journal Reviewer
- IEEE TKDE

AWARDS

- Alvin M. Weinberg Distinguished Fellowship, ORNL   2015
- Graduate Student Travel Award, UC Davis   2014
- Leiv Eiriksson Mobility Grant, The Research Council of Norway   2014
- Top 100 in Google Code Jam I/O for women   2014

| | - Block Grant Fellowship, Office of Graduate Studies, UC Davis | 2010 |

TALKS
- Building Resilient Distributed Systems from Byzantine Fault Tolerance. *Auburn University.* Mar 2017
- Building Resilient Distributed Systems from Byzantine Fault Tolerance. *University of Oklahoma.* Mar 2017
- Building Resilient Distributed Systems from Byzantine Fault Tolerance. *University of South Florida.* Mar 2017
- Resilience under Cascading Failures in Interdependent Distributed Systems. *University of Maryland Baltimore County.* Mar 2017
- Resilience under Cascading Failures in Interdependent Distributed Systems. *University of Idaho.* Mar 2017
- Building Resilient Distributed Systems from Byzantine Fault Tolerance. *United Technologies Research Center.* Feb 2017
- Building Resilient Distributed Systems from Byzantine Fault Tolerance. *Florida International University.* Feb 2017
- Best Effort Broadcast under Cascading Failures in Interdependent Networks. *ICDCN.* Jan 2017
- Reliable Communication under Cascading Failures in Interdependent Networks. *University of Connecticut.* Nov 2016
- Cost Sensitive Moving Target Consensus. *NCA.* Nov 2016
- Byzantine Reliable Broadcast in Sparse Networks. *NCA.* Nov 2016
- Reliable Communication in Critical Infrastructure Networks. *CDA Group Seminar, ORNL.* Sep 2016
- Building Secure and Reliable Distributed Systems. *Oak Ridge National Laboratory.* June 2015
- ByzID: Byzantine Fault Tolerance from Intrusion Detection. *SRDS.* Oct 2014
- BChain: A Family of Practical Byzantine Fault-Tolerant Protocols with Fault Diagnosis. *GGCS Seminar*, UC Davis. Dec 2012
- BChain: A Family of Practical Byzantine Fault-Tolerant Protocols with Fault Diagnosis. *Security Lab Seminar, UC Davis.* Nov 2012
- Byzantine Chain Protocol: Byzantine Agreement with Fault Diagnosis. *Tidal News Workshop.* Aug 2012

POSTERS
- Fully Distributed Reliable Broadcast under Cascading Failures for Smart City Infrastructure Networks. *Smart Cities Innovation Summit.* June 2016