

James Xi Zheng

Nationality: Australian

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Key Skills

Cyber Physical Systems (CPS), Cloud Computing, Robotics and Automation, Runtime Verification, Real Time Systems, Pervasive computing, Software Engineering, Information Retrieval, Mobile software and Middleware Design, Object Oriented Design and Development, Data and Application Integration, Large /Real Time Database System Design and Management, Software/System Development and Administration, Data Modelling, Information Management, Web Development and Technology.

Education

- **Ph.D., Software Engineering, The University of Texas at Austin (GPA: 3.97/4)**
- **Master of Computer Science and Engineering, UNSW, Sydney Australia (GPA: 3.88/4)**
- **Bachelor of Computing Information Science, Fu Dan University, Shanghai PRC (Major: 80/100)**

Research Focus

Software Modelling, Formal Verification, Security analysis, and Systematic testing for Cyber Physical System, Cloud Computing, Robotics and Autonomous Systems, Real-Time Systems, and Hybrid Systems.

Academic Experience

- 1) 01/2016 ~ **Deakin University Australia (Burwood Campus)**
Position Held: Lecturer in Computer Science

My main jobs include: design and teach various subjects in Computer Science including distributed systems, verification and validation, security analysis for Cyber Physical Systems and Internet of Things, robotics, and software engineering units; engage industrial and government for research projects in the area of Internet of Things, Cloud Computing, and Humanoid Robotics; mentor postgraduate students in these research areas for interesting yet challenging thesis; and provide/plan career development to students.

- 2) 09/2015 ~ 12/2015 **Deakin University Australia (Burwood Campus)**
Position Held: Research Fellow in Cyber Physical Systems

My main job is to create practical and project-oriented software engineering teaching units with specific focus on Cyber Physical Systems, lead a project for robocup soccer, collaborate on industrial research projects on securing car systems against various malicious attacks and in-depth forensic analysis of behaviours in vehicle systems, and conduct research on various topics in Cyber Physical Systems, and Internet of Things in general.

- 3) 09/2013 ~ 08/2015 **The University of Texas at Austin**
Position Held: Graduate Research Assistant, Mobile and Pervasive Computing Lab

My research focuses on the design and implementation of specification language, middleware, and real-time simulation for Cyber Physical Systems (CPS). I contributed an intuitive way to integrate

Formal Methods (temporal logic and timed automata specifically), practical online monitoring tools and middleware (efficient and expressive), and real-time simulation into CPS runtime verification.

4) **01/2013 ~ 09/2013 The University of Texas at Austin**
Position Held: Graduate Teaching Assistant

Algorithm EE360C – Spring 2013, Summer 2013

IT Industry Certifications

- MCSD - Microsoft Certified Solution Developer
- MCSE – Microsoft Certified System Engineer
- MCDBA – Microsoft Certified Database Administrator
- MCP – Microsoft Certified Professional

Professional Experience

11/2005~ 07/2012 Menulog/Artog/MyRate, Sydney Australia
Position Held: Solution Architect

- 1) Architect and design majority of the Menulog Systems by applying the latest research results in RDBMS, SOA, message systems, software integration, runtime software verification, and static analysis. This architect is essential for this 855 million dollar worth online systems (<http://www.afr.com/technology/web/ecommerce/james-packerbacked-menulogs-855m-sale-part-of-international-land-grab-20150511-ggylwn>), which is the largest food ordering system in Australia
- 2) Co-establish the IT team In Menulog
- 3) Establish collaboration with technical partners across the world
- 3) Provide training for the IT team
- 4) Manage various IT projects with other key stakeholders using SCRUM

04/2004~ 11/2005 Glintech Consulting, Sydney Australia
Position Held: IT Consultant

- 1) Develop Web application and middleware in .Net, ASP, VB, MySQL, SQL Server, Oracle, Adobe IForm; 2) develop XML database using SQLXML; 3) created invoice generation engine using XSL-FO; 3) develop message queuing system using IBM MQ, Java

04/2001~ 04/2004 QiCai Computing, Shanghai P.R.C
Position Held: Lead Developer

- Develop restaurant management systems using ASP, VB, C++, DCOM, SQL

Grant Applications and Award

“Investigating How to Build a Reliable and Secure Software-as-a-Service (SaaS) Platform”, CI: Xi Zheng, Mohamed, Abdelrazek, and Wanlei Zhou, Industry Research Grant (awarded 120k AUD for the first stage), 2016

“Securing Modern Vehicle Systems”, CI: Xi Zheng, Lei Pan, Lynn Batten, Deakin Distributed Systems and Security Research Cluster, awarded 2k, 2016

“Securing Modern Vehicle Systems”, CI: Xi Zheng, Lei Pan, Lynn Batten, SSBE Industry Engagement Grant, awarded 10k, 2016

“Securing Modern Vehicle Systems”, CI: Xi Zheng, Lei Pan, Lynn Batten, CCSR SRC Equipment Fund, awarded 5.1K, 2016

“Customizable and Efficient Development and Deployment of Micro Service for Software as a Service”, CI: Xi Zheng and Wanlei Zhou, Deakin Faculty award of Minor Equipment Scheme, Awarded 20k, 2017

“Customizable and Efficient Development and Deployment of Micro Service for Software as a Service”, CI: Xi Zheng and Wanlei Zhou, Deakin Faculty award of Travel Grant, Awarded 3.5K, 2017

“Smoking behaviour & context detection and automated recommender system”, CI: Xi Zheng, Sutharshan Rajasegara, and Chandan Karmakar, Deakin Centre for Cyber Security Research Equipment Grant, Awarded 10K, 2017

Deakin Industry Engagement Award *for excellence in industry engagement leading to strategic partnerships or industry funding 2016*

Key Industry engagement research projects:

1. Investigating How to Build a Reliable and Secure Software-as-a-Service (SaaS) Platform (Secured 120K, this involved into a follow-up research project “Customizable and Efficient Development and Deployment of Micro Service for Software as a Service”, which will solicit estimated 5 years industry research contribution with 200k first year, 400K second year, 500K third year, 800K fourth year, and 1 million fifth year. A memo of research collaboration is under discussion with an overseas industry partner)

This project is to explore the state of the art practical approaches to tackle challenges in developing, configuring, deploying, and securing Software-as-a-Service applications.

Initially, I got a very rough business requirement from my social network for this project. After carefully analysing all possibilities of technical issues, I booked a flight to Beijing (using all the start-up fund from Deakin for early career researcher which is \$2000) and organized meeting with the investors. I used two rounds of presentation and meetings to thoroughly understand their requirement and came up with a research plan on the spot. Two weeks later after I came back, they signed the investment of \$120k.

With this fund and my social network in Australia, I have established the research collaboration among a few leading universities (University of Melbourne, QUT, Macquarie University) and CSIRO/Data61, and created a prototype to demonstrate to the business our research capacity. I have organized a number of multi-party meetings among our best researchers in the team and the senior technical executives of a number of SaaS providers overseas. I have critically analysed their requirements, conducted extensive investigation into the state of the art and the state of the practice in developing, deploying, and securing SaaS, and identified a few very interesting yet challenging research issues which have not yet been solved by any known providers (e.g., Amazon AWS, Microsoft Azure, IBM BlueMix, Google Cloud Platform, Baidu Cloud Platform). Based on these research challenges, a new project “Customizable, Efficient and Secure Development and Deployment of Micro Service for Software as a Service” is created with five stages of deliverables. At the moment, we are at the very first stage and working on some interesting research challenges.

Though the team is well supported by the current team members and research collaborators, I am actively looking for a very established senior member in the service computing area to provide necessary guidance to the team so that the ultimate goal of the project can be achieved, which is to establish a flagship open source website where all the source codes and experimental results from the project and any on-wards works can be shared among public and contribute to the industry and academic communities significantly.

2. Securing Modern Vehicle Systems (Now exploring research collaboration with department of automotive vehicle and a Chinese Automotive company to secure modern vehicle systems)

This project is to investigate security vulnerabilities and practical solutions for modern vehicle systems.

This project has received three rounds of internal research funding from Deakin but unfortunately the funding is not enough to sustaining necessary resources to keep the project forward. Out of this concern, at the very beginning of the project, I established strong research collaboration with the state key laboratory of electric vehicles in Tsinghua University (one of the top research universities in China). With research collaborators in Tsinghua, we have published a number of top quality journal papers (with

impact factor over 2.1) and a few international conference papers on security and verification of IoT systems. Now we are collectively creating real-time simulation for evaluating security attacks and solutions on modern CAN bus. We are also looking at an effective yet efficient way to secure over the air vehicle update, prevent tampering of ECU inside a vehicle, and provide runtime monitoring for a vehicle's behaviour. We are exploring jointly the industry opportunity with a Tsinghua's long-term industry partner in automobile. We are developing a commercial prototype of real-time over the air vehicle update system for some industrial demos to possibly attract interests to apply for ARC Linkage and ARC-Chinese National Science Foundation joint research funding.

3. Non Invasive Sensor Based Smoking/Drinking Intervention Systems (Now in a commercial prototype stage to attract industrial interest for future ARC Linkage application)

This project is to investigate using state of the sensors, feature extraction, machine learning algorithms, and micro service architecture to develop smart smoking/drinking intervention systems.

I collaborated with two researchers in sensor networks and data analytics in Deakin to create prototypes and publications with the help from Master thesis students and HDR students. We are exploring the funding opportunity from local and overseas investors. As for now, we are developing a commercial prototype of real-time smoking/drinking activity recognition system for some industrial demos to possibly attract interests to apply for ARC Linkage jointly.

Publications

Journal Papers

- **X. Zheng**, C. Julien, M. Kim, S. Khurshid, *On the State of the Art in Verification and Validation in Cyber Physical Systems*, IEEE Systems Journal, 2016 **(Impact Factor: 2.114)**
- **X. Zheng**, C. Julien, R. Podorozhny, F. Cassez, T. Rakotoarivelo, *Brace: A Middleware for Practical On-Line Monitoring of Cyber-Physical System Correctness*, IEEE Systems Journal, 2016 **(Impact Factor: 2.114)**
- **X. Zheng**, C. Julien, H.X. Chen, R. Podorozhny, f. Cassez, *BraceBind: Combining Real-Time Simulation with Runtime Verification for Cyber Physical Systems*, ACM Transactions on Embedded Computing Systems, 2017
- L. Pan, **X. Zheng**, H.X. Chen, T. Luan, H. Bootwala, L. Batten, *Cyber Security Attacks to Modern Vehicular Systems*, Journal of Information Security and Application, 2017
- Anvari, L. Pan, **X. Zheng**, *Examining the Memorability of the Stories that were generated based on Propp theory of narrative for security questions*, Journal of Information Security and Application (2017)
- L. Pan, **X. Zheng**, P. Kolar, S. Bangay, *Object Localization through Clustering Unreliable Ultrasonic Range Sensors*, IEEE Journal of Sensor Networks (2017)
- **X. Zheng**, M. Fu, Mohit Chugh *Big data storage and management in SaaS applications*, Journal of Communications and Information Networks (2017)
- H. Radhappa, **X. Zheng**, W. Sheng, S. Rajasegara, C. Karmakar, *Practical overview of security issues in wireless sensor network applications*, International Journal of Computers and Applications (2017)

Conference Papers

- **X. Zheng**, D. Perry, C. Julien, *BraceForce: a middleware to enable sensing integration in mobile applications for novice*, Proc. of International Conference on Mobile Software Engineering and Systems (MobileSoft), In Conjunction with ICSE, Hyderabad, India, 2014. **(Acceptance Rate: 17%)**
- **X. Zheng**, D. Perry, C. Julien, *BraceForce: Software Engineering Support for Sensing in CPS Applications*, Proc. of International Conference on Cyber-Physical Systems (ICCPS), Berlin, Germany, 2014. **(Acceptance Rate: 24%)**
- **X. Zheng**, C. Julien, R. Podorozhny, F. Cassez, *BraceAssertion: Runtime Verification of Cyber-Physical Systems*, Proc. of International Conference on Mobile Ad-hoc and Sensor Systems (MASS), Berlin, Germany, 2015 **(Acceptance Rate: 25%)**
- **X. Zheng**, C. Julien, *Verification and Validation in Cyber Physical Systems: Research Challenges and Our Solution*, Proc. of International Workshop on Software Engineering for Smart Cyber-Physical Systems (SEsCPS), Florence, Italy, 2015.
- **X. Zheng**, L. Pan, H.X., Chen, P.Y. Wang, L. Batten, *An investigation of security vulnerability in modern vehicle systems*, Proc. of International Conference on Applications and Techniques in Information Security, Cairns, Australia, 2016
- **X. Zheng**, L. Pan, E. Yilmaz, *Security Analysis of Modern Mission Critical Android Mobile Applications*, Proc. of Australasian Computing Doctoral Consortium, Geelong, Australia, 2017 **BEST Paper Award**
- **X. Zheng**, A. Bansal, M. Lease, "Bullseye: Structured Passage Retrieval and Document Highlighting for Scholarly Search", Proc. of Asia-Pacific Conference on Conceptual Modelling, Geelong, Australia, 2017
- B. Bhandari, J.C. Lu, **X. Zheng**, S. Rajasegara, C. Karmakar, *Non-Invasive Sensor Based Automated Smoking Activity Detection*, International Conference of the IEEE Engineering in Medicine and Biology Society, Jeju, Korea, 2017
- Y.Q. Zhang, M.S. Zhang, **X. Zheng**, D. E. Perry, *Service2vec: A Vector Representation for Web Services*, International Conference on Web Services (ICWS), Honolulu, Hawaii, USA, 2017
- **X. Zheng**, L. Pan, H.X. Chen, R. D. Pietro, L. Batten, *A Testbed for Security Analysis of Modern Vehicle Systems*, International Symposium on Security, Privacy and Trust in Internet of Things, In Conjunction with TrustCom, Sydney, Australia, 2017
- **X. Zheng**, *Physically Informed Assertions for Cyber Physical Systems Development and Debugging*, Proc. Of International Conference on Pervasive Computing and Communications (PerCOM) - Doctoral Forum, Budapest, Hungary, 2014. **(Core A*)**
- V. Pham, X. Liu, **X. Zheng**, M. Fu, S. Deshpande, W.D. Xia, M. Abdelrazek, *PaaS - Black or White: An Investigation into Software Development Model for Building Retail Industry SaaS*, Proc. of International Conference on Software Engineering (ICSE) – Poster, Buenos Aires, Argentina, 2017 **(Core A*)**
- T.L. Zheng, Y.Q. Zhang, **X. Zheng**, M. Fu, L. Xiao, L.M. Zhu, *BigVM: A deployment Platform for Software as a Service*, International Conference on Advanced Cloud and Big Data (CBD), Shanghai, China, 2017

Papers under review:

Journal Papers

- Haiming Xie, Guangyu Tian, Guangqian Du, Yong Huang, Hongxu Chen, **X. Zheng**, Tom H. Luan, *A Hybrid Method Combining Markov Prediction and Fuzzy Classification For Driving Condition Recognition*, IEEE Transactions on Vehicular Technology (2017)
- **X. Zheng**, H. Bootwala, W. Sheng, L. Pan, J.C. Lu, H. X. Chen, *Security and Privacy Analysis on Vehicular Ad Hoc Network and its Way Forward*, International Journal of Ad Hoc and Ubiquitous Computing, 2017
- D.J. Yu, Yike Jin, Y.Q. Zhang, **X. Zheng**, *A Survey on Security Issues in Services Communication of Microservices*, Concurrency and Computation: Practice and Experience, 2017

Conference Papers

- **X. Zheng**, Jiao Jiao Jiang, Y.Q. Zhang, Yao Deng, Min Fu, TianLei Zheng, Liu Xiao, *SmartVM: A Multi-Layer Microservice-Based Platform for Deploying SaaS*, International Symposium on Parallel and Distributed Processing with Applications (ISPA), Guangzhou, China, 2017
- J.C. Lu, **X. Zheng**, S. Rajasegara, C. Karmakar, *Introducing Local Feature Engineering in Classifying the Daily Life Activities*, IEEE international Conference on Pervasive Computing and Communications, Athens, Greece, 2018

Papers in progress:

- Fuguo Wei, **X. Zheng**, Y.Q. Zhang, Chun Ou Yang, Yao Deng, WenHua Wang, Sara Hassan, Paola Yanez, Rami Bahsoon, *Microservices Development and Deployment: State-of-the-Art*, IEEE Transactions on Services Computing, 2017
- J.C. Lu, **X. Zheng**, S. Rajasegara, C. Karmakar, *Detecting Alcohol Drinking Behaviour using Non-Intrusive Mechanisms*, Pervasive and Mobile Computing, 2017
- Bin Li, **X. Zheng**, Rui Zhang, *An investigation of Big data processing challenges in developing IoT applications and its way forward*, IEEE Transactions on Knowledge and Data Engineering, 2017
- Jian Lu, **X. Zheng**, Yao Deng, Y.Q. Zhang, G.W. Yang, Rui Zhang, *An investigation of Software Verification challenges in developing Microservices based applications*, IEEE Transactions on Parallel and Distributed Systems, 2017

Invited Talks

NanJing University China, Visit Talk, "Physically Informed Runtime Verification for Cyber Physical Systems", NanJing, China, March 2015

NICTA Australia, End of Visit Talk, "Physically Informed Runtime Verification for Cyber Physical Systems", Sydney, Australia, May 2015

Macquarie University Australia, End of Visit Talk. "Physically Informed Runtime Verification for Cyber Physical Systems", Sydney, Australia, May 2015

University of California, Los Angeles, Visit Talk. "Physically Informed Runtime Verification for Cyber Physical Systems", Los Angeles, USA. June 2015

NanYang Technological University, Visit Talk. "Physically Informed Runtime Verification for Cyber Physical Systems", Singapore. June 2015

Singapore Management University, Visit Talk. "Physically Informed Runtime Verification for Cyber Physical Systems", Singapore. June 2015

Hong Kong Polytechnic University, Visit Talk. "Physically Informed Runtime Verification for Cyber Physical Systems", Hong Kong. June 2015

Hong Kong University of Science and Technology, Visit Talk. "Physically Informed Runtime Verification for Cyber Physical Systems", Hong Kong. June 2015

Sun Yat-Sen University, Visit Talk. "Physically Informed Runtime Verification for Cyber Physical Systems", Guang Zhou, China. June 2015

TianJing Univeristy, Visit Talk. "Research prospects in Service computing and IoT", TianJing, China, Jan 2017

Hangzhou DianZi Univeristy, Visit Talk. "Research prospects in Service computing and IoT", Hangzhou, China, Jan 2017

Sun Yat-Sen University, Visit Talk. "Research prospects in Service computing and IoT", Guangzhou, China, Jan 2017

Southern University of Science and Technology, Visit Talk. "Research prospects in Service computing and IoT", ShenZhen, China, Jan 2017

AnHui University, Visit Talk. "Research prospects in Service computing and IoT", AnHui, China, April 2017

Teaching

Unit Chair and Lecturer in SIT 782 (Master): Practical Projects (96-100% teaching evaluation)

Lecturer in SIT 322 (Undergraduate): Distributed Systems (100% teaching evaluation)

Supervised Research Students (Major Thesis)

Peiyin Wang, MIT Professional Deakin, 2015 (thesis: survey of modern car systems)

Harish Radhappa, MIT Professional Deakin, 2016 (thesis: security analysis of sensor networks)

Huzefa Bootwala, MIT Professional Deakin, 2016 (thesis: security analysis of modern vehicle systems)

Gurjeet Bhatia, MIT Professional Deakin, 2016 (thesis: practical overview of human motion detection solutions)

Lovejit Gupta, MIT Professional Deakin, 2016 (thesis: Detecting Alcohol Drinking Behaviour Using non-intrusive mechanisms)

Akash Chhetri, MIT Professional Deakin, 2016 (thesis: Real-time recommendation system to intervene excessive use of Tobacco and Alcohol)

Veerpal Kaur Ramgarhia, MIT Professional Deakin, 2016 (thesis: Recommendation Systems on Health)

Babin Bhandari, MIT Professional Deakin, 2016 (thesis: A Non-Intrusive Way of Detecting Smoking Using Accelerometer)

Lakshmi Sirisha Revadi, MIT Professional Deakin, 2016 (thesis: Investigating Key User Experiencing Engineering Aspects in Software-as-a-Service Service Delivery Model)

Research-Related Administrative Work

Committee member of Smart Campus Deakin (representing school of IT)

PC member of PerCOM 2018 <http://www.percom.org>

PC member of PerCOM 2017 <http://www.percom.org/node/12>

PC member of MOBILESoft – New Idea Track 2017 <http://mobilesoftconf.org/2017/new-ideas-track/>

Technical Co-Chair of Cyber Physical Systems Track of CSS 2017 (International Symposium on Cyberspace Safety and Security)

Technical Co-Chair of International Workshop on Security and Privacy in Social Big Data (in conjunction with SecureCOMM 2017)

Technical Co-Chair of ACDC 2017 <http://anslab.org/events/ACDC17/committees.html>

Session Chair (“Algorithms in IoT”) for MASS 2015 <http://mass2015.eecs.utk.edu/program.htm>

PC member for IEEE/ACM International Conference on Mobile Software Engineering and Systems 2017 <http://mobilesoftconf.org/2017/important-dates/>

Member of Advanced Networking and Security Research Lab (ANS) <http://www.anslab.org>

Reviewer for IEEE Systems Journal

Reviewer for ACM Transactions on Design Automation of Electronic Systems

Reviewer for Pervasive and Mobile Computing

Reviewer for IEEE Transaction on Cloud Computing

References

1 Christine Julien Associate Professor The University of Texas at Austin Email: c.julien@utexas.edu Phone: 512. 232. 5671 Fax: 512.471.5190 Mailing: One University Station, C5000. The University of Texas at Austin, TX, 78712, USA	2 Miryung Kim Associate Professor University of California, Los Angeles Email: Miryung@cs.ucla.edu Phone: 310.825.2858 Fax: 310.794.5057 Mailing: 420 Westwood Plaza 4532-H Boelter Hall Los Angeles, CA, 90095-1596, USA	3 Franck Cassez Associate Professor Macquarie University Email: franck.cassez@mq.edu.au Phone: 02 9850 9513 Mailing: Department of Computing Faculty of Science and Engineering Macquarie University NSW 2109, Sydney, Australia
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