UNIVERSITY OF MACAU

FACULTY OF SCIENCE AND TECHNOLOGY

"Internet of Safe Things"

by

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Abstract

As devices in the world around us are increasingly connected, the possibilities about how to use these devices and the data have exploded. Many of these scenarios such as home automation and office productivity require software tools beyond data visualizations, to express user intents, check for bugs, and ensure interactions do not cause harm to the users and physical world. However, the

complexities of the user and environmental contexts these devices operate within present enormous challenges to the software development, testing and verification. I will describe our work on (1) Contextual Fuzzing, a cloud based mobile app testing service that systematically explores environmental conditions (such as networking, sensor input) and user interactions at scale, and (2) SIFT, a safety-centric app synthesis and verification platform for IoT devices that checks whether conflicts or policy violations can arise in the apps. I will demonstrate the power of Contextual Fuzzing and SIFT through user studies and deployments, and highlight the research challenges and opportunities for safe and secure IoT systems.

Biography

Feng Zhao is an Assistant Managing Director at Microsoft Research Asia, responsible for the hardware, mobile and sensing, software analytics, systems, and networking research areas. His research has focused on wireless sensor networks, energy-efficient computing, and mobile and cloud systems. He has authored or co-authored over 100 technical papers and books, including a book, Wireless Sensor Networks: An information processing approach, by Morgan Kaufmann, and has over 30 US patents issued.

Since joining Microsoft Research Asia in 2009, Feng and his team have developed mobile and cloud solutions that advanced the state-of-the-art in computing and significantly impacted Microsoft product groups: accurate indoor navigation system, efficient search index serving platform, interactive visual analytics for big data, and software defined radio and networking for data centers.

Prior to joining MSR-Asia, Feng was a Principal Researcher at Microsoft Research Redmond (2004-2009), and founded the Networked Embedded Computing Area. During this time, he led the team to develop the MSR sensor mote, Tiny Web Service, SenseWeb and SensorMap, Data Center Genome, JouleMeter, and GAMPS data compression. With the help of some of these technologies, Microsoft data centers are considered among the most densely instrumented and monitored cloud computing infrastructures in the world.

Feng was a Principal Scientist at Xerox Palo Alto Research Center (Xerox PARC) (1997-2004) and founded PARC's sensor network effort. He played a key role in PARC's Smart Matter Project that developed tiny networked sensors and actuators for embedding into physical environments, and a suite of collaborative sensing,

control and processing protocols, including the IDSQ algorithm.

Feng was the founding Editor-In-Chief of ACM Transactions on Sensor Networks (2003-2010), and founded the ACM/IEEE IPSN conference in 2001. He served on ACM SIGBED Executive Committee (2004-2010), as Technical Program Co-Chairs for ACM Sensys'05 and Mobisys'13, and on the Steering Committee for CPSWeek (2007-now). In 2008, he worked with USENIX and ACM to start HotPower, a technical forum focusing on sustainable computing.

Feng received his BS from Shanghai Jiaotong University (1984), and MS and PhD in Electrical Engineering and Computer Science from MIT (1988 and 1992, respectively). He taught at Ohio State University as an Assistant and then tenured Associate Professor in Computer Science (1992-1997), and at Stanford University as a Consulting Professor of Computer Science (1999-2006).

Feng is also a Professor at Shanghai Jiaotong University, University of Science and Technology of China, and Harbin Institute of Technology, and an Affiliate Faculty at University of Washington. He serves on the advisory boards for Information Engineering at Chinese University of Hong Kong and Computer Science and Engineering at Hong Kong University of Science and Technology.

An IEEE Fellow, Feng received a Sloan Research Fellowship (1994) and US NSF and ONR Young Investigator Awards (1994, 1997). His work has been featured in news media such as BBC World News, BusinessWeek, and Technology Review.

ALL ARE WELCOME!