

## EDITORIAL PREFACE

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The choices for the operating systems of desktop and notebook computers and servers are limited. They are mainly either Microsoft Windows or open-source Linux. On the other hand, the choices for smartphones were many in the past, like Symbian, BREW, Windows Mobile, J2ME, and Palm OS. Finally, the battle for the dominance of mobile operating systems is almost subsided according to Table 1, which shows the worldwide smartphone sales by operating system from 2007 to 2014. From the Table, it can be safely said that only three mobile operating systems will survive in the near future. They are Android, iOS, and Windows Phone from three prominent IT corporations, Google, Apple, and Microsoft, respectively. The correct prediction of the survivability of mobile operating systems is critical for mobile developers. It is because the apps developed for those soon-to-be obsolete operating systems might not be in use for long after spending much time and money on developing them. This issue consists of four articles covering the current topics of handheld computing including: (i) dielectric sensors, (ii) mobile social interaction, (iii) mobile performance testing, and (iv) game behavior tracking. Brief introductions of the four articles are given next.

**Article 1. Biocompatible Implanted Dielectric Sensors for Breast Cancer Detection:** This article describes the development of a method for a biocompatible sensor device for the intent of in vivo breast tissue dielectric properties measurements. It focuses on a specific type of sensor that utilizes an LC circuit with an inter-digital capacitor (IDC) with small size and high sensitivity for early stage breast cancer detection. To meet this objective an IDC was optimized in terms of contrast and miniaturized size via simulation techniques. For experimental testing, a scaled-up prototype inter-digital capacitor and spiral square inductor sensor was fabricated, and tested with known media, such as distilled water and glycerol. The results suggest that there is a need for further development, such as fabrication and testing for the biocompatible, miniaturized sensor for breast tissue application.

**Article 2. Detection of Social Interaction using Mobile Phones via Device Free Passive Localization:** Mobile devices using the 802.11 Wi-Fi are ubiquitous these days. At the same time, there is an unmet need in research and monitoring applications, and particularly in those relating to service and healthcare scenarios, to accurately detect the occurrence and hence frequency and duration of human interaction between subjects. Various sensor modalities exist that are able to perform localization of human subjects with useful degrees of

*Table 1. Worldwide smartphone sales by operating system from <http://wenchen.cs.und.edu/handheldresearch/>*

Year (Total Sales)	Market Share						
	Android	Linux	iOS	RIM	Symbian OS	Windows Phone	Samsung Bada
2007 (122.3 million)	—	4 <sup>th</sup> (9.6%)	5 <sup>th</sup> (2.7%)	3 <sup>rd</sup> (9.6%)	1 <sup>st</sup> (63.5%)	2 <sup>nd</sup> (12.0%)	—
2008 (139.3 million)	—	5 <sup>th</sup> (8.1%)	4 <sup>th</sup> (8.2%)	2 <sup>nd</sup> (16.6%)	1 <sup>st</sup> (52.4%)	3 <sup>rd</sup> (11.8%)	—
2009 (172.4 million)	—	5 <sup>th</sup> (4.7%)	3 <sup>rd</sup> (14.4%)	2 <sup>nd</sup> (19.9%)	1 <sup>st</sup> (46.9%)	4 <sup>th</sup> (8.7%)	—
2010 (296.6 million)	2 <sup>nd</sup> (22.7%)	—	4 <sup>th</sup> (15.7%)	3 <sup>rd</sup> (16.0%)	1 <sup>st</sup> (37.6%)	5 <sup>th</sup> (4.2%)	—
2011 (472.7 million)	1 <sup>st</sup> (46.4%)	—	2 <sup>nd</sup> (18.9%)	4 <sup>th</sup> (12.1%)	3 <sup>rd</sup> (18.7%)	— (2.1%)	5 <sup>th</sup> (2.4%)
2012 (675.0 million)	1 <sup>st</sup> (66.2%)	—	2 <sup>nd</sup> (19.1%)	3 <sup>rd</sup> (5.1%)	4 <sup>th</sup> (4.2%)	5 <sup>th</sup> (2.5%)	— (2.3%)
2013 (969.7 million)	1 <sup>st</sup> (78.5%)	—	2 <sup>nd</sup> (15.5%)	4 <sup>th</sup> (1.9%)	—	3 <sup>rd</sup> (3.2%)	—
2014 (1,244.9 million)	1 <sup>st</sup> (80.7%)	—	2 <sup>nd</sup> (15.4%)	4 <sup>th</sup> (0.6%)	—	3 <sup>rd</sup> (2.8%)	—

accuracy, but they are either expensive, inflexible, or prone to influencing subject behavior via the Hawthorne or observer effect. Therefore, a system, which localizes human presence based on the human body's obstructive effects on RF transmissions through interpretation of perturbation of the received signal strength values generated during transmission, may offer a feature that is both inexpensive and flexible, while avoiding the need for direct subject participation, and thus reducing the impact of the Hawthorne effect.

**Article 3. Performance Testing of Mobile Applications on Smartphones:** Smartphones became the preferred means of communication among users due to the availability of tens of thousands of apps. Although the hardware and software capabilities of smartphones are on the rise, the apps are primarily constrained by the wireless bandwidth and battery life. This paper presents a test architecture to: (i) evaluate the energy performance of two different designs of the same mobile app service; and (ii) evaluate the bandwidth and energy impacts of advertisements on smartphones. The measurements on two video players show that, the proper design results a more energy efficient video players. Next, the authors compare the bandwidth and energy performance news and magazine websites with ads and without ads. In some cases, ads bandwidth cost reaches 50%, whereas ads energy cost reaches 17.8%.

**Article 4. Rolopanel—Tracking Game Behaviour through Mobile Analytics:** When web goes more mobile, there is a need to understand behaviour of mobile visitors and their engagement with mobile apps. This research tries to explore mobile app analytics in three ways: (i) the mobile app as a data source, (ii) the analytics tools needed to turn the data into deep insights, and (iii) the organizational aspect of using actionable insights to inform decision-making. This research develops mobile analytics dashboard—Rolopanel, which easily helps to track and analyse traffic of mobile app visitors through events tracking functionality. The authors examine the gaming apps data and the engagement of users with that mobile app.

According to Table 1, there are more than 1 billion smartphones delivered each year. On the other hand, only 300 million of PC and servers shipped in one year. It shows the future of IT relies on handheld computing. Therefore, handheld computing is no longer an optional, but a must for IT. The IJHCR provides the up-to-date and critical information about handheld research and development. To make the IJHCR even better, you are welcome to contribute articles to this journal or join the editorial review board.

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*Wen-Chen Hu received a BE, an ME, an MS, and a PhD, all in Computer Science, from Tamkang University, Taiwan, the National Central University, Taiwan, the University of Iowa, Iowa City, and the University of Florida, Gainesville, in 1984, 1986, 1993, and 1998, respectively. He is currently an associate professor in the Department of Computer Science of the University of North Dakota, Grand Forks. He was an assistant professor in the Department of Computer Science and Software Engineering at the Auburn University, Alabama, for years. He is the Editor-in-Chief of the International Journal of Handheld Computing Research (IJHCR), the general chairs of a number of international conferences such as the 2015 International Conference on Big Data, IoT, and Cloud Computing (BIC 2015), and associate editors of several journals like Journal of Information Technology Research (JITR). In addition, he has acted more than 100 positions as editors and editorial advisory/review board members of international journals/books, and track/session chairs and program committee members of international conferences. He has also won a couple of awards of best papers, best reviewers, and community services. Hu has been teaching more than 10 years at the US universities and over 10 different computer/IT-related courses, and advising/consulting more than 100 graduate students. He has published over 100 articles in refereed journals, conference proceedings, books, and encyclopedias, edited more than 10 books and conference proceedings, and solely authored a book entitled "Internet-enabled handheld devices, computing, and programming: mobile commerce and personal data applications." His current research interests include handheld/mobile/smartphone/tablet computing, location-based services, web-enabled information system such as search engines and web mining, electronic and mobile commerce systems, and web technologies. He is a member of Association of Computing Machinery (ACM).*