

GetMobile

An Overview of Emerging Video Coding Standards

Page 13



A PUBLICATION
OF ACM SIGMOBILE

CONTENTS

- 3 Message from the Editor-in-Chief



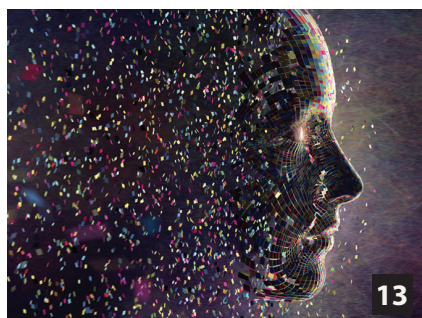
EXPERIMENTAL METHODS

- 5 In Praise of Small Data: When You Might Consider N-of-1 Studies



ARM'S LENGTH

- 9 Towards Approximate Mobile Computing



STANDARDS

- 13 An Overview of Emerging Video Coding Standards



AWARDS

- 21 2018 SIGMOBILE Outstanding Contributions Award: Teresa H. Meng



past → FUTURE

- 22 Energy Harvesting is Charging Up

HIGHLIGHTS



- 25 RuntimeDroid: Restarting-Free Runtime Change Handling for Android Apps



- 30 Augmented Vehicular Reality: Enabling Extended Vision for Future Automobiles



- 35 Mobile Imaging Using Acoustic Signals

MESSAGE FROM THE EDITOR-IN-CHIEF

CONTRIBUTORS

EDITOR-IN-CHIEF

Eyal de Lara, University of Toronto

MANAGING EDITOR Donna Paris

DESIGNER JoAnn McHardy

SENIOR ADVISORS (Past Editors-in-Chief)

Paramvir Bahl, Microsoft Research

Suman Banerjee, University of Wisconsin, Madison

Srikanth Krishnamurthy, University of California, Riverside

Jason Redi, BBN Technologies

Mani Srivastava, University of California, Los Angeles

Nitin Vaidya, University of Illinois, Urbana-Champaign

SECTION EDITORS

Ardalan Amiri Sami, University of California, Irvine

Aruna Balasubramanian, Stony Brook University

Nilanjan Banerjee, University of Maryland, Baltimore County

Romit Roy Choudhury, University of Illinois, Urbana-Champaign

Eduardo Cuervo, Microsoft Research

Prabal Dutta, University of Michigan

Carla S. Ellis, Duke University

Michelle X. Gong, Google

Haitham Hassanieh, University of Illinois, Urbana-Champaign

Julie A. Kientz, University of Washington

Nic Lane, Bell Labs and University College, London

Robert LiKamWa, Arizona State University

Shiwen Mao, Auburn University

Iqbal Mohamed, Samsung Research America

Sami Rollins, University of San Francisco

Lin Zhong, Rice University

Xia Zhou, Dartmouth College

ACM STAFF

Julie Goetz, Administrator – Publications Production

Adrienne Griscti, Publication Manager – SIG Publications

April Moskus, Program Coordinator – SIG Activities

SIGMOBILE EXECUTIVE COMMITTEE

Suman Banerjee, University of Wisconsin-Madison, *Chair*

Lili Qiu, University of Texas Austin, *Vice Chair*

Marco Gruteser, Rutgers University, *Treasurer*

Alec Wolman, Microsoft Research, *Secretary*

Roy Want, Google, *Past Chair*

**“NEVER BE AFRAID TO TRY SOMETHING NEW.
REMEMBER, AMATEURS BUILT THE ARK.
PROFESSIONALS BUILT THE TITANIC.”** – Unknown



Eyal de Lara

THE TIME HAS COME for me to step down as editor-in-chief of GetMobile. I want to take this opportunity to reflect on my experience at the head of the publication. I took over the helm of SIGMOBILE's flagship publication with the stated goal of transforming it from what was basically an archival journal that published papers drawn from a traditional open call into a magazine consisting of a set of regular sections curated by a committed group

of editors. To herald this transformation, a new name was chosen and MC²R became GetMobile.

I have to admit that, like many others, I had doubts about the long-term viability of the project. Would we be able to continue to produce a high-quality magazine on a quarterly basis year after year, or would we run out of material after publishing a handful of papers authored by the usual suspects?

Alas, seventeen issues later, and thanks to the concerted efforts and dedication by a large group of talented and motivated individuals, GetMobile is going strong! I want to thank the SIGMOBILE Executive Board for believing in this new vision, and for providing the resources to make it happen. My thanks go to the members of the editorial board for their relentless commitment to secure and shepherd articles; the high-quality content we publish is the result of their selfless efforts. I also want to express my deep appreciation to Donna Paris who, as managing editor, has made my job as editor-in-chief (almost) a walk in the park, as well as to our designer, JoAnn McHardy, for producing our beautiful layouts and graphics. Finally, I want to thank all the contributing authors for entrusting us with their content.

It is my pleasure to announce that the SIGMOBILE Executive Board has confirmed Dr. Landon Cox as my successor. Landon earned his PhD in Electrical Engineering and Computer Science from the University of Michigan in 2005 under the direction of Prof. Brian D. Noble. Landon is a senior researcher in the Mobility and Networking Group at Microsoft Research Redmond. Before joining Microsoft, Landon was an associate professor with tenure in the Department of Computer Science at Duke University. Landon's research is on experimental software systems with a focus on privacy in mobile computing and operating systems. He is perhaps best known for his work on TaintDroid, an information-

flow tracking system for realtime privacy monitoring on smartphones. Landon has also taken several important leadership roles in our community, including serving as TPC Chair of HotMobile in 2011 and MobiSys in 2014. He is clearly a leader and a visionary in our field, and I cannot think of anyone better qualified to take GetMobile forward.

In this issue, we highlight three papers from ACM MobiSys 2018. In “RuntimeDroid: Restarting-Free Runtime Change Handling for Android Apps,” Umar Farooq and Zhijia Zhao point out that in Android systems, configuration changes, such as screen orientation changes, screen resizing, keyboard attachments, and language switching, are typically handled by application restarting, which, due to poor coding practices, can result in user data loss to app crashes. The authors describe a restart-free runtime that avoids the need for application restarting while ensuring proper resource updating and user data preservation.

“Augmented Vehicular Reality: Enabling Extended Vision for Future Automobiles,” by Hang Qiu, Fawad Ahmad, Fan Bai, Marco Gruteser, and Ramesh Govindan present an approach that improves vehicular safety in autonomous driving by extending a vehicle’s visual horizon by enabling it to wirelessly share visual information with other nearby vehicles.

Lastly, “Mobile Imaging Using Acoustic Signals,” by Wenguang Mao, Mei Wang, and Lili Qiu describes an acoustic imaging system that runs on a phone without extra hardware and can detect objects under clothing and inside bags.

The rest of the issue consists of four additional columns:

In the Experimental Methods column, Julie A. Kientz explores the merits of conducting small Single Case designs or N-of-1 studies. The article discusses how to conduct such studies in the context of a mobile app for self-experimentation with gastrointestinal health.

In the Arm’s Length column, Veljko Pejović provides an overview of Approximate Computing Techniques that save energy by reducing the amount of computation to the point where the result accuracy is just above the minimum necessary to satisfy a user’s requirements.

The Standards column features an article by Ticao Zhang and Shiwen Mao, which provides an overview of existing and emerging video coding standards. The authors review the timeline of the development of the popular H.26X family video coding standards, introduce several emerging video coding standards such as AV1, VP9, and VVC, and discuss future trends that leverage advancements in machine learning and hardware acceleration.

The Awards column penned by Lin Zhong recognizes Dr. Teresa H. Meng, the 2018 SIGMOBILE Outstanding Contributions Award recipient for her groundbreaking research, engineering and entrepreneurial leadership to make Wi-Fi faster, lower power, and lower cost.

Finally, in the past→future column, Jeremy Gummeson discusses developments and challenges in the space of energy harvesting technology for mobile and ubiquitous applications.

I hope you enjoy this issue, and I welcome your thoughts about GetMobile in general, and this issue in particular. ■

EDITORIAL CORRESPONDENCE

Address to: Prof. Eyal de Lara, 40 St. George Street, Suite 4283, Department of Computer Science, University of Toronto, Toronto, Ontario M5S2E4, Canada, Email: getmobile_editor@acm.org. For specific department email addresses, see the “Call for Contributions” on page 39.

NOTICE TO CONTRIBUTING AUTHORS TO SIG NEWSLETTERS

By submitting your article for distribution in this Special Interest Group publication, you hereby grant to ACM the following non-exclusive, perpetual, worldwide rights: to publish in print on condition of acceptance by the editor, to digitize and post your article in the electronic version of this publication, to include the article in the ACM Digital Library, and to allow users to copy and distribute the article for noncommercial, educational or research purposes. However, as a contributing author, you retain copyright to your article and ACM will make every effort to refer requests for commercial use directly to you.

ACM GETMOBILE

ACM SIGMOBILE publishes ACM GetMobile four times annually for its members. The Newsletter has a controlled distribution with the compliments of ACM SIGMOBILE. GetMobile assumes no responsibility for the return of submitted manuscripts, photographs, artwork, or other material. Nothing in this publication shall constitute an endorsement by ACM, or SIGMOBILE or GetMobile (collectively, the “Publisher”) of any information contained in this publication, and the Publisher disclaims any liability with respect thereto or the use or reliance on any such information. The information contained in the publication is in no way to be construed as a recommendation by the Publisher of any kind or nature whatsoever, nor as a recommendation of any industry standard, nor as an endorsement of any product or service, nor as an opinion or certification regarding the accuracy of any such information.

SIGMOBILE URL:

<http://www.acm.org/sigmobile>

ISSN 2375-0529