Fulfilling the Promise of Mobile Device Crowds

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Abstract—Mobile devices today possess an incredible amount of processing power and storage. They are increasingly ubiquitous and tend to be present in clusters or crowds. These crowds can be made up of a small number of devices when, for example, one considers the devices an individual may carry on their person or may have in their home. Alternatively, the device crowds can be made up of a large number of devices as, for example, one might find in a classroom, coffee shop or university campus. Within each crowd the devices can communicate with each other as well as with entities outside the crowd. It has been observed that one can leverage these device crowds to provide meaningful compute capability for applications from within and outside the crowd. In this talk I will provide a taxonomy for device crowds that will help emphasize the diversity of contexts in which they may operate. I will then summarize our work on a number of device crowd-based systems, such as Serendipity and FemtoCloud. This work aims to understand the processing capability that can be provided with mobile device crowds in various settings. Finally I will discuss some of the challenges that remain to be addressed for device crowds to fulfil their promise.

Index Terms—Pervasive computing, Device-to-Device collaboration, FemtoCloud, Opportunistic crowd, Context-awareness, Mobile devices

SPEAKER BIO

Mostafa Ammar: is a Regents' Professor with the School of Computer Science at the Georgia Institute of Technology. He is currently serving as the Interim Chair of the School. Dr. Ammar received the S.B. and S.M. degrees from the Massachusetts Institute of Technology and the Ph.D. from the University of Waterloo, Ontario, Canada. Dr. Ammar's research interests are in network architectures, protocols and services. He has contributions in many areas within networking research, most recently in disruption-tolerant networks, mobile cloud computing, network virtualization, packet scheduling in modern networks, and adaptive video streaming. To date, 37 Ph.D. students have completed their degrees under his supervision; many have gone on to distinguished careers in academia and industry. Dr. Ammar has served the networking research community in multiple roles. Most notably, he served as the Editor-in-Chief of the IEEE/ACM Transactions on Networking (ToN) from 1999 to 2003, and he was the co-TPC Chair for the IEEE ICNP 1997, ACM CoNEXT 2006 and ACM SIGMETRICS 2007 conferences. His awards include the IBM Faculty Partnership Award (1996), Best Paper Award at the 7th WWW conference (1998), the GT Outstanding Doctoral Thesis Advisor Award (2006), the Outstanding Service Award from the IEEE Technical Committee on Computer Communications (2010), the ACM Mobihoc Best Paper Award (2012), and the Best Paper Award at IFIP Network Traffic Measurement and Analysis Conference (2018). He received the 2018 Alumni Achievement Award from the Faculty of Engineering at the University of Waterloo. Dr. Ammar is Fellow of the ACM and Fellow of the IEEE.