

---

# PURBA 2013: Workshop on Pervasive Urban Applications

**Francesco Calabrese**  
IBM Research  
Dublin, Ireland  
fcalabre@ie.ibm.com

**Neal Lathia**  
Computer Laboratory  
University of Cambridge  
Cambridge, United Kingdom  
neal.lathia@cl.cam.ac.uk

**Giusy Di Lorenzo**  
IBM Research  
Dublin, Ireland  
giusydil@ie.ibm.com

**Dominik Dahlem**  
IBM Research  
Dublin, Ireland  
dominik.dahlem@ie.ibm.com

**Santi Phithakkitnukoon**  
Computing Department  
The Open University  
Milton Keynes  
United Kingdom  
santi.phi@open.ac.uk

---

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from [permissions@acm.org](mailto:permissions@acm.org).

*UbiComp'13 Adjunct*, September 8–12, 2013, Zurich, Switzerland.  
Copyright © 2013 ACM 978-1-4503-2215-7/13/09...\$15.00.

## Abstract

This is the proposal for the Third Workshop on Pervasive Urban Applications (PURBA 2013). The workshop aims to build on the success of the previous workshops organized in conjunction with the Pervasive 2011 and 2012, to continue to disseminate the results of the latest research outcomes and developments of ubiquitous computing technologies in urban areas. An IBM-Best student award will be given at the workshop.

## Author Keywords

Smart cities, urban computing, data mining, ubiquitous computing.

## ACM Classification Keywords

H.2.8 [Database Applications]: Data mining Spatial databases and GIS

## Background and Motivation

Over the past decade, the development of digital networks and operations has produced an unprecedented wealth of information. Handheld electronics, location devices, telecommunications networks, and a wide assortment of tags and sensors are constantly producing a rich stream of data reflecting various aspects of urban life. This constant stream of 0s and 1s allows unprecedented research opportunities. Through phone calls we can see cities

making bold handshakes' during business hours, and then becoming introverted during the evening. With SMS texts, we can capture crowds cheering and sharing their emotional highs in special events. These digital traces also reveal the migratory magnetism of coastal city hotspots and the drudgery of a gridlocked commute. For urban planners and designers, these accumulations of digital traces are valuable sources of data in capturing the pulse of the city in an astonishing degree of temporal and spatial detail. Yet this condition of the hybrid city which operates simultaneously in the digital and physical realms also poses difficult questions about privacy, scale, and design, among many others. These questions must be addressed as we move toward achieving an augmented, fine-grained understanding of how the city functions socially, economically and yes, even psychologically.

The third PURBA workshop builds on the success of the PURBA 2011 and PURBA 2012, which were organized at Pervasive 2011 and 2012, respectively. The first workshop attracted significant interest and many submissions. From 30 submitted papers, we accepted eight for long presentations and an additional eight for short presentations. Along with the paper presentations, we had a highly interactive group discussion and an insightful keynote given by Lisa Amini, director of the IBM Smarter Cities Technology Center. The workshop was well received, with about 70 researchers and practitioners from industry and academia attending. The workshop concluded with the presentation of the two best student paper awards sponsored by IBM. Attendees were encouraged to submit extended papers for possible publication in the Elsevier Pervasive and Mobile Computing (PMC)'s special issue on Pervasive Urban Applications, which was organized by the workshop organizers as guest editors. The special issue was

successfully published in 2012. In addition, the summary of the workshop was published with the IEEE Pervasive Computing magazine in October-December 2011 issue.

The second workshop, PURBA 2012 was organized at Pervasive 2012 in Newcastle, UK. Although the workshop only attracted 14 submissions, it was the highest number of submissions among other workshops organized at the Pervasive 2012. We know this information because our workshop's co-organizer, Santi Phithakkitnukoon was involved in organizing Pervasive conference as a member of Culture Lab at Newcastle University. Along with paper presentations of six selected papers, we had a highly interactive group discussion and best paper award presentation sponsored by IBM.

Based on feedback that we received, we feel that researchers enjoyed the workshop's informal and highly interactive format, which prompts us to continue with a third edition of PURBA in 2013 at UbiComp.

### Objective

The PURBA 2013 workshop aims to bring together researchers and practitioners to discuss and explore the research challenges and opportunities in applying the pervasive computing paradigm to urban spaces. We are seeking multi-disciplinary contributions that reveal interesting aspects about urban life and exploit the digital traces to create novel urban applications that benefit citizens, urban planners, and policy makers. The best papers will be invited along with the summary of the discussions and challenges identification of the workshop as part of the Guest Editorial for a Special Issue on a high impact Journal (IEEE Pervasive Computing).

The PURBA 2013 workshop fosters discussions covering topics such as (but not limited to):

- Pervasive computing applications for urban planning and design
- Mining of data collected from urban networks e.g. transportation, energy
- Urban mobility and geo-localization
- Multi-source urban information integration
- Real-time urban information processing
- City-related knowledge infrastructure and computational models
- Case studies and applications of mixed urban sensing and mining
- Analysis of social networks in urban space
- Middleware for mobile urban computing
- Context-aware systems for urban space
- Smart cities
- Intelligent transportation system
- Urban application demos and visualizations
- Wireless sensor networks, mobile devices, and social network sensing
- Security, privacy, reputation, and trust issues in urban computing
- Impact of pervasive technologies in urban space e.g. social, economical, and psychological.

### Format

PURBA 2013 workshop is based on a one-day workshop format. Concretely, it will be one session for a keynote lecture and two sessions for technical papers. Papers are to be grouped in at least two themes:

1. Urban Computing – including aspects of sensing and mining urban data
2. Urban Applications – including new urban applications using pervasive technologies

The third session will include open discussions towards identifying challenges on sensing and mining urban data, as well as developing pervasive urban applications. The format of the workshop will stimulate interaction among participants by interactive presentations and joint discussions and plans to organize a Special Issue on a high impact Journal (IEEE Pervasive Computing) inviting the best papers and summarizing the discussions and challenges of the workshop as part of the Guest Editorial.

Specifically, we propose to start off the workshop with an introduction given by the organizers to tie each contribution into the broader theme of the workshop followed by a brief informal introduction of our participants. Then, we plan to have two one-hour paper presentation sessions in the morning with a coffee break in between. After lunch, the program reconvenes with demos of urban applications and visualizations. We envision very interactive sessions in the afternoon, where one session concentrates on challenges in urban spaces and problem formulations that utilize pervasive technologies. The last interactive session puts those findings into concrete solutions. We hope by encouraging a final group discussion with all participants to provide a comprehensive

perspective on current and future pervasive urban applications to the community at large. The workshop concludes with a keynote given by an expert in the field. The tentative schedule is given below.

Time	Activity
9:00AM	Introduction
9:30AM	Paper Presentation (Session 1)
10:30AM	Coffee Break
11:00AM	Paper Presentation (Session 2)
12:00PM	Lunch Break
1:30PM	Demos
2:00PM	Interactive Presentation (Session 1): Problems
2:30PM	Coffee Break
3:00PM	Interactive Presentation (Session 2): Solutions
5:00PM	Group Discussion
5:30PM	Key note and Best Paper Award announcement

### Soliciting Submissions

Research in the topic of Urban Planning and Pervasive Computing together with advances in wireless sensor networks and mobile sensing are the topics of paramount interest for today's R&D arena. Both communities are now converging into a new challenge that is the integration of both approaches to better understanding of city dynamics. In this sense, leading companies like Google, Yahoo!, Microsoft, IBM, and others have recently been focusing on hybrid approaches for sensing and mining urban information. Moreover, this workshop is supported by IBM Research through the Best Paper Award and is open to all researchers working in the area of Urban Computing. The workshop intends to attract around 30-40 submissions from which around the best 12 will be invited to present during the workshop day. In order to do this, the workshop website will be created.

The Organizing Committee together with Program Committee will promote the workshop among on-going projects in the field of Urban Computing and disseminate the CFPs and results of the workshop widely in events organized by IBM Smarter Cities Technology Centre, Open University, as well as University of Cambridge through a number of different mailing lists, websites, and relevant ACM and IEEE high quality events in view of attracting the expected number of submissions.

### Selecting Participants

To ensure a rigorous peer-review process, the program committee with relevant research expertise in Pervasive Computing and Urban Computing will be involved in the reviewing process. All submitted position papers will be reviewed by at least three PC members and judged on originality, technical correctness, relevance, and quality of presentation. All contributions must not have been previously published or be under consideration for publication elsewhere. A selected number of submissions will be invited to submit an extended version for a Special Issue of a high impact Journal (IEEE Pervasive Computing). A list of researchers who will serve on the Technical Program Committee is given below in alphabetical order:

Carlos Bento, Universidade de Coimbra

Martin Brynskov, Aarhus University

Licia Capra, University College London

Enrique Frias-Martinez, Telefonica Research

Vanessa Fras Martnez, Telefonica Research

Jon Froehlich, University of Maryland

Marcus Foth, Queensland University of Technology

Teerayut Horanont, University of Tokyo

Fabien Girardin, Near Future Laboratory

Gerd Kortuem, The Open University

Mirco Musolesi, University of Birmingham

Anastasios Noulas, University of Cambridge

Patrick Olivier, Newcastle University

Daniele Quercia, Yahoo! Research

Salvatore Scellato, Google

Stephan Sigg, National Institute of Informatics

Yoshihide Sekimoto, University of Tokyo

Zbigniew Smoreda, Orange Labs

### Organizers

**Francesco Calabrese** is an Advisory Research Staff Member at the IBM Research - Ireland center in Dublin, Ireland. Francesco manages the Smarter Urban Dynamics group, focusing on developing analytics and tools to better understand and optimize the urban dynamics. He received the Laurea (BS and MS) degree in Computer Engineering, cum laude, in 2004, and the Ph.D. in Computer and System Engineering from the University of Naples Federico II, Italy, in 2007. He was research scientist and postdoctoral associate at the Massachusetts Institute of Technology from 2007 to 2010, where he led research in urban networks & society. His research interests include ubiquitous computing, intelligent transportation systems, urban network analysis and the

design of distributed control systems. He has co-authored over 60 scientific publications. His work has been exhibited in leading museums worldwide, including the Venice Biennale, Science Gallery and MoMA, NY.

**Giusy Di Lorenzo** is currently a Research Scientist at the IBM Research - Ireland center in Dublin, Ireland. Her current research explores the analysis of urban dynamics and human mobility using data gathered from sensor networks and social media. In particular, she is interested in developing context-aware applications to improve urban living experiences of citizens. Giusy received a PhD in Computer and System Engineering, from University of Naples Federico II in December 2008 and the degree with Honours (cum laude) in Computer Engineering from the same university, in April 2005. During her Ph.D., she was Research Assistant at Computer Science and Engineering School, University of New South Wales (UNSW), Sydney (Australia). She was postdoctoral associate at the Massachusetts Institute of Technology from 2009 to 2010, where she led the AIDA project in collaboration with Audi VW.

**Dominik Dahlem** is a Research Scientist at the IBM Smarter Cities Technology Centre, Dublin, Ireland, where is focusing on urban network analysis and optimization. He holds an affiliation with the Senseable City Lab of the Massachusetts Institute of Technology, Cambridge, MA, USA. Prior to joining IBM, Dominik was a Postdoctoral Research Fellow at the Senseable City Lab, where he was leading the research initiatives on healthcare informatics and the Networks and Society research group. He received his Ph.D. at the School of Computer Science and Statistics from Trinity College Dublin in Ireland in May 2010. Previous to that he also completed an M.Sc. by research and a diploma in Statistics from the same

university and a Diploma Engineer from the university of applied sciences in Wiesbaden, Germany. His Ph.D. thesis studied decentralised optimisation processes on networks with a focus on quantifying non-linear effects brought about by their complex interactions. A large part of his research endeavour is related to utilizing statistical and mathematical tools to uncover the character of these processes and how they impact the functioning of the underlying network structure. Recently, this extended into studying human mobility and healthcare. His interests include social/complex network analysis, non-parametric methods, statistical learning, and high-performance computing. He is a member of the ACM and IEEE societies.

**Santi Phithakkitnukoon** is currently a Lecturer in Computing at the Open University, United Kingdom. Santi is also a Visiting Research Fellow at Culture Lab Newcastle University and a Research Affiliate at MIT's SENSEable City Laboratory. His research interest is in the area of social and urban computing. His recent work involves analyzing large-scale digital footprints e.g., mobile phone CDRs and GPS traces (e.g., taxis, buses) to better understand social and urban systems. He is currently a member of editorial board of Social Networking and IGI Global journals. He has previously organized PURBA 2011, PURBA 2012, and **SocialUrban 2011** workshops, which were held in conjunction with Pervasive 2011, Pervasive 2012, and SocialCom 2011, respectively. He's been a PC member for several conferences and workshops such as MDM 2013, Nokia Data Challenge 2012, SocialCom 2012. Santi received B.S. and M.S. degrees in Electrical Engineering from Southern Methodist University, Dallas, Texas (USA) in 2003 and 2005, respectively. He received his Ph.D. in Computer Science and Engineering from the University of

North Texas, Denton (USA) in 2009. Before joining the Department of Computing & Communications at the Open University, he was a postdoctoral fellow at MIT and research associate at Newcastle University.

**Neal Lathia** is currently a Research Associate in the Networks and Operating Systems Group of Cambridge University's Computer Laboratory, where he is working on the EPSRC UBhave (Ubiquitous and Social Computing for Positive Behaviour Change) project with Dr. Cecilia Mascolo. Prior to joining the Computer Lab, he was a Research Associate in the Department of Computer Science at University College London (where he is still an honorary Research Associate). He researched personalisation in mobile/public transport contexts as part of the EC i-Tour project with Dr. Licia Capra. Lathia also obtained his PhD from University College London, under the supervision of Prof. Stephen Hailes and Dr. Licia Capra, funded by the EPSRC Utiforo project: his doctoral work centred around evaluating collaborative filtering algorithms (for online recommender systems) over time. His research to date falls somewhere in the intersection of data mining, mobile systems, ubiquitous/pervasive systems, and personalisation/ recommender systems, applied to a variety of contexts (e.g., transport).