

PERVASIVE

ISWC

2012

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Welcome



## Message from chairs

Welcome to Pervasive 2012, the 10th International Conference on Pervasive Computing. Pervasive is the premier forum for researchers to present their latest results in all areas related to the architecture, design, implementation, application and evaluation of pervasive computing.

Pervasive 2012 takes place in Newcastle-upon-Tyne, UK, a lively, friendly and modern city, with a compact city centre and renowned cultural venues, including the Baltic Centre for Contemporary Art, the Sage Gateshead and the iconic Angel of the North. We hope that you will find time to explore the city and its surrounding areas during your visit.

This year the program chairs accepted 28 papers out of 138 submissions. In addition to the technical program, we have a busy schedule of workshops, demos, posters, videos and a doctoral consortium. We think that the final program represents a broad and exciting cross-section of today's research. It also represents an enormous amount of work by authors, chairs, the program committee and reviewers, to whom we are thankful for their time and effort.

We hope that you enjoy the conference!

Patrick Olivier and Antonio Krüger

Pervasive 2012 General Chairs



Welcome to ISWC 2012 – the 16th International Symposium on Wearable Computing.

The hard work of many volunteers resulted in an exciting conference program: besides paper presentations, ISWC 2012 features two days of Tutorials and Workshops, a Doctoral Consortium, and a Panel session on Wearable Computers. Moreover, Posters, Videos, and Demos are in the programme. We are particularly proud to host a Design Competition, which is freely accessible to the public. Please visit [www.iswc.net/iswc12](http://www.iswc.net/iswc12) for more details.

The soar of smartphones, unobtrusive sensors, and mobile user interfaces has been part of ISWC's success and recognition over the past years. However, research around novel smart materials is currently making great leaps and may lead into ISWC's future. In the closing keynote speech of Elias Siores we will take a close look at the recent advances.

I like to thank all active members of the organising committee, the technical program committee, and all reviewers for their enthusiasm and effort to support the conference organisation. We thank the IEEE Computer Society for technically co-sponsoring ISWC 2012, as well as Google and Nokia for their kind donations to support the conference.

Please enjoy the ISWC 2012 program!

Oliver Amft

ISWC 2012 General Chair

# Contents

4

Intro / message from chairs



Use #per2012 or #iswc12 when you tweet

6

PERVASIVE/ISWC 2012



## Contents

Social programme	8
Keynote speakers	10
Papers > Wednesday	12
Papers > Thursday	22
Papers > Friday	40
Workshops	48
Demos	58
Design Exhibition	72
Posters	74
Interactivity	76
Local information / things to do	78
Map	BACK

# Social Calendar

## Informal Activities

MON

Drinks at the Five Swans. Join us there or meet outside the Herschel Building at 7pm

TUES

Guided walks around the city.  
Meet outside the Herschel Building at 2pm

WED

Drinks and food after the demo session.  
Gather at the Great North Museum

THUR

After the conference dinner,  
meet at The Town Wall pub on Pink Lane

FRI

Drinks and food starting at Northern Stage bar on campus. Meet at Northern Stage or outside Herschel Building at 7pm



# Social Calendar

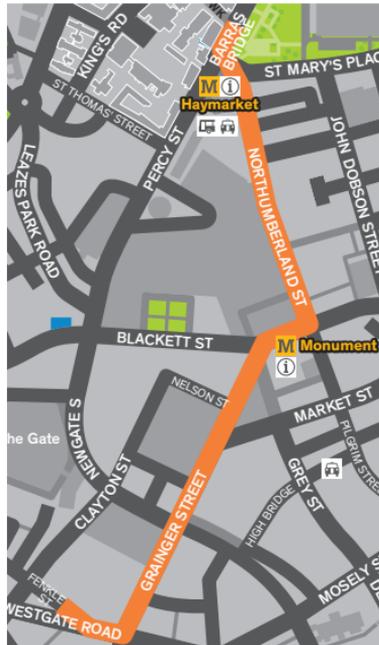
## Lunch

Lunch will be provided every day of the conference in the Great North Museum. The museum is located just outside the university's main gates across Claremont Road. See campus map.

## Conference Dinner

The conference dinner will be held on Thursday evening at 7pm in the Assembly Rooms on Fenkle Street.

There will be a walking bus from outside the Herschel Building at 6.45pm.



# Keynote Speakers

## Sanjiv Nanda

Putting contextual intelligence in the hands of the average end user requires innovations in many fields beyond traditional sense making or contextual awareness. We believe that advances in low power implementation and autonomous peer to peer networking will also enable contextual intelligence. Challenges such as low-power, always-on sensing, seamless networking, and pervasive information exchange are key steps in making contextual intelligence a reality. At Qualcomm, we are working on creating an ecosystem to enable information-rich, low-power, pervasive contextual intelligence. This keynote will highlight how the confluence of continuous sensing, smart spaces, and collaborative data brings contextual intelligence to the real world.



**Sanjiv Nanda is a vice president of engineering in Qualcomm's Corporate R&D group and oversees the Systems Engineering department**



## Keynote Speakers

### **Elias Siores**

Smart materials are capable of sensing the environment within which they are functioning and responding to a stimulus from that environment. In this keynote, the research and development work undertaken in the area of smart materials for applications in technical textile systems and devices, especially wearables, are explained and discussed. Systems and devices based on energy conversion are explored for potential industry applications ranging from renewable energy by scavenging energy from human motion and the elements, to vehicle and personal protection, healthcare and biomedical. The incorporation of such smart materials into flexible fibre structures and systems integration on wearables is also outlined along with the potential to apply the emerging technologies in other areas.

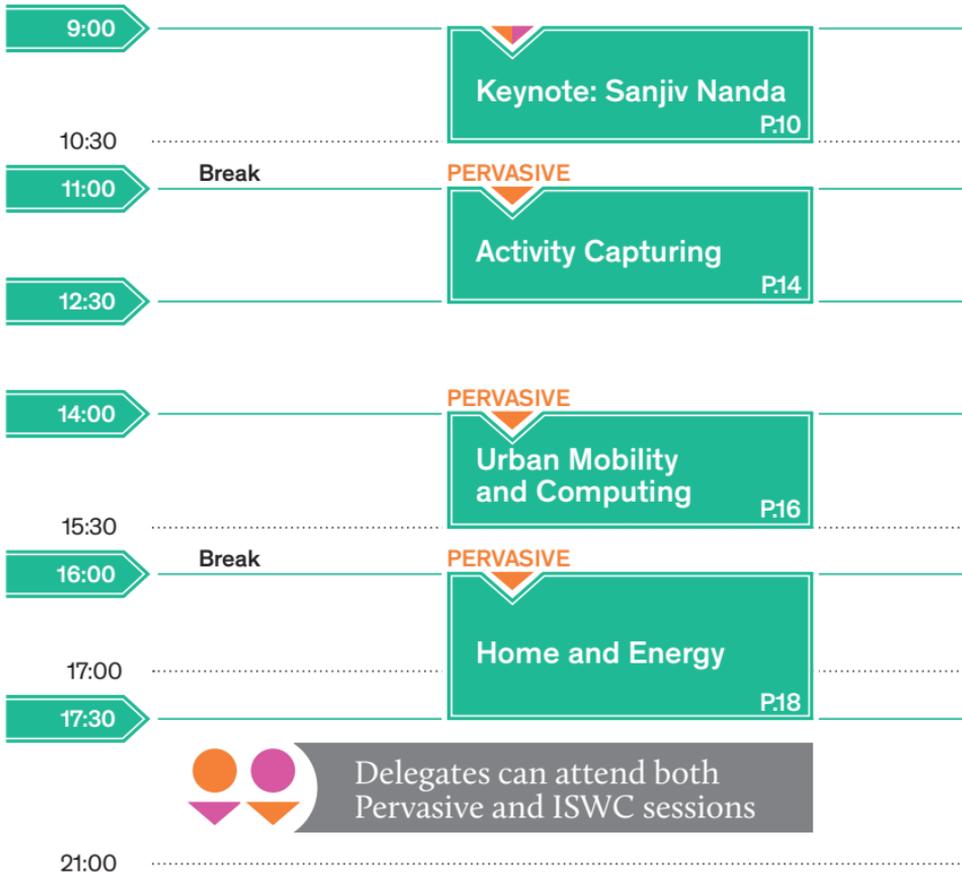
**Prof. Elias Siores is the  
Provost and Director of  
Research and Innovation at  
The University of Bolton**



WEDS

# Paper Session Daily Overview

Curtis Auditorium



Delegates can attend both Pervasive and ISWC sessions



WEDS

# Paper Session Daily Overview

Great North Museum

Lecture Theatre 3

9:00



remember to use #per2012 or #iswc12

10:30

Break

11:00

12:30

Lunch

14:00

13:30

ISWC

Break

16:00

Learning  
About People P.20

17:00

17:30

Demos and  
Reception

P.58

21:00

WEDS

## Activity Capturing

Curtis  
Auditorium

PERVASIVE



use #activcap to tweet about this session

11:00

### Personalized Driving Behavior Monitoring and Analysis for Emerging Hybrid Vehicles

Kun Li, Man Lu, Fenglong Lu, Qin Lv,

Li Shang, Dragan Maksimovic

User driving behavior, which varies from person to person, can significantly affect electric-drive vehicle operation and the corresponding energy and environmental impacts. This paper presents a personalized driving behavior monitoring and analysis system for emerging hybrid vehicles. We propose phone-based multi-modality sensing that captures precise driver—vehicle information through denoise, calibration, synchronization, and disorientation compensation.



Drinks and food after the demo session  
Gather at the Great North Museum



## Mimic Sensors: Battery-shaped Sensor Node for Detecting Electrical Events of Handheld Devices

11:30

Takuya Maekawa, Yasue Kishino,  
Yutaka Yanagisawa, Yasushi Sakurai

---

We propose and implement a battery-shaped sensor node that can monitor the use of an electrical device into which it is inserted by sensing the electrical current passing through the device. We also propose a method that automatically identifies into which electrical device the node is inserted and recognizes electrical events related to the device by analyzing the sensor data.

## Leveraging Children's Behavioral Distribution and Singularities in New Interactive Environments: Study in Kindergarten Field Trips

12:00

Martin Halvey, David Hannah,  
Graham Wilson & Stephen Brewster

---

We explore the collective behaviors of a group of children by pervasive technology, and its assistive potentials for human experts in the child education. We deliver the design and practices for behavioral monitoring in field trips. We deploy our design on multiple field trips and deliver rich benefits in terms of extending the teachers' awareness on children's field trip behaviors.

Curtis  
Auditorium

PERVASIVE

14:00

**Urban Traffic Modelling and Prediction  
using Large Scale Taxi GPS Traces**

Pablo Castro, Daqing Zhang, Shijian Li

In this paper, we propose a method to construct a predictive model of traffic density based on digital traces produced by GPS-equipped taxis; we further propose as a novel method for automatically determining the capacity of each road segment in a road network. We demonstrate our methods' outstanding performance on a large database of GPS traces.

14:30

**A Unified Framework for Modeling  
and Predicting Going-out Behavior**Shoji Tominaga, Masamichi Shimosaka,  
Rui Fukui, Tomomasa Sato

A non-parametric Bayesian clustering method to extract one's own rhythm of the daily going-out behavior and a prediction method of one's future presence using the extracted models are proposed in this contribution. Experimental results with data of 6 subjects, total 827 days show that our method copes with the complexity of patterns and flexibly adapts to unknown observation.



## Urban Mobility and Computing



use #urbanmob to tweet about this session

### **The Hidden Image of the City: Sensing Community Well-Being from Urban Mobility** (note)

15:00

**Neal Lathia, Daniele Quercia, Jon Crowcroft**

---

Historically, researchers have established a link between well-being and visibility of city neighbourhoods. We propose a method to perform these studies with pervasive technology that is easily implemented and scaled. We test whether urban mobility is a viable proxy for the visibility of city communities by examining the correlation between London's public transport flows and census-based indices of the well-being.

### **Scalable Mining of Common Routes in Mobile Communication Network Traffic Data** (note)

15:15

**Olof Görnerup**

---

A method for inferring common routes from cellular network data is presented. Besides providing mobility information, the method enables coarse-graining and anonymisation by mapping individual sequences onto common routes. Trajectories are represented by Cell ID sequences that are grouped using locality-sensitive hashing and graph clustering; an approach that is demonstrated to be scalable and accurate using GPS tagged data.

WEDS

## Home and Energy

Curtis  
Auditorium

PERVASIVE



use #homeenergy

16:00

### Accounting for Energy-Reliant Services within Everyday Life at Home

Oliver Bates, Adrian K. Clear,  
Adrian Friday, Mike Hazas, Janine Morley

Thirty-one participants, four flats, twenty days. 2.2 megawatt-hours. Lots of lighting, cooking, and information technology. Come find out how we connected energy to everyday life at home.



Drinks and food after the demo session  
Gather at the Great North Museum



WEDS

## Home and Energy

### **Smart Blueprints: Automatically Generated Maps of Homes and the Devices Within Them**

14:30

Jiakang Lu, Kamin Whitehouse

Off-the-shelf home automation technology is making it easier than ever for people to convert their own homes into “smart homes”. However, manual configuration is tedious and error-prone. In this paper, we present a system called Smart Blueprints that automatically generates a map of the home and the devices within it by inferring the floor plan from the smart home sensors.

### **Hacking the Natural Habitat: An In-the-wild Study of Smart Homes, Their Development, and the People Who Live in Them**

15:00

Sarah Mennicken, Elaine M. Huang

We conducted a qualitative study with smart home inhabitants and professionals involved in the process of making homes “smart” in order to understand effects of such technologies on everyday life. We identified motivations for bringing smart technology into homes, explored the varied roles of inhabitants, as well as several challenges and benefits that arise while living in a smart home.

WEDS

## Learning About People

Lecture  
Theatre 3

ISWC

16:00

### **Extracting Mobile Behavioral Patterns with the Distant N-Gram Topic Model**

**Katayoun Farrahi, Daniel Gatica-Perez**

Mining patterns of human behavior from large-scale mobile phone data has potential to understand certain phenomena in society. The study of such human-centric massive datasets requires new mathematical models. In this paper, we propose a probabilistic topic model to address the problem of learning long duration human location sequences. The distant n-gram topic model is based on Latent Dirichlet Allocation.



Drinks and food after the demo session  
Gather at the Great North Museum



use #peoplelearn to tweet about this session

## Socio-Technical Network Analysis from Wearable Interactions

14:30

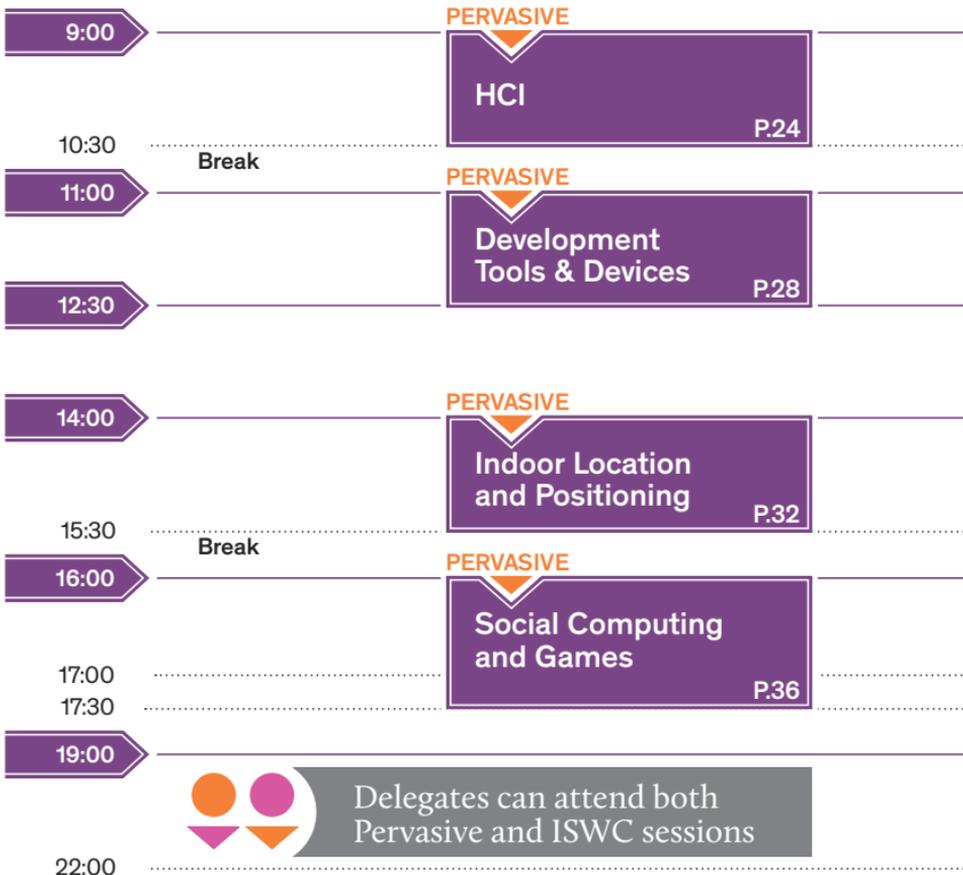
**Katayoun Farrahi, Remi Emonet, Alois Ferscha**

This paper draws from interaction patterns collected via smartphones and reality mining techniques to explain the dynamics of personal interactions and relationships. Our findings impact a wide range of data-driven applications by providing an overview of community interaction patterns which can be used for applications such as epidemiology, or in understanding the diffusion of opinions and relationships.

THURS

## Paper Session Daily Overview

Curtis Auditorium



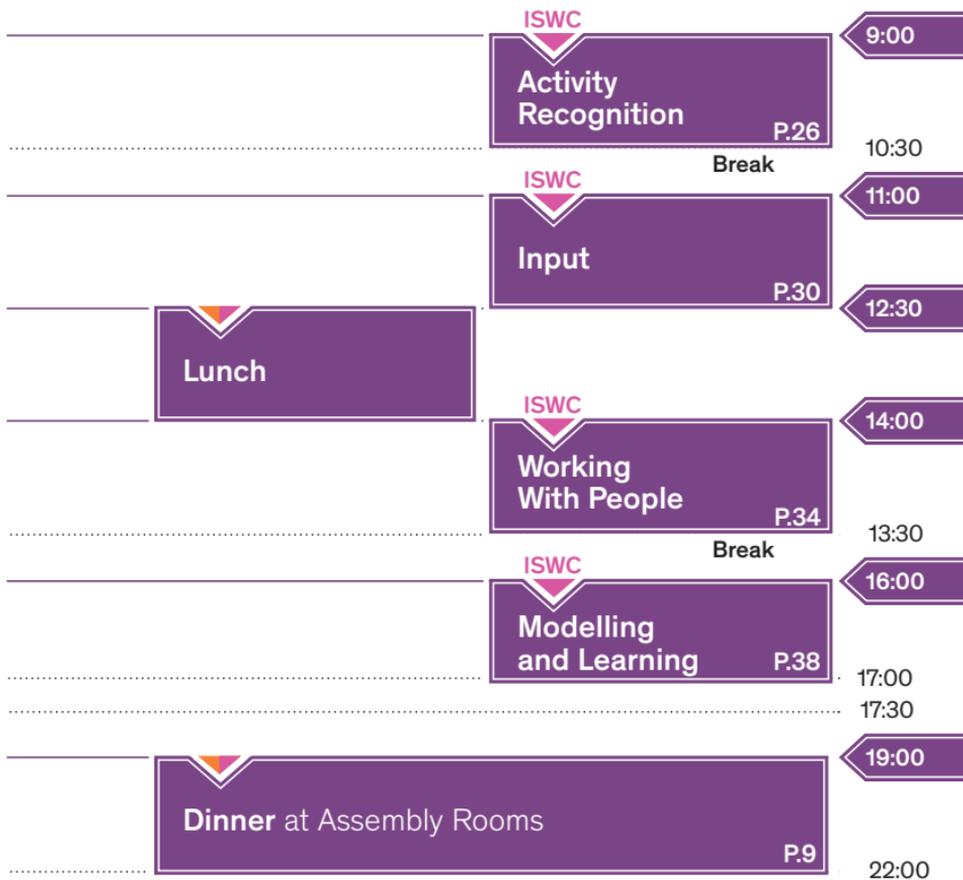


THURS

# Paper Session Daily Overview

Great North Museum

Lecture Theatre 3



THURS

HCI

Curtis  
Auditorium

PERVASIVE



use #hci

9:00

## The Design of a Segway AR-Tactile Navigation System

Ming Li, Lars Mahnkopf, Leif Kobbelt

We propose a AR-Tactile navigation system for the Segway. The visual route information is presented in an Augmented Reality interface while turning instructions are delivered via vibro-tactile patterns. We evaluate the system in the real traffic. Compared to the traditional vehicle navigator, the experiment results show our system reduces the Segway users' cognitive workload and improves their driving performance.



After the conference dinner,  
meet at The Town Wall pub on Pink Lane



THURS

HCI

## Route Guidance Modality for Elder Driver Navigation

9:30

SeungJun Kim, Jin-Hyuk Hong,  
Kevin Li, Jodi Forlizzi, Anind Dey

---

This paper explores the efficacy of multi-modal cues for providing route guidance information. For elder drivers, navigation systems need to be personalized to enhance the benefit of auditory feedback without increasing the number of sensory feedbacks. For younger drivers, it is necessary to incorporate new non-visual feedback (e.g., haptic feedback) to minimize distractions caused by visual feedback.

## Interactive Environment-Aware Handheld Projectors for Pervasive Computing Spaces

10:00

David Molyneaux, Shahram Izadi,  
David Kim, Otmar Hilliges, Steve Hodges,  
Xiang Cao, Alex Butler, Hans Gellersen

---

We present two novel handheld projector systems which are “aware” of their environment both spatially (their pose in 3D space) and geometrically (they build a model of the world). One relies on infrastructure while the other is infrastructure-less. We highlight a series of touch and gesture interactions, and compare systems by quantifying their location tracking and input sensing capabilities.

THURS

## Activity Recognition

Lecture  
Theatre 3

ISWC

9:00

### **Energy-Efficient Continuous Activity Recognition on Mobile Phones: An Activity-Adaptive Approach**

**Zhixian Yan, Vigneshwaran Subbaraju,  
Dipanjan Chakraborty, Archan Misra, Karl Aberer**

---

We tackle the problem of energy-efficient continuous accelerometer-based activity sensing. After establishing the “energy overheads” vs. “classification accuracy” tradeoff for activity recognition, on a per-activity basis, we design an activity-sensitive strategy (dubbed “A3R”). Experiments on N95 & Android phones show that A3R saves energy by dynamically adapting the accelerometer sampling frequency and the classification features.

9:30

### **Recognizing Daily Life Context using Web-Collected Audio Data** (note)

**Mirco Rossi, Oliver Amft, Gerhard Tröster**

---

This work presents an approach to model daily life contexts from web-collected audio data. Crowd-sourced textual descriptions (tags) related to individual sound samples were used to model sound context categories. We analysed our approach with dedicated recordings and in a study of full-day recordings of 10 participants using smart phones.



THURS

## Activity Recognition



use #activerecog to tweet about this session

### Energy-Efficient Activity Recognition using Prediction

9:45

Dawud Gordon, Jürgen Czerny, Takashi Miyaki, Michael Beigl

We present a method for activity recognition leveraging the predictability of human behavior to conserve energy. The algorithm accomplishes this by quantifying activity-sensor dependencies, and using prediction methods to identify likely future activities. Unneeded sensors are then temporarily turned off at little or no recognition cost. The evaluation reveals that large savings in energy are possible at very low cost.

### SAMMPLE: Detecting Semantic Indoor Activities in Practical Settings using Locomotive Signatures (note)

10:15

Zhixian Yan, Dipanjan Chakraborty, Archan Misra, Hoyoung Jeung, Karl Aberer

We study mobile phone-generated accelerometer data for detecting high-level (i.e., at the semantic level) indoor lifestyle activities, such as cooking at home and working at the workplace. We design a 2-Tier activity extraction framework (called SAMMPLE) and evaluate discriminatory power of the intermediate-level locomotive micro-activities (e.g., sitting, standing).

THURS

## Development Tools and Devices

Curtis  
Auditorium

PERVASIVE



use #devtools

11:00

### **.NET Gadgeteer: A Platform for Custom Devices**

**Nicolas Villar, James Scott, Steve Hodges,  
Kerry Hammil, Colin Miller**

.NET Gadgeteer is a new platform conceived to make it easier to design and build custom electronic devices for a range of ubiquitous and mobile computing scenarios. This is designed to be accessible to a wide range of people with varying backgrounds and provide enough flexibility to allow experts to build relatively sophisticated devices and complex systems in less time.



After the conference dinner,  
meet at The Town Wall pub on Pink Lane



### **Recognizing Handheld Electrical Device Usage with Hand-worn Coil of Wire**

11:30

**Takuya Maekawa, Yasue Kishino,  
Yutaka Yanagisawa, Yasushi Sakurai**

---

We develop a finger-ring shaped sensor device with a coil for recognizing the use of handheld electrical devices such as digital cameras, electric toothbrushes, and hair dryers by sensing magnetic fields emitted by the devices. The sensor device recognizes the use of electrical devices that are not connected to the home infrastructure without the need to equip them with sensors.

### **Self-Calibration of RFID Reader Probabilities in a Smart Real-Time Factory**

12:00

**Bilal Hameed, Farhan Rashid, Frank Dürr, Kurt Rothermel**

---

This paper presents a system that continuously calibrates the probabilities of RFID readers to reflect the accuracy with which these readers detect RFID tags. The concepts were studied in a Smart Real-Time Factory and evaluated using extensive simulations that mimicked the real production environment.

THURS

Input

Lecture  
Theatre 3

ISWC

11:00

### **Huffman Base-4 Text Entry Glove (H4-TEG)**

**Bartosz Bajer, Scott Mackenzie, Melanie Baljko**

---

We designed and evaluated a Huffman base-4 Text Entry Glove (H4-TEG). H4-TEG uses pinches between the thumb and fingers on the user's right hand. Characters and commands use base-4 Huffman codes for efficient input. In a longitudinal study, participants reached 14.0 wpm with error rates <1%. In an added session without visual feedback, entry speed dropped only by 0.4 wpm.

11:30

### **Toe Input using Mobile Projector and Kinect (note)**

**Daiki Matsuda, Keiji Uemura,  
Nobuchika Sakata, Shogo Nishida**

---

We present a toe input system that can realize haptic interaction, direct manipulation, and floor projection using a wearable projection system with a large projection surface. It is composed of a mobile projector, Kinect depth camera, and a gyro sensor. It is attached to the user's chest and can detect when the users foot touches the floor.



THURS

Input



use #iswcinput: to tweet about this session

### **Airwriting: Hands-free mobile text input by spotting and continuous recognition of 3d-space handwriting with inertial sensors.**

11:45

**Christoph Amma, Marcus Georgi, Tanja Schultz**

---

We present an input method which enables hands-free interaction through 3d handwriting recognition. Users can continuously write text in the air as if they were using an imaginary blackboard. Motion sensing is done wirelessly by accelerometers and gyroscopes. We propose a two-stage approach for spotting and recognition of handwriting gestures. Person-independent performance is evaluated on vocabularies with over 8000 words.

### **Textile Interfaces: Embroidered Jog-Wheel** (note)

12:15

**Clint Zeagler, Scott Gilliland, Halley Profita, Thad Starner**

---

In our efforts to create new e-textile interfaces and construction techniques for our Electronic Textile Interface Swatch Book (an e-textile toolkit), we have created a multi-use jog wheel using multilayer embroidery, sound sequins from PVDF film, a fabric twisted pair for long leads across the body, and a tilt sensor using a hanging bead, embroidery and capacitive sensing.

THURS

## Indoor Location and Positioning

Curtis  
Auditorium

PERVASIVE



use #locpos

14:00

### **AWESOM: Automatic Discrete Partitioning of Indoor Spaces for WiFi Fingerprinting**

**Teemu Pulkkinen, Petteri Nurmi**

We propose AWESOM, a novel measure for automatically creating a discrete partitioning of the space where WiFi positioning is being deployed. AWESOM also provides a measure for evaluating the goodness of a given partitioning as well as identifying partitions where additional access points should be deployed. We demonstrate the usefulness of AWESOM using data collected from two large scale deployments.



After the conference dinner,  
meet at The Town Wall pub on Pink Lane



## Indoor Location and Positioning

### **Indoor Pedestrian Navigation Based on Hybrid Route Planning and Location Modeling**

14:30

**Kari Rye Schougaard, Kaj Grønbaek, Tejs Scharling**

---

This paper introduces methods and services called PerPosNav for development of custom indoor pedestrian navigation applications to be deployed on a variety of platforms. PerPosNav combines symbolic and geometry based modeling of buildings, and in turn combines graph-based and geometric route computation. The paper argues why these hybrid approaches are necessary to handle the challenges of in-door pedestrian navigation.

### **Estimating Position Relation between Two Pedestrians Using Mobile Phones**

15:00

**Daisuke Kamisaka, Takafumi Watanabe,  
Shigeki Muramatsu, Arei Kobayashi, Hiroyuki Yokoyama**

---

In an indoor environment such as a huge mall, sometimes the direction and distance relative to another person are more important for pedestrians than their absolute positions. We propose a simple approach to estimate such position relation, which finds the timing when two pedestrians walk together and corrects the parameters of position updates dynamically, even if absolute positions are unknown.

14:00

**Garment Positioning and Drift in  
Garment-Integrated Wearable Sensing**

Guido Gioberto, Lucy Dunne

Wearable sensors are notoriously plagued by the error introduced by the movement of the sensor over the body surface. Here, we implement a novel method for analyzing error introduced by garment properties in wearable sensing during body movement, and assess in detail the errors introduced by donning and doffing of a garment and by garment drift during the gait cycle.

14:30

**GazeCloud: A Thumbnail Extraction Method  
using Gaze Log Data for Video Life-Log (note)**

Yoshio Ishiguro, Jun Rekimoto

GazeCloud is a method for information extraction and presentation using recorded eye gaze data, i.e., personal life-log video data. It calculates the importance of information from gaze data that is consequently used for the generation of thumbnail images. This method performs the calculation using the eye gaze duration. Additionally, we construct a prototype daily-use wearable eye tracker system.



THURS

## Working With People



use #iswcpeople to tweet about this session

### **Urban Vibrations: Modeling and Evaluation of Sensitivities in the Lab and Field across a Broad Demographic** (note)

14:45

Ann Morrison, Lars Knudsen, Hans Jørgen Andersen

We tested vibration intensity sensitivity with a wearable vibration belt on a diverse group with evenly distributed ages and gender (7 to 79 years). We contribute the first vibration sensitivity field testing. We increasingly escalated the level of distraction and busy-ness. Our findings differ from previous lab studies in that we found a decreased detection rate in busy environments.

### **Tongue Mounted Interface for Digitally Actuating the Sense of Taste**

15:00

Nimesha Ranasinghe, Ryohei Nakatsu, Nii Hideaki, Ponnampalam Gopalakrishnakone

We present two systems for stimulating different taste sensations digitally on human. Initial experimental results indicate that sour (strong), bitter (mild), and salty (mild) are the main sensations, which can be evoked while there are evidences of sweet sensation too. Then we describe a more focused study to control the sour taste digitally through electrical stimulation of the tongue.

Curtis  
Auditorium

PERVASIVE

16:00

**Clearing a crowd: Context-supported Neighbor Positioning for People-centric Navigation**Takamasa Higuchi, Hirozumi Yamaguchi, Teruo Higashino

This paper presents a positioning system for “people-centric” navigation that leads users to their friends in a crowd of neighbors. Our system, called PCN, provides relative positions of surrounding people based on sensor readings and Bluetooth RSS obtained via off-the-shelf mobile phones. Utilizing the feature of “group activity”, it reduces the effect of sensor noise and other error-inducing factors.

16:30

**Paying in Kind for Crowdsourced Work in Developing Regions**Navkar Samdaria, Akhil Mathur, Ravin Balakrishnan

In developing regions, services like Mechanical Turk (mTurk) have been limited by the lack of adequate payment mechanisms and low visibility amongst the crowd. We present a commodity-based-model for crowdsourcing where crowd-workers get paid in-kind in the form of a commodity instead of money. Results show that the model reached workers with very different demographics from the typical mTurk workers.



use #socialcom to tweet about this session

### **Tangible and Casual NFC-enabled Mobile Games** (note)

17:00

**Luis F. G. Sarmenta**

---

We introduce the idea of NFC-enabled mobile games that are tangible (i.e., using NFC for physical interaction, not just information lookup), and casual (i.e., downloadable and playable “on impulse” using everyday NFC cards, such as transit cards, ID badges, etc., and not requiring infrastructure). We present several novel games, design patterns, implementation techniques, and results from a public beta trial.

### **Real-World Drag’n’Drop — Bidirectional Camera-based Media Transfer between Smartphones and Large Displays** (Video)

17:15

**Matthias Baldauf, Katrin Lasinger, Peter Fröhlich**

---

We introduce a novel promising mobile interaction technique called “Real-World Drag’n’Drop” and present a fully functional prototype: Using a smartphone as a see-through device, locally or remotely stored files may be directly dragged onto a distant screen targeted through the viewfinder and vice versa.

THURS

## Modelling & Learning

Lecture  
Theatre 3

ISWC



use #iswcmodel

14:00

### Pattern-based Alignment of Audio Data for Ad-hoc Secure Device Pairing (note)

Ngu Nguyen, Stephan Sigg, An Huynh, Yusheng Ji

We use fingerprints extracted from ambient audio to generate the common cryptographic key in secure mobile phone pairing. To deal with misalignment in recorded audio data due to the variety of recording hardwares, we propose a pattern-based approximative matching process to achieve synchronisation independently on each device without any inter-device communication other than an initial plain pairing request.



After the conference dinner,  
meet at The Town Wall pub on Pink Lane



### **Kinect=IMU? Learning MIMO models to automatically translate activity recognition models across sensor modalities**

14:15

**Oresti Baños, Alberto Calatroni, Miguel Damas, Héctor Pomares, Ignacio Rojas, Hesam Sagha, José del R. Millán, Gerhard Tröster, Ricardo Chavarriaga, Daniel Roggen**

---

A method to translate a preexisting recognition system from a source sensor domain  $S$  to a target sensor domain  $T$ , possibly of different modality, is presented. MIMO system identification is used to map the signals of  $S$  to  $T$  and subsequently translate the recognition system. The approach is demonstrated in a gesture recognition problem translating between Kinect and IMUs.

### **Automatic Synchronization of Wearable Sensors and Video-Cameras for Ground Truth Annotation - A Practical Approach (note)**

14:45

**Thomas Ploetz, Chen Chen, Nils Hammerla, Gregory Abowd**

---

We present a practical approach to automatic cross-modal synchronization. Distinctive gestures, captured by a camera, are matched with recorded acceleration signal(s) using cross-correlation based time-delay estimation. PCA-based data pre-processing makes the procedure robust against orientation mismatches between the marking gesture and the camera plane. We evaluated five different marker gestures and report very promising results for actual use.

FRI

## Paper Session Daily Overview

Curtis Auditorium

9:00

PERVASIVE

Privacy

P.42

10:30

Break

11:00

PERVASIVE

Public Displays and  
Services

P.44

11:30

12:30



Delegates can attend both  
Pervasive and ISWC sessions

14:00

Closing Keynote:  
Elias Siores

P.11

15:30



FRI

# Paper Session Daily Overview

Great North Museum

Lecture Theatre 3

ISWC

9:00

Panel:  
Wearable  
Computing

10:30

P.46

11:00

11:30

Lunch

12:30

14:00



remember to use #per2012 or #iswc12

15:30

FRI

Privacy

Curtis  
Auditorium

PERVASIVE



use #privacy

9:00

## Big Brother Knows Your Friends: on Privacy of Social Communities in Pervasive Networks

Igor Bilogrevic, Murtuza Jadliwala, Istvan Lam,  
Imad Aad, Philip Ginzboorg, Valtteri Niemi,  
Laurent Bindschaedler, Jean-Pierre Hubaux

This work addresses the important issue of privacy in pervasive communities by experimentally evaluating the accuracy of an adversary-owned set of wireless sniffing stations in reconstructing the communities of mobile users. To the best of our knowledge, this is the first study that provides empirical evidence on the accuracy and feasibility of community tracking in pervasive networks.



Drinks and food starting at  
Northern Stage bar on campus from 7pm



## Map-aware Position Sharing for Location Privacy in Non-trusted Systems

9:30

**Pavel Skvortsov, Frank Dürr, Kurt Rothermel**

---

We have presented a new map-aware position sharing approach for managing obfuscated user positions on a set of untrusted location servers. Our approach includes enhanced share generation algorithms and fusion algorithms that further improve our basic position sharing approach presented earlier. Firstly, we reduced the predictability of share generation; secondly, we have taken map knowledge into account.

## Sense and Sensibility in a Pervasive World

10:00

**Christos Efstratiou, Ilias Leontiadis, Marco Picone, Cecilia Mascolo, Kiran Rachuri, Jon Crowcroft**

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In this work we present an empirical study of the introduction of a sensor-driven social sharing application within the working environment of a research institution. Our study is based on a real deployment of a system that involves location tracking, conversation monitoring, and interaction with physical objects, and we are reporting on our findings regarding privacy and acceptability.

FRI

## Public Displays and Services

Curtis  
Auditorium

PERVASIVE



use #publicdisp

11:00

### **From School Food to Skate Parks in a few Clicks: Using Public Displays to Bootstrap Civic Engagement of the Young**

**Simo Hosio, Vassilis Kostakos, Hannu Kukka,  
Marko Jurmu, Jukka Riekkii, Timo Ojala**

This submission presents Ubinion, a service that utilizes large public interactive displays and social networking services to enable young people to give personalized feedback on municipal issues to local youth workers.



Drinks and food starting at  
Northern Stage bar on campus from 7pm



## **Increasing Brand Attractiveness and Sales Through Social Media Comments on Public Displays – Evidence from a Field Experiment in the Retail Industry**

11:30

**Erica Dubach, Christian Hildebrand, Florian Michahelles**

---

In a field experiment we displayed brand- and product-related facebook comments as pervasive advertising in small-space retail stores. Sales showed a slight increase, the overall brand attractiveness and innovativeness improved. Finally, results suggested to design a system that protects individual identities while still allowing friends to recognize each other on the screen for future work.

## **Automatic Description of Context-Altering Services Through Observational Learning**

12:00

**Katharina Rasch, Fei Li, Sanjin Sehic, Rassul Ayani, Schahram Dustdar**

---

Understanding the effect of pervasive services on user context is critical to many context-aware applications. We present a method for automatically providing detailed descriptions of pervasive services by observing and learning from the behavior of a service with respect to its environment. Our experiments show that our approach facilitates context-awareness without the need for manually added service descriptions.

FRI

## Panel: Wearable Computing Then and Now

Lecture  
Theatre 3

ISWC

9:00

### Have We Achieved the Ultimate Wearable Computer?

**Bruce Thomas**

This paper provides a provocative view of wearable computer research over the years, starting with the first IEEE International Symposium on Wearable Computers in 1997. The goal of this paper is to reflect on the original research challenges from the first few years. With this goal in mind, two questions can be examined: 1) have we achieved the goals we set out? and 2) how has the direction of research changed in the past fifteen years? This is not a survey paper, but a platform to stimulate discussion.



Drinks and food starting at  
Northern Stage bar on campus from 7pm

FRI



Panel: Wearable Computing Then and Now



use #wearablecomp to tweet about this session

# Workshops



## **Mobile Data Challenge by Nokia**

**Juha Laurila, Daniel Gatica-Perez**

---

Mobile Data Challenge by Nokia (MDC) releases a comprehensive and relatively unexplored data set for the research community. The data was released to more than 500 individual participants for more than 400 challenge tasks. Selected entries will be invited to participate in this workshop, which includes presentations, demos and posters. Participants are able to freely define their own research questions.



## **Workshop on Kinect in Pervasive Computing**

**David Kim, Shahram Izadi, Otmar Hilliges**

---

Participants of this workshop will quickly implement pervasive computing scenarios with Kinect in the hands-on sessions. Each group will be provided with a programming template and support. We aim to foster discussions around chances and challenges of using Kinect in pervasive computing and to jointly identify and establish a set of new tools and to agree on uniform data standards.



### **6th International Workshop on Ubiquitous Health and Wellness - UbiHealth 2012**

**Venet Osmani, Bert Arnrich, Oscar Mayora**

---

The workshop's major theme will be relationship between behaviour and health. The topics will be centred on measuring and sensing behaviour, its correlation with overall physical and mental health, prediction of disorders/episodes from the measured behaviour and effects of persuasion on behaviour change. A specific objective of the workshop will be discussion of the latest findings on the relationship between physical behaviour and mental health.

### **5th International SAME Workshop (Semantic Ambient Media Experience)**

**Artur Lugmayr, Thomas Risse, Bjorn Stockleben, Bjorn Stockleben, Bogdan Pogorelc, Estefania Serral Asensio**

---

Today the screen seems to be the main modality for consuming and interacting with media. However, the main challenge for ambient media is to 'render' the digital world in the natural environment, augment the world around us, and to bring the digital world into the real physical world. Within the scope of this workshop we solely focus on no-screen, no-keyboard, no-mouse based semantic media applications.

## Workshops



### **Pervasive Intelligibility: Second Workshop on Intelligibility and Control in Pervasive Computing**

**Jo Vermeulen, Brian Y. Lim, Fahim Kawsar**

---

Drawing upon the state-of-the-art, our goal is to refine existing and identify new directions for research in intelligibility and user-centric controls for pervasive computing that will foster further work in the community. Topics include: novel intelligible applications and interaction techniques, algorithms, toolkits and frameworks to support intelligibility and control, user studies and techniques (metrics and methods) to evaluate intelligibility and controllability.



### **Fourth International Workshop on Security and Privacy in Spontaneous Interaction and Mobile Phone Use**

**Marc Langheinrich, Rene Mayrhofer,  
Alexander De Luca, Max-Emanuel Maurer**

---

Securing the potentially massive amount of interactions using mobile devices is difficult, because typically there will be no a priori shared information such as passwords, addresses, or PIN codes between the phone, its user, and the service they want to use. The workshop is intended to foster cooperation between research groups and to establish a highly connected research community.



### **Pervasive Information Architectures as Architectures of Meaning for Complex Cross-channel Systems**

**Andrea Resmini, Terence Fenn, Jason Hobbs**

---

The practice of information architecture (IA) as the structural design of shared information environments has been changing under the influx of media convergence and ubiquitous and pervasive computing. IA is uniquely positioned to improve the design of user experiences in pervasive, cross-channel environments. We aim to: reframe information architecture; tackle established problems within the field; identify new directions of; promote the shared understanding of issues.

### **.NET Gadgeteer Hack-Fest**

**Jonathan Hook, Tom Bartindale, Thomas Smith, Patrick Olivier**

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The .NET Gadgeteer Hack-Fest will teach attendees how to utilise this new and exciting platform to develop rich, functional hardware prototypes for use in their research. Attendees will be provided with a range of Gadgeteer modules and libraries that will allow prototypes to be developed that interact with real sensor data drawn from the conference venue.

# Workshops



## Web of Things 2012

**Simon Mayer, Dominique Guinard, Erik Wilde**

---

Our goal is to foster discussion on systems towards a real-time Web of Things and the discovery, search, and composition of services. The Web of Things workshop solicits contributions in all related areas, thinking beyond sensor networks and Web applications, imagining, designing, building, evaluating, and sharing thoughts and visions on what the future of the Web and of networked devices will be.



## Frontiers in Accessibility for Pervasive Computing

**Mario Romero, Jeff Bigham, Tiago Guerreiro,  
Shaun Kane, Sergio Mascetti, Caleb Southern,  
Konstantinos Votis, Gottfried Zimmermann**

---

We aim to determine what it means for a pervasive system to be accessible and how can we measure it. We will discuss how pervasive computing systems can provide accessibility support for everyday tasks that would otherwise be impossible or very difficult to manage independently. We will discuss lessons learned from previous design successes and failures, raising methodological issues in designing special evaluations.



### **The Second Workshop on Pervasive Urban Applications (PURBA-2012)**

**Francesco Calabrese, Santi Phithakkitnukoon,  
Dominik Dahlem, Giusy Di Lorenzo**

---

The PURBA 2012 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 5th Workshop on Pervasive Advertising**

**Jörg Müller, Florian Alt, Daniel Michelis, Bo Begole**

---

Pervasive Advertising is finally gaining importance at a rapidly accelerating pace also outside of research labs, and policy makers, industrial players, and citizen have difficulty in keeping up. We hence invite papers that address any relevant issues, especially Calm vs. Engaging Advertising, Lessons from Deployments, Audience Measurement and Personalization, and Economic Key Performance Indicators (KPI).

## Workshops



### **1st International Workshop on Language Technology in Pervasive Computing (LTPC)**

**Dimitra Anastasiou, Christoph Stahl**

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Our objective is to consider the intersection of two research domains which have been separated the past years: Natural language Processing (NLP) and pervasive computing. In these scenarios, spoken language is the ideal modality for human beings to interact with a “disappearing” computer. We believe that the pervasive computing community can make an important contribution to the field of NLP.



### **Workshop on Recent Advances in Behavior Prediction and Pro-active Pervasive Computing**

**Niklas Klein, Brian Ziebart, Stephan Sigg**

---

The workshop especially targets the potential of context and behaviour prediction in sustainability applications. With current research challenges in sustainability and new possibilities such as crowd sourcing and mobile sensing, it is the time to advance context prediction further and improve, for instance, prediction of room level location/room occupancy, prediction of traffic condition, prediction of air quality, and prediction of energy demands.



### **The Second Workshop on Smart Mobile Applications (SmartApps'12)**

**Claudia Linnhoff-Popien, Stephan Verclas**

---

This workshop intends to bring together researchers, professionals and practitioners to discuss and address recent developments and challenges for the design, operation and backend integration of mobile applications for non-commercial Apps as well as enterprise applications. Furthermore, one of the challenges is to bring the different mobile platforms together and to have secure concepts for additional services like location, payment, authorization etc.

### **An Introduction to prototyping with the Arduino for the Software Engineer**

**Ross Travers Smith**

---

The session starts with an introduction to the Arduino, followed by an interactive workshop to set up the development environment on the attendees' own laptop. Following this you will work through projects from the Sparkfun Inventors kit with or your own hardware design. Finally, you will be introduced to the C++ like programming language and write the firmware required to customize your own applications.

## Workshops



### **Clothing in Motion: An Exploration of Wearable Technologies for Fashion, Wellness and Dance**

**Galina Mihaleva**

---

Participants will divide into groups and work hands-on with textiles and electronics to create kinetic dresses. Each group will receive a hand-out with instructions and suggestions. Finally, the groups will present their product and explain how their dress functions and how they chose to incorporate various technological components. The workshop will conclude with a discussion about key design issues and concepts.



### **How to industrialize Wearable AR?**

**Christian Buergy, Juha Pärkkä, Bruce Thomas,  
Thuong Hoang, Michael Lawo, Holger Kenn**

---

We invite researchers from relevant disciplines to a one-day workshop held in conjunction with ISWC 2012 to present novel works and discuss the application of state-of-the-art wearable computing research to outdoor augmented reality systems. The workshop also provides an opportunity for directed discussion sessions to identify current issues, research topics, and solution approaches, which lead to the proposal of future research directions.

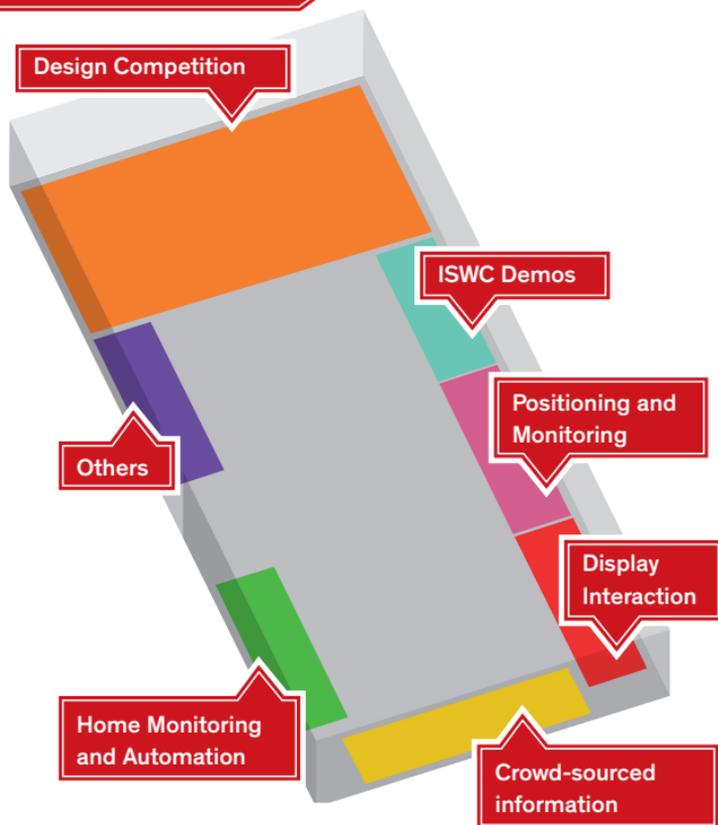


## Workshops

WED

Demos

Great North Museum

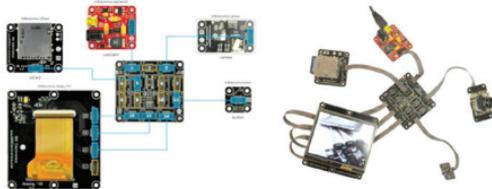




## .NET Gadgeteer: A Platform for Custom Devices

Nicolas Villar, James Scott, Steve Hodges,  
Kerry Hammil, Colin Miller

.NET Gadgeteer is a new platform conceived to make it easier to design and build custom electronic devices and systems for a range of ubiquitous and mobile computing scenarios. It consists of three main elements: solder-less modular electronic hardware; object-oriented managed software libraries accessed using a high-level programming language and established development environment; and 3D design and construction tools.



## A Dependable Wearable System by Device Bypassing

Tsutomu Terada, Yutaka Yanagisawa, Masahiko Tsukamoto,  
Seiji Takeda, Yasue Kishino, Takayuki Suyama

We show a system that fulfills the dependability by device bypassing. In our system, I/O devices directly communicate with each other when a system problem occurs. These devices have filters to modify raw data from input devices to values that can be managed by output devices. Filters and communication rules are dynamically installed when the system works correctly.



## A Dual Scene Camera Eye Tracker for Interaction with Public and Hand-held Displays

Jayson Turner, Andreas Bulling, Hans Gellersen

PERVASIVE

To enable eye-based interaction with a public display and a hand-held device we have developed a dual scene camera eye-tracking system with an extended field of view. Our system enables new interaction techniques that take advantage of gaze on remote and close proximity displays to select and move information for retrieval and manipulation.



## Airwriting: Mobile text-entry by 3d-space handwriting.

Christoph Amma, Marcus Georgi, Tanja Schultz

ISWC

We demonstrate a wearable text-entry system. Users can write text in the air, as if they were writing on an imaginary blackboard. Motion is sensed by inertial sensors attached to the back of the hand. Written text is spotted and recognized by a two-stage approach using SVMs and HMMs.



## Demonstration Of A Monitoring Lamp To Visualize The Energy Consumption In Houses

Christophe Gisler, Grazia Barchi,  
G r me Bovet, Elena Mugellini, Jean Hennebert **PERVASIVE**

We demonstrate a wireless lamp dedicated to the feedback of energy consumption. The principle is to provide an intuitive feedback to residents through color variations of the lamp depending on the amount of energy consumed in a house. Our system use inexpensive components managed in a WoT framework. Different versions of the color variation algorithm are also presented.



## Estimating Position Relation between Two Pedestrians Using Mobile Phones

Daisuke Kamisaka, Takafumi Watanabe, Shigeki Muramatsu,  
Arei Kobayashi, Hiroyuki Yokoyama **PERVASIVE**

In an indoor environment such as a huge mall, sometimes the direction and distance relative to another person are more important for pedestrians than their absolute positions. We present a demo system to estimate such position relation, which finds the timing when two pedestrians walk together and corrects the parameters of position updates dynamically, even if absolute positions are unknown.



## Freehand Gestural Marking Menu Selection

Gang Ren, Eamonn O'Neill

PERVASIVE

In this freehand gestural marking menu selection demo, users will experience menu selection techniques without holding any wireless devices or attaching any fiducial markers. They can use their body alone as an effective input device to perform menu selection. Users will have chances to try 2 different selection gestures, as well as 2D and 3D marking menu layout.



## Handheld Particulate Matter Measurements with COTS Sensors

Matthias Budde, Matthias Berning,  
Mathias Busse, Takashi Miyaki, Michael Beigl

PERVASIVE

The demo will show the TECO Envboard, an environmental sensing platform for research and development purposes that carries a wide range of commercial off-the-shelf (COTS) sensors. The usage of the device will be shown in conjunction with a mobile host device. A sample visualization app will be used to show live readings from the device.



## Here-n-Now: A Framework for Context-Aware Mobile Crowdsensing

Prem Prakash Jayaraman, Abhijit Sinha, Wanita Sherchan,  
Shonali Krishnaswamy, Arkady Zaslavsky,  
Pari Delir Haghighi, Seng Loke, Manh Thang Do

PERVASIVE

The mobile application allows users to share sensory data related to their current location (e.g., light intensity levels, noise levels) and their current activity (e.g., walking, running). Based on data collected from a large number of users in different locations, the application is



able to provide real-time reasoning about different situations/ambience of the locations( e.g., lively, busy, quiet).

## HomeOrgel: Interactive Music Box to Present Actual Home Activities with Symbolic Sounds

Maho Oki, Koji Tsukada, Kazutaka Kurihara, Itiro Siio

PERVASIVE

We propose a music-box-type interface, “HomeOrgel”, which can help users look back on past activities in the home using sounds, imitating the recall of memories using a music box. We developed the HomeOrgel device and installed a simple activity recognition system in an actual house “Ocha House” to verify the effectiveness of the HomeOrgel using actual data.

## Interactive Environment-aware Handheld Projectors for Pervasive Computing Spaces

David Molyneaux, Shahram Izadi, David Kim,  
Otmar Hilliges, Steve Hodges, Xiang Cao,  
Alex Butler, Hans Gellersen

PERVASIVE

We present two novel handheld projector systems which are “aware” of their environment both spatially (i.e. pose in 3D space) and geometrically (i.e. build a model of the world). One relies on infrastructure while the other is infrastructure-less. We highlight a series of touch and gesture interactions, and compare systems by quantifying their location tracking and input sensing capabilities.



## Live Sound-based Proximity Detection On Mobile Phones

Kamil Kloch, Benjamin Thiel, Paul Lukowicz

PERVASIVE

We present an algorithm which uses inaudible sound patterns to detect whether two mobile phones, hidden in the pockets, are within the short distance from each other. The algorithm delivers the precision of 5m, unobtainable using the classic Bluetooth RSSI scan. The solution is implemented as a standalone iPhone application and runs live on the device.



## Mimic Sensors: Battery-shaped Sensor Node for Detecting Electrical Events of Handheld Devices

Takuya Maekawa, Yasue Kishino,  
Yutaka Yanagisawa, Yasushi Sakurai

PERVASIVE

We propose and implement a battery-shaped sensor node that can monitor the use of an electrical device into which it is inserted by sensing the electrical current passing through the device. We also propose a method that automatically identifies into which electrical device the node is inserted and recognizes electrical events related to the device by analyzing the sensor data.

## Mobile Campaign Designer: A Tool for Creating Participatory Sensing Applications

Scott Heggen, Amul Adagale,  
Osarieme Omokaro, Jamie Payton

PERVASIVE

The Mobile Campaign Designer is designed to support the creation of participatory sensing applications by campaign organizers; with this tool, an organizer can define a data collection campaign, distribute a mobile application to participants to support the campaign, monitor the campaign's progress, and analyze the results of contributions, without writing a single line of code.





### **Paying in Kind for Crowdsourced Work in Developing Regions**

Navkar Samdaria, Akhil Mathur, Ravin Balakrishnan **PERVASIVE**

In developing regions, services like Mechanical Turk (mTurk) have been limited by the lack of adequate payment mechanisms and low visibility amongst the crowd. We present a commodity-based-model for crowdsourcing where crowd-workers get paid in-kind in the form of a commodity instead of money. Results show that the model reached workers with very different demographics from the typical mTurk workers.



### **Pervasive Gaze-Based Interaction with Public Display using a Webcam**

Yanxia Zhang, Andreas Bulling, Hans Gellersen **PERVASIVE**

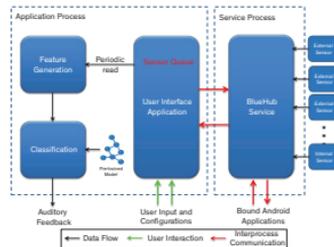
In this demo, we present a real-time system which detects human attention/interest area on a display using a web camera.



## Real-Time Detection of Freezing of Gait for Parkinson's Disease Patients via Smartphone

Zack Zhu, Sinziana Mazilu, Michael Hardegger, Meir Plotnik, Jeff M. Hausdorff, Daniel Roggen, Gerhard Troester **PERVASIVE**

A video will illustrate freezing of gait experienced by Parkinson's disease patients. Our mobile system will be present at the demo for participants to try out. Specifically, participants will experience feedback upon imitating freezing of gait as shown in the video.



## RefrigeMeter: Automatic Detect/Display System for Items in the Refrigerator

Marina Mikubo, Koji Tsukada, Itiro Siio **PERVASIVE**

People often have problems to leave foods in refrigerators too long time and spoil them. To solve this problem, we propose a simple interactive surface, "RefrigeMeter", which can automatically detect the positions of items placed in the refrigerator and informs users of their duration. Users can tell the status of items in refrigerator at a glance without any special operation.

## Sensify: Multimodal Interaction in Experiential Advertising

Jan Dziekan, Long Lam,  
Lukasz Szostek, Piotr Wiechno, Jason Williams

PERVASIVE

After watching a concept video that shows futuristic interaction modalities, the viewers follow the same scenario with an Android smartphone in hand. The demo is arranged so that existing interaction modes such as 3D gestures are mixed with ones that are



not yet commonly available, such as interactive ad billboards; the latter are modeled in hardware and software as needed.

## Smart Blueprints: Automatically Generated Maps of Homes and the Devices Within Them

Jiakang Lu, Kamin Whitehouse

PERVASIVE

Smart Blueprints is shown in a table-top demo where users can interact with the floor plan of an actual home, and see an example of one of the sensors used to generate the floor plan. The floor plan shows the rooms of the house, the locations of the sensors, and real-time occupancy of the rooms (inferred from the same sensors).



## Tangible and Casual NFC-enabled Mobile Games

Luis F. G. Sarmenta

PERVASIVE

In our paper in the main program, we introduce the idea of NFC-enabled mobile games that are tangible (i.e., using NFC for physical interaction, not just information lookup), and casual (i.e., downloadable and playable “on impulse” using everyday NFC cards, such as transit cards, ID badges, etc.). This demo offers hands-on opportunities to see and play with the games.

## UBI4HEALTH: Ubiquitous System to Improve the Management of Healthcare Activities

Juan Enrique Garrido Navarro,  
V́ctor M. R. Penichet, Maŕa D. Lozano

PERVASIVE

UBI4HEALTH is an ubiquitous and context-aware system designed to improve the daily work in a residential care home, but it could be also applied in other medical centres. The system allows users to collaborate through several devices (Personal Computers, Laptops, PDAs and Mo-bile Phones) while moving around the centre.

## Zero Configuration HTTP-CoAP Proxy Implementation based on CGI

Jongsoo Jeong, Jeehoon Lee, Haeyong Kim, Gyusang Shin,  
Seontae Kim

PERVASIVE

CoAP is an emerging web protocol for constrained environments. However, most of client devices are based on HTTP. Our HTTP-CoAP Proxy is based on the reverse proxy technique. It enables that many HTTP clients interact with CoAP devices easily without any configurations on them.





WED

Demos

## Icebreaker T-shirt: a Wearable Device for Easing Face-to-Face Interaction.

Nanda Khaorapong, Matthew Purver

ISWC

Augmenting online user information i.e. Facebook in mobile devices such as smartphone and tablet have been reported to facilitate social communication in pervasive manner. Designed to be worn in real-world events, and aimed at increasing comfort feeling and familiarity between strangers, Icebreaker T-shirt leverages online social network information on clothing.

WED

## Design Exhibition

**Don't Break My Heart – wearable distance warning system for cyclists**

Rain Ashford

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**Temperature Sensing T-shirt (AKA: 'Yr In Mah Face!')**

Rain Ashford

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**Twinkle Tartiflette – an Arduino driven interactive word and music artwork**

Rain Ashford

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**Reconfigurable Electronic Textiles Garment**

Kaila Bibeau, Lucie Mulligan, Ashton Frith

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**Context aware signal glove for bicycle and motorcycle riders**

Tony Carton

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WED

## Design Exhibition

### **Solar Family**

Silvia Guttmann, Sara Lopez, Dziyana Zhyhar

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### **Fairy Tale Kinetic Dress**

Helen Koo

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### **The Photonic Bike Clothing III – For Enthusiastic Biker**

Sunhee Lee and Kyungha Nam

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### **Wearable Multimodal Warning System**

Jessica Loomis, Grace Lorig, Mai Yang

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### **Flutter**

Halley P. Profita, Nicholas Farrow, Nikolaus Correll

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## Posters

### **A Community Enhanced Personalisation System for Digital and Physical Social Spaces**

Sarah Gallacher, Eliza Papadopoulou,  
Fraser Blackmun, Nick K. Taylor, M. Howard Williams **PERVASIVE**

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### **A Controlled Study for Measuring Emotional Stress with a Wearable Activity Sensor**

Rüdiger Zillmer, Brian Newby, Robert Treloar **PERVASIVE**

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### **Application Configuration through the use of a Meta-Data Ontology**

Martin Peters, Christopher Brink, Sabine Sachweh **PERVASIVE**

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### **Automatic Generation of Personal Indoor Activity Map**

Nobuhiko Nishio, Harumitsu Fujii, Takuya Azumi **PERVASIVE**

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### **Communicating With Things - An Energy Consumption Analysis**

G r me Bovet, Jean Hennebert **PERVASIVE**

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### **Developing Mobile Systems using PalCom:**

#### **A Data Collection Example**

Bj rn A. Johnsson, Boris Magnusson **PERVASIVE**

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### **Maximizing Wireless Power Transmission Efficiency with Linear Deployment Resonator Array and Band Pass Filter Theory**

Wei Wei, Takuya Miyasaka,  
Yoshihiro Kawahara, Tohru Asami **PERVASIVE**

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### **Nursing Work Recognition using Topic Models**

Tomoko Murakami, Kentaro Torii, Naoshi Uchihira **PERVASIVE**

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**Towards Activity-Relevant Attribution of Computer Energy Usage**  
Oliver Bates PERVASIVE

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**Upstairs - Supporting Peripheral Awareness  
between Non-Colocated Spaces**  
Till Bovermann, René Tünnermann,  
Christian Leichsenring, Thomas Hermann PERVASIVE

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**A Textual Analysis of the International Symposium on  
Wearable Computers: 1997-2011 Proceedings**  
Adam Martin ISWC

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**Inertial Body-worn Sensor Data Segmentation  
by Boosting Threshold-based Detectors**  
Yue Shi, Yuanchun Shi, Xia Wang ISWC

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**Introducing a New Benchmarked Dataset for Activity Monitoring**  
Attila Reiss, Didier Stricker ISWC

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**iPod for Home Balance Rehabilitation Exercise Monitoring**  
Kevin Huang, Patrick Sparto, Sara Kiesler,  
Dan Siewiorek, Asim Smailagic ISWC

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**Studying Order Picking in an Operating  
Automobile Manufacturing Plant**  
Hannes Baumann, Thad Starner, Patrick Zschaler ISWC

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**At which station am I?: Identifying subway  
stations using only a pressure sensor**  
Takafumi Watanabe, Daisuke Kamisaka,  
Shigeki Muramatsu, Hiroyuki Yokoyama ISWC

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# Interactivity

This year we're all about starting discussions. We think that going to a conference is about much more than just talks, so we have worked hard to bring together as much content, social media and discussion as possible to give you a more immersive experience.

There are loads of ways to get involved in this melting pot of contributions, find out more about the current topics, and start discussions with others:

## Get Interactive



Electronic badges allow you to search video and find out more about presenters and authors.



Prototype hardware devices provide a novel experience.



Interactive coffee tables let you browse videos, papers and discussion while you chat.

---

## Start a discussion

Get immersed in our commissioned data visualisations of conference content.



Get live updates, tweets and feedback during presentations from scrolling displays.

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## Know what's happening

See all the conference highlights so far on the event TV channel.



Discover what's currently happening inside each venue and check remaining session time, on these tall displays.





## Interactivity

### Have an opinion

Stay connected offline with the conference mobile app, the programme, and direct tweeting.



Let others know what you've heard using unique session Hashtags alongside #per2012 or #iswc12



Upload your event photos to our flickr group Pervasive2012

### Stay Connected



Find a wireless username and password in your conference pack for free campus-wide access. These will also work on walk-up pc terminals.

### Experience it Everywhere



Watch recorded sessions back in your own time. Know someone who couldn't make it? They can watch online at [pervasiveconference.org](http://pervasiveconference.org)

### Experience more Content



Live and offline question and answer sessions give you the chance to get that burning question answered properly.



Author interviews are made available for you to watch at any time.



Collated papers, photos, tweets, flickr, interviews, talks, presentations, authors, delegates, affiliations and much more give you a full picture of the conference content.

If you have any queries or comments about your conference interactive experience, just let us know over at the registration desk.

The conference experience is so much more than presentations, so get involved in the discussion!

## Local information... Things to do

### Travel

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#### Metro

[nexus.org.uk/metro](http://nexus.org.uk/metro)

The easiest way to get around Newcastle is the Metro. Haymarket station is within walking distance of the conference venues. Jesmond, Monument and Central stations are in the city centre. A DaySaver ticket can be used unlimited times within the day.

#### Bus

[nexus.org.uk/bus](http://nexus.org.uk/bus)

Local buses run from Haymarket and Eldon Square near the conference venue.

#### Trains

[nationalrail.co.uk/stations/ncl.html](http://nationalrail.co.uk/stations/ncl.html)

Fast trains south to London and north to Edinburgh, as well as the nearby historic cities of Durham and York. The train station is located on Neville St and served by Central Metro station.

#### Taxis

For taxis, we recommend Blueline. To book, call +44 (0)191 262 6666.

### Places to Visit

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#### Angel of the North

Andrew Gormley's iconic sculpture, standing just south of Gateshead, is one of the most recognisable sights in the North of England. Take buses 21 and 22 from Eldon Square bus station.

#### Quayside

Enjoy views of the Tyne and Millennium Bridges from the Quayside's restaurants, bars and cafés. From the city centre, walk down Grey St, or catch a QuayLink bus from Haymarket, Monument or Central Station.



## Local information... Things to do

### The Coast

Take the Metro to Tynemouth or Cullercoats to visit the North East coast, including Tynemouth priory and castle.

### Hadrian's Wall

Take the train to Hexham to explore Hadrian's Wall, built in AD 122 to defend Roman England from Celtic tribes.

### BALTIC Centre for Contemporary Art

From the Quayside, walk over the Millennium Bridge to visit Gateshead's modern art museum. Entry is free.

### Great North Museum: Hancock

Newcastle's natural history museum is located near the university campus. Entry is free.

## Places to Eat and Drink

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### Pubs with Food

Northern Stage - *King's Walk, university campus*

The Town Wall - *Pink Lane*

The Forth Hotel - *Pink Lane*

Bar Loco - *Leazes Park Road*

Bacchus - *High Road*

### Mediterranean Food

Marco Polo - *Dean St*

Reza - *Westgate Road*

Red Mezze - *Leazes Park Road*

Salsa Café - *Westgate Road*

### British Food

Blackfriars - *Friars St*

Pan Haggerty - *Queen St*

The Living Room - *Grey St*

### Asian Food

St Sushi - *Westgate Road*

Cheeky Duck - *Stowell St*

Bankok Café - *Low Friar St*

Little Saigon - *Bigg Market*

Nudo - *Low Friar St*

Akbars - *City Quadrant,*

*Westmorland Road*



For more local information, visit [newcastle Gateshead.com](http://newcastle Gateshead.com) or the stand at Great North Museum

# Map



**M** Haymarket  
Metro Station