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# SenCity 2: Visualizing the Hidden Pulse of a City

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**Abstract**

Following the success of the first SenCity workshop at UbiComp 2013, which focused on urban sensing technologies, the SenCity 2 workshop will focus on visualizing collected data in new ways. Specifically we will focus on *physical* forms of data visualizations using various mediums and actuation to explore how sensed data could be presented back to urban citizens in engaging and experiential ways. Participants will collaboratively apply practical research and creative flair at this hands-on workshop to design and prototype *physical visualizations*, bringing to life the hidden pulse of Osaka.

**Author Keywords**

Workshop; Urban Data; Physical Visualization; Cities

**ACM Classification Keywords**

A.0. General: Conference Proceedings.

**Rationale**

Cities act as hubs designed to accommodate and support millions of inhabitants, nomads and tourists that rely on the city's infrastructure to move around, communicate and flourish as individuals and as a community. This shapes the culture, habits and pulse of a city creating an organic urban landscape often invisible to the naked eye. However, these urban

landscapes are becoming more and more instrumented with sensing technologies that can track all kinds of data, from personal data such as daily step counts and tweets, to city wide data such as air quality and traffic conditions. Much of this data is presented back to the urban populace, often with the aim of encouraging a positive behavior change whether to provide a personal benefit or a benefit to the wider urban community. However, current dashboards and visualizations of personal and citywide data are often constrained to graphical or numerical, 2D formats which can be disengaging to the general public. Additionally, data is sometimes not situated where it is most meaningful; for example, air pollution figures online do not have the same impact as seeing them on the street where your children go to school. If we as researchers hope to design for positive behavior change at personal or city level we must first address these disconnects and look to make data visualizations much more contextual, engaging and alive to citizens.

### **Objectives**

The SenCity 2 workshop aims to create a practical, creative and structured forum for researchers, designers and practitioners to come together to discuss, design and rapidly prototype physical visualizations of urban datasets. By providing a collaborative forum for multi-disciplinary groups to work together we are seeking to create novel and engaging ways of visualizing urban data to encourage greater citizen engagement for personal or public good.

Ready-to-use datasets, of both a personal and public nature, will be provided by workshop organizers, including data from Osaka where the workshop will take place. Participants will also be invited to bring their own interesting datasets. Organizers will provide a novel

*rapid prototyping toolkit* that will include up to 12 different forms of actuation and physical mediums such as light, vibration, movement, smoke, bubbles, etc. that can be used alone or in combination to create physical visualizations of the datasets. The toolkit will be WiFi enabled and pre-configured to provide a '*plug and play*' experience for workshop participants, enabling them to fully focus on the design and development of novel forms of physical visualizations. A variety of prototyping materials including foam core, card, glue, tape, etc., will also be provided to further support design and development. Through the rapid prototyping of physical visualizations we hope to support emergent design principles or metaphors that link data to physical representations.

Finally, we plan to gain further understanding of citizen engagement with physical visualizations in situ by displaying the final creations in appropriate urban settings in and around the Osaka workshop venue. In addition to practical knowledge gained, the SenCity 2 workshop will also further discussions on topics such as (but not limited to):

- Urban sensing and big data
- Visualizations of complex data from urban sensors or the urban crowd
- Public visualizations
- Ephemeral visualizations and interfaces
- Physical data visualizations
- Rapid prototyping with actuation technologies
- New applications for urban spaces

### **Detailed Plan**

#### *Before the Workshop*

There will be a limited number of places available at this workshop. The call for participation will be

distributed in all the relevant communities, including those of ubicomp, pervasive computing and HCI.

*At the Workshop*

The workshop will adopt a one-day format of hands-on, focused activities that will be performed in cross-disciplinary groups of 4 or 5 people. The groups will be pre-assigned by the organizing committee prior to the workshop and participants will be seated in their group on arrival. The workshop will kick off with a short introduction session so participants can become familiar with those in their group as well as other workshop delegates. This will be followed by an overview of the available datasets (including any others that participants have made available). Organizers will then introduce the rapid prototyping toolkit and give a full tutorial of the various actuations and mediums that the toolkit provides as well as instructions of how to use it with the datasets. Participants will then be presented with the design and development challenge of using the toolkit and materials provided to create an engaging physical visualization of one or more of the datasets. While doing so they will be asked to consider (1) appropriate urban settings for their design; (2) how much the design should 'blend in' or 'stand out' in its urban setting; and (3) metaphors linking data with visualization mediums. After the coffee break each group will have two hours to explore the datasets and use the toolkit to begin creating their physical visualizations. Workshop organizers will be available during this time to provide help and guidance.

After a one-hour lunch break, prototyping will continue for another short while before participants leave the workshop room with their creations to display them in appropriate public spaces in and around the workshop venue. Groups will have one hour to explore different

deployment locations and observe how passers-by engage with their visualizations and the data it represents. On returning to the workshop venue, groups will have some time to reflect on their experiences and insights. Each group will then present to the others describing their creation, the design and prototyping process they followed and their experiences and observations when displaying it in public spaces. After additional feedback and final discussions the workshop will be brought to a close. The following table details the workshop schedule:

<i>Time</i>	<i>Activity</i>
09:30	Introductions and groupings
10:00	Development challenge presentation. Introduction to datasets and toolkit tutorial
10:30	Coffee break
11:00	Dataset exploration and group brainstorming
11:30	Collaborative design and rapid prototyping of physical visualizations using toolkit
12:30	Lunch
13:30	Rapid prototyping continued
14:30	Public deployment of physical visualizations and observation in urban settings.
15:30	Coffee break
16:00	Group reflections
16:30	Group presentations, feedback and discussions
17:30	Close

**Table 1.** Workshop schedule

*After the Workshop*

The organizers wish to continue to collaborate with participants after the workshop with the aim of publishing findings from the day. This was already achieved following the first SenCity workshop, which resulted in a number of workshop and conference publications.

**Participant Selection & Expected Audience**

The workshop will have an interdisciplinary appeal. We expect participants from a diverse list of disciplines such as ubiquitous computing, pervasive computing, HCI, mobile computing, embedded systems, computer science and information visualization. Only a limited number of places will be available at this workshop so prospective attendees will be requested to submit a short position paper of no more than 4 pages in SIGCHI papers format including a short biography covering their background and research interests. Participants will then be selected through an internal review process and will be pre-assigned to cross-disciplinary groups (based on their biography) before the workshop. Submissions to this workshop are for participant selection purposes only and will not be subject to full peer review or inclusion in the ACM Digital Library and supplemental proceedings for the conference. We have decided to take this approach to allow researchers from all backgrounds and all stages of research to propose ideas without the need to write a fully formed research paper. However, all position papers submitted by successful candidates will be published on the workshop's website so that participants can read the ideas and work of others in advance.

Given the success of the previous SenCity workshop at Ubicomp 2013 and other workshops (such as PURBA @ Pervasive and GeoHCI @ CHI) in the same "urban" or "cities" thread we expect to receive a respectable number of applicant submissions.

**Organizer Backgrounds***Sarah Gallacher*

Computer scientist, maker and internet of things enthusiast. Cities researcher and co-organizer of the first SenCity workshop.

*Connie Golsteijn*

Interaction designer and maker. Research interests include cities, craft, tangible interaction, and personalization of everyday objects.

*Vaiva Kalnikaite*

Creative director and founder at Dovetailed. Creating technologies for self-quantification, behavior change, internet of things, wearables and creative dining. Co-organizer of the first SenCity workshop.

*Steven Houben*

HCI researcher interested in physical computing, multi-device interactions and sensor-based systems.

*Rose Johnson*

HCI researcher, tinkerer, fan of wearable and physical computing. Participant at first SenCity workshop.

*Daniel Harrison*

HCI researcher, with a strong interest in behavior change and a passion for building and prototyping. Co-organizer of the first SenCity workshop.

*Nicolai Marquardt*

Lecturer in Physical Computing at University College London. Research interests in physical and tangible interfaces, cross-device interactions, prototyping toolkits and design methods.