Healthy Cities Ambient Displays

Description
The Healthy Cities project:
- Provides a public display of city health factors that are often difficult to assess or interpret.
- Empowers residents to improve city health by making them feel like their actions are visible.

Questions to consider:
- How do you influence your city’s health?
- Do you have a sense of the resources your city uses?
- Would you take more responsibility for improving city health if you knew your actions were appreciated?

Motivation
- Increase public awareness of city health.
- Explore challenges in designing for the general public.
- Evaluate the use of ambient displays as a persuasive and community-building tool.
- Explore use of distributed sensors for ambient displays.

Background
What are Ambient Displays?
- Monitor non-critical, potentially complex information.
- Display information continuously and panoramically.
- Present information in a simple, intuitive, aesthetic way, reducing cognitive load.
- Ideal for city health displays, where people will be in display location only in passing.

Non-technical examples:
- Windows give cues on time, weather, activity level.
- Footprints or paths give a history of walking patterns.

Prior Work:
- Natalie Jeremijenko: Hanging String – blankets with each packet sent over PARC network.
- M.I.T. Media Lab®.
- Water Lamp – shadows of water ripples
- Pinwheels – movement and air flow.
- Georgia Tech: Digital Family Potrait – awareness of remote family members by daily changing picture frame.
- MoMA Institute: information art, slow technology.

Interviews
Six open-ended interviews of people who live or work in Berkeley.

- Purpose: explore conceptions of the city and of city health.
- City energy usage is estimated by city light pollution.
- Berkeley electricity and recycling displays.

Other displays: air quality, employment, health, education, transit

Interview quotes – What is city health?
- “A healthy city is well-maintained - people actually try to better it, and it’s complex and intriguing, to take you out of yourself.”
- “Walking is necessary to feel connected to the community, and to get to know a city.”
- “Sick people clean air - remote traffic makes places where people don’t have to breathe exhaust.”
- “Money from local businesses goes back into the community, and it reduces pollution and traffic.”

Survey Results
Survey questions inspired by open-ended interviews.

- 33 Likert scale and yes/no questions, 10 written-response questions.
- 10 groups of questions:
  - Neighbors and safety, diversity, environment and conservation, public events, city history, volunteers, recycling, and economics, schools, transportation, and emergency services.

145 responses from Berkeley and nearby cities.

- 52 male, 90 female.
- Ethnic distribution similar to Berkeley’s 2000 census data.
- 95 recruited at post offices, 50 from Craigslist.

Topics with means above 4.0 and mode of 5 listed below.

Some topics more appropriate for ambient displays:
- Quantitative, change frequently, measured often, can be automatically collected.
- Topics selected to investigate: recycling, resource management, clean air, public events, pedestrian safety and community, streets and safety.

Electricity Display
City energy usage is estimated by city light pollution.

Design considerations:
- Compare nightly electricity usage on different time scales (days, weeks, months).
- Display time-lapse data.
- Use an intuitive map-based display.

Implementation:
- Capture pictures of Berkeley every minute during the night from two webcams in the Intel research lab, 13 stories above downtown Berkeley.
- Calculate true pixel brightness from pixel’s brightness in the picture, the interpolated distance, a watts/pixel scaling factor, and weather considerations.
- Calibrate brightness of pixels with a “standard candle” pixel to account for dimming from fog or storms or moon brightness.

Recycling Display
Increasing awareness of recycling in one aluminum bin.

Design considerations:
- Show aggregate amount recycled.
- Update display as a can is thrown in.
- Entice users to recycle with intriguing display design.

Implementation:
- Weight measurements are taken by a force sensor attached to an inundation wireless mote.
- Mote sends weight data to a nearby computer when weight changes more than a threshold value.
- Computer updates the display at the bin with new weight data and uploads the data to a central database.

Future Work
- Evaluate and iterate on electricity and recycling displays.
- Other displays: air quality, public events.
- Displays in other cities.

References

Morgan Ames, Chinmayi Bettadapura, Anind Dey, Jennifer Mankoff

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