Mobile Contextual Display Systems

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1 Introduction

In recent years many conventional public displays were replaced by electronic displays hence enabling novel forms of advertising and information dissemination. This includes mainly stationary displays, e.g. in billboards and street furniture, and currently first mobile displays on cars appear [3]. Yet, current approaches are mostly static since they do not consider mobility and the context they are used in.

In our work we explore how mobile public displays, which rapidly change their own context, can gather and process information about their context. Data about location, time, weather, people in the vicinity etc. can be used to react accordingly by displaying related content.

2 Approach

In order to explore the value and impact of context-aware mobile displays in public environments we deployed a system capable of selecting and displaying content based on context data derived from different sensors.

First, we integrated a tablet PC with a standard backpack (Figure 1). The tablet PC received information about its current position by using a Bluetooth GPS receiver. For displaying content on the screen we implemented a tool allowing for specifying campaigns in certain areas by using the Google Maps API. Once a person moves into one of the defined areas, the tool automatically selects a previously created and locally stored image based on the current location.

Figure 1: Prototype of a Contextual Mobile Display

3 Prototype System for Contextual Advertising

In order to explore the potential of contextual advertising we implemented a web-based system. It includes a component, which allows advertisers to specify campaigns based on their preferences, anchored in location (see Figure 2). These campaigns are stored in a backend and matched against the users' preferences by dynamically creating content for contextual advertising displays. The users are provided with a client for adjusting the preferences with regard to the advertised products. The system architecture is depicted in Figure 3.

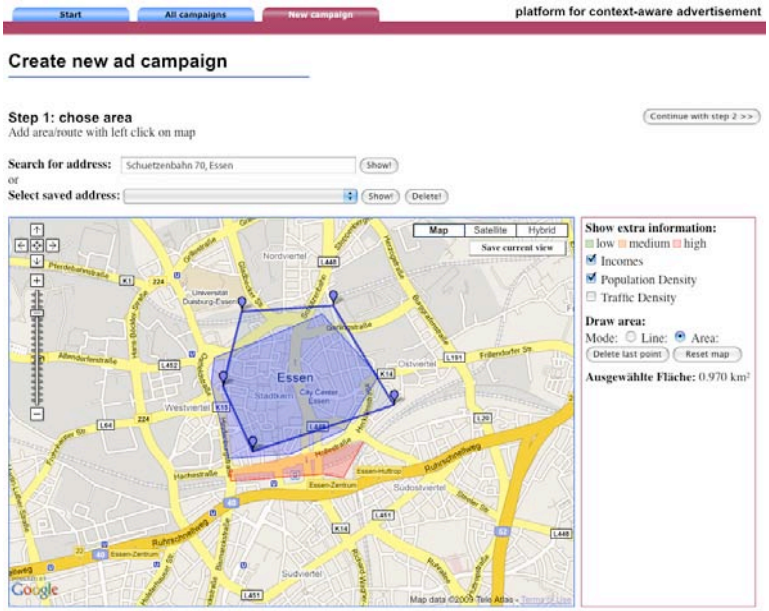

Figure 2: Advertiser's Client for specifying contextual advertising campaigns.

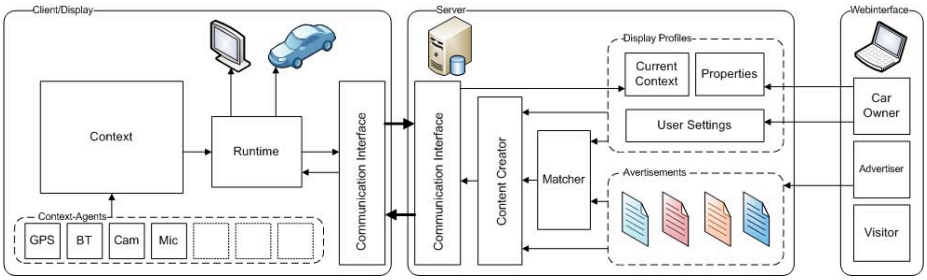

Figure 3: Architecture of the advertising platform. (1) Client-side: context agents gather context data. (2) Communication Interface: data exchange between client and server side (3) Server side: front-end for advertiser and car owner.

4 Situated Demonstration & Focus Group

To get an initial idea of the potential users' attitudes and concerns, we ran a focus group with 8 participants. The subjects were students, their majors being systems engineering, mechatronics, and arts.

To demonstrate the system we created several campaigns along the pedestrian area of Essen, Germany. The campaigns included information about sights along the way, metro stations, tourist maps, and advertisements for local shops. The images stored for the campaigns were displayed on the screen once the group reached the associated location. The 20-minute demonstration was followed by a discussion during which we also showed the participants alternative ways of displaying the content, such as using electronic paper attached to a T-shirt. Figure 2 shows how we simulated the electronic paper using a portable projector.

Figure 4: Mockup of a wearable display

5 Initial Findings

All of the participants stated that they would use such a system in return for incentives such as payment per walked distance, coupons, etc. Yet most of them would not walk different or longer routes but considered this a promotion job requiring no or only very little effort. One of the major concerns was that the person carrying the system does not see the content herself in case the display is located on her back though it might be interesting for her. Participants also wanted to stay in control of the content that is displayed and to be able to switch off the system at any time. Some of the participants were concerned that people seeing the display would start asking questions about the displayed content.

In the following we present some of the users' quotes, which outline their opinion about the system and its usage:

- "Information about famous sites around would be great."
- "There might be an information overflow if many people use such a device."
- "I don't mind if somebody knows where I was as long as I can turn off the device whenever I want."
- "I would walk different ways based on the incentive. "
- "I am afraid of being asked questions about the displayed content."
- "I would like to be able myself to see the content."
- "This would be a nice promotion job which requires only very little effort."
- "I would not wear the devices at night in bars, clubs, etc".
- "I want to stay in control of the displayed content."

6 Related Work

The idea of wearable public displays is not entirely new. Falk et al. [1] presented the BubbleBadge, a low-cost wearable computer based on a video game, which people could attach to their coat. Its intention was to support face-to-face communication.

Recently, commercial applications of wearable public displays such as the AdWalker [2] entered the market. This device can be mounted like a backpack. As the name already indicates, its primary purpose is to show static advertisements.

Figure 5: Location-aware advertisements on a taxi

Advertising displays with location-specific content are already used in commercial settings. One example is taxis in the Boston area [3], which have a roof-mounted display, and adjust their content to their current location (see Figure 5).

7 Conclusion

In the near future developments in the area of wearable computing will make it possible to easily integrate low-weight displays into garments. Using different sensors such as Bluetooth and GPS they can react and display content according to their context. We showed how this could be achieved for location. However, also further context can be taken into account such as the weather or the amount of people in the vicinity of a mobile display.

8 References

1. Falk J, Bjork S. The BubbleBadge: A Public WearableDisplay. Extended Abstracts of CHI '99, ACM Press, 1999.
2. *http://www.adwalker.com*
3. *http://www.clearchanneltaximedia.com/products/taxi-tops-digital-smart.asp*