
Inch-scale Interactive Displays for Social Object Annotation

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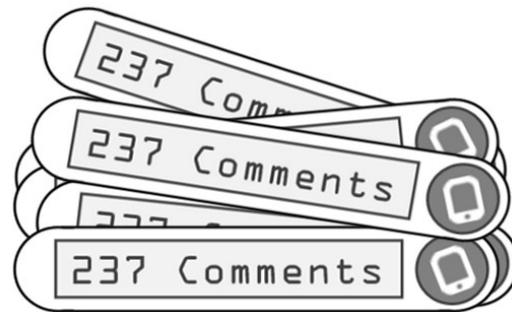


Figure 1: Inch-scale interactive displays fitted with radio frequency tag for mobile interaction (mock-up).

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Abstract

This paper offers an HCI perspective on ubiquitous annotation with a focus on social object annotation. It suggests that user experience issues with static-display visual markers and radio frequency tags are due to a lack of up-to-date information about the related object or service. To provide that information it proposes small situated displays that can encourage engagement and support interaction with dynamic user-generated content services. The paper describes a platform for research into small pervasive displays in the context of social object annotation and briefly discusses the relevance of the research for the wider field.

Author Keywords

HCI; Ubiquitous computing; Pervasive computing; Ubiquitous annotation; Social Object Annotation; Pervasive displays; Digital signage

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

Ubiquitous annotation involves attaching digital information to physical objects and places [8]. Current end-user perspectives on ubiquitous annotation

typically include location based services and mobile information access or service interaction via visual markers or radio frequency tags. While these systems typically deliver professionally created content, more recent applications inspired by social concepts and technologies from the World Wide Web involve user-generated dynamic content attached to objects and places. Examples include physical "Like" buttons [25] and "Check-in" marks [6], as well as research prototypes that enable users to attach provenance information to physical objects [3], rate products in retail environments [14], vote on community issues [26] and annotate museum exhibits [7, 11].

This paper briefly discusses user experience issues with radio frequency tags (RFID, NFC) and 2D barcodes (QR codes), two of today's most widely used object tagging technologies, and proposes to augment tags with small pervasive displays to address some of these issues.

User experience

Critical HCI aspects of ubiquitous annotation center around awareness, engagement and interaction: in order to be accepted by users, pervasive services need to be easily discoverable, encourage engagement and support interaction at all stages. However, research indicates that many users have weak mental models of tags and tag interaction [9, 15], feel a lack of control when interacting with tags [23] and are concerned about the currency, security and origin of tags [15, 18], making them overall less likely to engage with pervasive services using these technologies.

While the number of NFC capable mobile devices will reach 500 million by the end of 2013 [1] and companies started to add NFC capabilities to

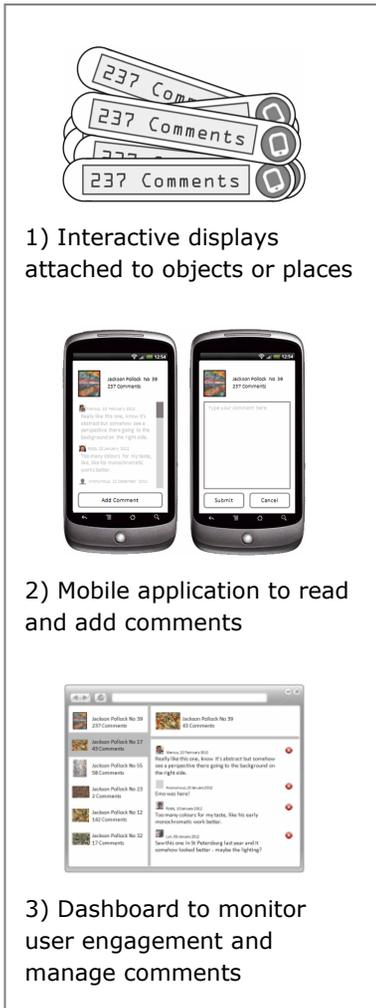
advertising panels [20], research into public awareness and familiarity with radio frequency technology suggests that many people are initially unsure how to interact with radio frequency tags [9, 15] and in some cases prefer more traditional interaction models [10].

A similarly problematic picture emerges for QR codes. While market reports praise the ubiquity and public recognition of QR codes [4, 19], a research study by youth marketing agency Archrival [2] involving more than 500 US students found that while QR codes enjoy a high level of awareness among students, only 21% were able to successfully scan and activate a code. Investigating why 75% of students said they were not likely to scan a QR code in the future, the same study found that the main reasons for non-engagement were uncertainty and low expectations of potential rewards.

A key problem in this context seems to be a lack of situated information that would help users to make informed decisions about their engagement, support them while interacting with the service and leave a trace of their interaction in the physical environment.

One approach to addressing the lack of service-related situated information is to develop standardised visual clues that help users to recognise tags and understand their interaction capabilities [22, 23]. These efforts involve static displays, which are economical to produce and deploy. However, they don't provide users with up-to-date information before the interaction and they don't show any state change after the interaction took place.

While this is acceptable for services involving static content selection and delivery, it becomes problematic



1) Interactive displays attached to objects or places

2) Mobile application to read and add comments

3) Dashboard to monitor user engagement and manage comments

Figure 2: Generic platform for social object annotation.

for user-generated content services where users are interested in interaction feedback confirming their content submission and in the amount and recency of other contributions. These indicators enable users to gauge the relevancy of the annotated object and the related discussion, and help them to make informed decisions about their potential engagement. To provide such information in-situ, i.e. independent of user interaction and the mobile device, we propose to augment tags with dynamic displays (Figure 1).

Small pervasive displays

Research into pervasive displays, public displays and digital signage has explored a wide range of issues, including capturing and holding users' attention [12], making users aware of interactivity [17], changing consumer behaviour with user-generated social content [24] and promoting community interaction [16]. Most of this research has focused on large (yard-scale) and medium-sized (foot-scale) displays while there is not much recent research into small (inch-scale) pervasive displays (sizes in reference to [27]) .

In order to develop design guidelines for inch-scale pervasive displays in the particular context of social object annotation, we have developed a generic ubiquitous annotation platform comprising prototypes that combine tags with dynamic displays, a mobile application for users to browse and create digital annotations and an analytics backend to monitor user engagement and manage annotations (Figure 2).

The research is highly relevant due to the wide range of potential application areas for ubiquitous social object annotation, the strong momentum of social concepts from the Web penetrating every aspect of society and

the increasing availability and proliferation of small pervasive displays, e.g. in the form of dynamic shelf labels in retail environments [5, 13, 21].

While the research focuses primarily on social object annotation in museums and galleries, it is anticipated that many of the developed design guidelines for small, interactive, pervasive displays and their integration with a mobile application and the target environment will also be relevant for other application domains.

Summary and conclusions

This paper has framed ubiquitous annotation in the context of social object annotation. It has linked user experience issues with static-display tags to a lack of up-to-date information about the related service and argued that situated dynamic displays are particularly suited to support users' engagement and interaction with user-generated content services. We have described a platform for research into inch-scale pervasive displays for social object annotation and briefly discussed its relevance in the wider field.

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