Multitouch and Surface Computing

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Abstract
Natural user interfaces (NUI) such as multitouch and surface computing are positioned as the next major evolution in computing and user interfaces. Just graphical user interfaces (GUIs) brought unprecedented interaction capabilities to their command-line predecessors, we believe multitouch and surface computing will spawn novel ways to interact with media and improve social usage patterns. Since experimentation and deployment are currently limited, the exploration of applications and interfaces in this area is still at an early stage.

Keywords
Multitouch, surface computing, NUI, natural user interface, touch computing

ACM Classification Keywords
H5.2. User Interfaces

Introduction
Natural user interfaces (NUI) such as multitouch and surface computing are positioned to mark the next major evolution in computing and user interfaces. Just graphical user interfaces (GUIs) brought unprecedented

interaction capabilities to their command-line predecessors, we believe NUIs will bring unprecedented interaction experiences and capabilities to computing. In recent years, many groups, both in the industry and academia, have revisited what we have learned over the last two decades about human-computer interaction to leverage time-tested principles to the multitouch experience. Additionally, many researchers are investigating current multitouch technologies and experiences to formulate new paradigms to capture the essence and experience of touch interaction. Looking prospectively at potential usability and design obstacles is another critical focus as multitouch interaction emerges. This workshop aims to consolidate (a) the retrospective assessment of what we already know, (b) the current evaluation of what we are learning, and (c) a prospective description of what remains to be explored in this burgeoning field in terms of the obstacles and technical and non-technical challenges that lie ahead.

Related Work

A recent and prominent work in this area that provides a glimpse into the multifaceted nature of this topic was presented by researchers HIIT in CHI 2008 [1]. CityWall, is a large multi-touch display installed in a central location in Helsinki, giving playful access to pictures of the city on a timeline. Observations of encounters at the display were examined qualitatively as well as quantitatively detailing social uses: crowding, massively parallel interaction, teamwork, games, negotiations of transitions and handovers, conflict management, gestures and overt remarks to co-present people, and —marking‖ the display for others. The study analyzed how public availability is achieved through social learning and negotiation, why interaction becomes performative and, finally, how the display restructured the public space. Finally the study shows how the multi-touch feature, gesture-based interaction, and the physical display size contributed differentially to these uses.

Such a study also raises several questions. As most of the visitors were interested in the playful and novel interface, what happens when the novelty factor wears out? How do we keep users engaged with such installations? The issue is how installation as CityWall are useful or provide unique experiences to users. Generally either a specific practice is studied and becomes the design target of the technology or the technology enables a new practice. The CityWall did support serendipitous social interaction in public space and a more conscious design along these lines could be attempted but the design space of applications is not yet explored. Another question raised by the study is how to support multiple users as most of the interactions at the display included groups.

Research Questions

The research questions for this workshop are divided into three groups: Retrospective, Current, Prospective.

Retrospective

The first set of questions concerns our experience in HCI over the last two decades and how those experiences can generalize to multtouch and surface computing. Specifically, we want to answer the following questions:

- Interface metaphors – what interface metaphors are applicable
- Widgets – which widgets can be adopted and used and how can they be used

- Ergonomic principles – what ergonomic principles we can adopt for vertical and horizontal interactive screens

Current
The next set of questions surrounds research knowledge accrued in recent years specifically directed to multitouch and surface computing. Specifically, we want to answer the following questions:

- Touch input – how to design the input thinking of number of fingers and hands.
- Gestures – what gestures can be used
- Combining modalities and tangible interaction
- Usability – how to improve the usability of multitouch application accounting for cognitive and ergonomic aspects
- Appropriation – how are multitouch screens used in different settings for social an organizational issues?

Prospective
Because of the uniqueness of multitouch and surface computing, there are obstacles and challenges to understanding and advancing the field. These are likely surmountable; however, articulating these is the first step. Specifically, we would like to answer the following questions:

- How to design for and supported collocated group interaction?
- What current application areas should be targeted?
- What new applications are made possible by multitouch and surface computing?

Outcomes

During the workshop a poster will be produced to be presented during CHI. The workshop outcome will be an edited book on multitouch and surface computing.

References

[1] Peltonen, P., Kurvinen, E., Salovaara, A., Jacucci, G., Ilmonen, T., Evans, J., Oulasvirta, A., and Saarikko, P. (2008). "It's mine, don't touch": Interactions at a large multitouch display in a city Center. In *Proc. of the SIGCHI conference on human factors in computing systems (CHI'08),* ACM Press, 1285-1294.