SLAP: Silicone Illuminated Active Peripherals for Multi-touch Tables

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1. Introduction

The intention of augmenting the digital technology with the richness of physical world objects has established in HCI. By giving a physical representation to digital objects on the table, Tangible User Interfaces make the information graspable and manipulatable to the user without visual attention. However, tangibles were only used to directly manipulate the position or rotation of the represented virtual object [5]. Changing parameters is still done by dragging sliders, turning knobs, or typing soft keyboards [4] on the surface without tactile feedback.

This work will make use of silicone widgets to integrate the tangible representation of sliders, Knobs and other interface widgets to the multi-touch tables. Since SLAP widgets are also used to change parameters, which cannot be changed by direct manipulation, my work will also investigate pairing mechanism.

Since the ability of representing a change to the tangible object is limited, one major issue of TUI is the one way communication. Hiroshi Ishii [3] calls the disability of changing the form, position or properties in realtime the *intangible representation* of TUI. With the approach of using silicone for physical objects, the SLAP widgets use rear projection to change their appearance. Even if the real change is still on the surface it appears to the user as if the objects itself interactively change.

Another issue which arises with intangible representations is using absolute input devices, like e.g. the slider, on the table. Since the position of the physical button of the slider cannot be changed, it has to mapped to the interface representation. For example, the user wants to change the brightness of an image. She places a slider on the surface. After pairing with the image object and brightness function, the interface slider position is at 50% whereas the physical slider is at 0%.

This work will also investigate solutions for integrating absolute input devices to interactive tables.

2. Related Work

In VoodooSketch [1], users extend interactive surfaces by physically plugging widgets into a palette or drawing them. In comparison, SLAP adds dynamic relabeling via projection, and does not require power.

For text entry on tabletops, [2] provides an overview of existing external and on-screen methods. Following their taxonomy, SLAP keyboards combine the advantages of physical keyboards (no visual attention required) with those of on-screen keyboards (no switching between table and external device).

3. Project Schedule

- Literature Review and construction of the prototypes(1 month)

  Initially, I will familiarize myself with existing literature regarding my topic as well as constructing the SLAP prototypes.

- DIA Cycle: Prototypes, Implementation, and Evaluation & Analysis (5 months)

  In order to design an interface and improve tactile feedback by physical widgets, I will use the DIA cycle. In the beginning I will run a preliminary study with a paper prototype to get more detailed information about interface issues, using text entry on a tabletop and additional tactile widgets. Considering the information I got from the prototypes, I will then develop the system. In the end I will run a qualitative user study regarding the user experience using SLAP as well as a performance regarding the accuracy of the SLAP keyboard compared to on-screen keyboards.

References

[1] F. Block, M. Haller, H. Gellersen, C. Gutwin, and M. Billinghurst. VoodooSketch: Extending interactive surfaces with adaptable interface palettes. In *Proc. TEI 2008*

(Bonn, Germany, Feb. 18-20, 2008), pages 55–58. ACM Press.

[2] U. Hinrichs, M. S. Hancock, M. S. T. Carpendale, and C. Collins. Examination of text-entry methods for tabletop displays. In *IEEE Tabletop 2007*, pages 105–112.

[3] H. Ishii. Tangible bits: Beyond pixels. In *Proc. TEI 2008 (Bonn, Germany, Feb. 18-20, 2008)*, pages xv–xxv. ACM Press.

[4] S. Jordà, G. Geiger, M. Alonso, and M. Kaltenbrunner. The reactable: exploring the synergy between live music performance and tabletop tangible interfaces. In *TEI '07: Proceedings of the 1st international conference on Tangible and embedded interaction*, pages 139–146, New York, NY, USA, 2007. ACM.

[5] J. Underkoffler and H. Ishii. Urp: a luminous-tangible workbench for urban planning and design. In *CHI '99: Proceedings of the SIGCHI conference on Human factors in computing systems*, pages 386–393, New York, NY, USA, 1999. ACM.