Post-Bit: Embodied Video Contents on Tiny Stickies

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ABSTRACT

Post-Bit is a small e-paper device modeled after paper Post-Its®[1]. We explored and designed interfaces to handle multi-media contents with paper-like manipulations using this e-paper device. The functions of each Post-Bit combined the affordance of physical tiny sticky memos and digital handling of information. At this stage of the design, we have prototyped two features of the interface: connecting computer-based workspaces and physical workspaces (using a function called Drop-Beyond-Drag), and tangible and tactile operation of multi-media contents. In this paper, we present the integrated design and functionality of the Post-Bit system's main components as shown in the video scenario.

Categories and Subject Descriptors

H.5.2 [**User Interfaces**]: Haptic I/O, Input devices and strategies, Interaction styles, Prototyping; H.5.3 [**Group and Organization Interface**]: Computer-supported cooperative work

General Terms

Design, Experimentation

Keywords

Multi-Media, E-paper, Ubiquitous Computing, Tactile, Haptic and Tangible UIs

1. INTRODUCTION

In recent years, the work environment has been inundated with digital hardware such as PCs, PDAs, cell phones and so on. However, when we examine real workplaces and the tools people use, we find paper still thrives; the manipulability of paper keeps it a valuable asset in many tasks. We have noticed that in particular, Post-Its®are very popular. These small paper sticky memos serve both tangible and cognitive functions in real work spaces. However, as Post-Its®'s uses are limited to static hand-written information, the contents are not dynamic, digital resources of information. To solve this problem, Post-Bit is designed as an e-paper device to combine paper-based manipulation and digital handling of information.

*The Post-Bit project was initiated and built as part of an internship by the first author at FX Palo Alto Laboratory, Inc.

[1]Post-It is a registered trade mark of 3M.

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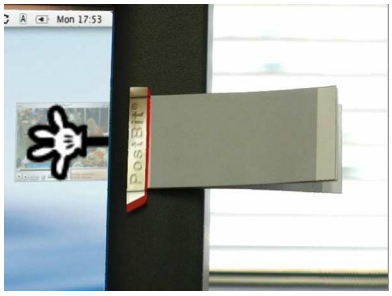

Figure 1: The Drop-Beyond-Drag function.

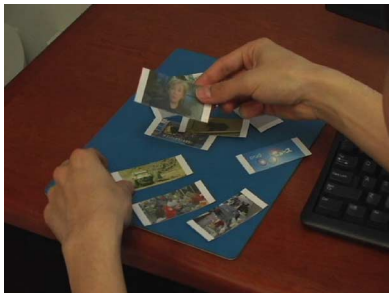

Figure 2: Editting video contents on a physical desktop.

2. SCENARIO

Post-Bit is used to edit and manipulate video contents by physical operations. The scenario is as following:

Takashi is watching his video archive on his computer. He chooses some videos to make a digest of cool scenes, and copies a video file into a stack of Post-Bits dragging the file directly to Post-Bit located on a display frame.(Drop-Beyond-Drag **figure1**) Each Post-Bit shows one scene. He

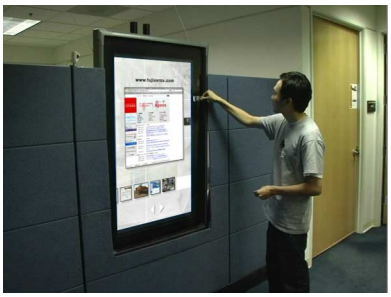

Figure 3: Squeezing a video onto a public display.

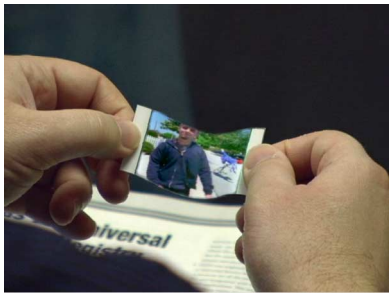

Figure 4: Controlling Video Speeds by A Haptic Interface.

shuffles those scenes on his physical desktop and makes a differently ordered stack (**figure2**). He brings the edited stack of Post-Bits, with the reordered video scenes, over to a public plasma display to show them (**figure3**). Later Takashi meets Chris and shows him a Post-Bit with the most exciting scene. Chris rubs and flexes the Post-Bit to rewind and show the content again and again, at different speeds (**figure4**).

3. DESIGN AND FUNCTION

The design started with informal user observations. From these observations, we found three main uses of paper Post-its®. 1) Reminder: storing information, 2) Comunication: sharing information and 3) Brain Storming: sorting information. One important user behavior we observed is that users tend to put Post-its®around a PC display frame. Locations of Post-its®are linked to a place or an object both in a physical space and in the user's mental spatial referent. Post-Bit's user interfaces are designed with these observation in mind. The design is shown both with a real embedded-system prototype that we built, and a video scenario to show some futuristic features.

3.1 Drop-Beyond-Drag

Drop-beyond-Drag is a function to copy multimedia content between a device (PC, PDA and so on) and Post-Bits. When a Post-Bit is placed on the frame of the computer monitor, it can act as an extension of the main display. A user drags and drops the file from a PC display directly to a Post-Bit. When copying the file from GUI to Post-Bit, we used a convention of the GUI; the Drag-and-Drop and an animated hand-icon to indicate reception. When data moves in the other direction, as when a user transports a file from a Post-Bit to external displays, the user places the Post-Bit on the display and squeezes its edge; the squeeze sensor triggers data transport. Related research includes Infopoint's [2] Pick-and-Drop function. However, between picking and dropping, the conceptual relationship between the object and the contents is broken. The Post-Bit directory transports the files without disengaging from the device and the Post-Bit displays the contents on itself, which is more intuitive. It is important for Post-Bit's interface to connect a locus of data transportation and actions not only in data structures but also in the user's mind.

3.2 Tangible and Haptic Manipulation

E-paper has additional attributes such as flexible surfaces and picture memory functions. The design of the Post-Bit adopts Post-it®'s tangible and physical arrangement, and uses e-paper's dynamic attributes for displaying sequential video content. Tangible Bits[1] has shown interfaces with tangible operation; most of them are interfaces for projecting visuals onto objects in bigger demonstration systems. In contrast, each Post-Bit itself is a display and each one has sensors on its back, so it stands alone as a separate device. A video is rewound by rubbing (against a slide sensor on the back) and a video's playback speed can be changed by flexing a Post-Bit, similar to Gummi [3] which takes a similar approach. When Post-Bit is loaded and placed somewhere, it can retain a keyframe without electricity.

The design focuses on uses for many Post-Bits in a task. For example, picking many scenes of video on a large physical desktop, and editing them into a different order. To deal with such uses, Post-Bits can be stacked, and the stacks can be divided or recombined to shift video content.

4. CONCLUSION

In this paper, we introduced a conceptual design of Post-Bit. Our next steps include a usability study, as well as building a prototype with flexible displays. (A simple physical prototype was developed using a character LCD along with several sensors and a microcontroller.) This project attempts to make rich multi-media contents manipulable in the real world, having both physical and digital usability.

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6. REFERENCES

[1] H. Ishii and U. Brygg. Tangible bits: Towards seamless interfaces between people, bits and atoms. In *Proceedings of CHI 97*, pages 22–27. ACM Press, January 1997.

[2] N. Kohtake, J. Rekimoto, and Y. Anzai. Infopoint: A device that provides a uniform user interface to allow appliances to work together over a network. *Personal Ubiquitous Computing*, 5:264 –274, January 2001.

[3] C. Schwesig, I. Poupyreu, and E. Mori. Gummi: a bendable computer. In *Proceedings of CHI 2004*, pages 263–270. ACM Press, January 2004.