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CULTURE AS A DRIVER OF INNOVATION

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Abstract

I present three examples of work in an emerging new field of culturally rooted computing and culture conscious product design in the context of developing nations. Against the backdrop of the proliferation of ICT in developing nations, these projects show how the aesthetics and visions of ancient cultures can shape new forms of computing technology, and how ‘culture’ can drive innovation. The large numbers of traditional design talent in developing nations must not be seen merely as a market for ‘Silicon Valley’ based products and methodologies, but rather as an opportunity for innovation and a rethinking of the forms of computing for all of the world.

1. The award winning Crossing exhibit project illustrates new forms of interfaces inspired by and based on cultural forms of India’s city of Transformation, Banaras. Installations and products of the Crossing exhibit show culturally rooted design as well as interactions with digital content that challenge the key board and mouse forms of interactions with workstations.

2. The Vrindavan Physical-Virtual Authoring Tool explores a multimedia-authoring environment that allows village children in rural India to compose digital representations of their sacred city, Vrindavan composed through physical, tactile media as well as digital multimedia.

3. Lastly we illustrate how communities in Asia personalize their technology, and how a technology whether a computer, a vending kiosk, or an automobile can serve as an extension of cultural identity and expression, and in turn how ornamentation is an essential design need. Given the needs of these emerging communities, culturally rooted computing will play an important factor in making technologies usable and accessible to people.

Key words: Culture-conscious computing, Culturally-rooted Computing, The Crossing, Tangible Interfaces, Personalization and Cultural Customization of Technology.

1.0 Introduction

Over the past 18 years, through a series of technology exhibits of traditional culture shown in museums, we have explored new forms of dissemination of culture through

multimedia technology, but also how cultural domains can shape new interface technology. The projects aim to preserve, disseminate, and re-interpret the world's traditional knowledge using digital tools, but the contribution goes beyond just museum applications. The projects create an interesting space of culture-conscious product design for “the rest of us”, the 4 billion people lying on the wrong side of the digital divide.

The work encompasses three themes:

1.1 Re-questioning the Interface

The present form of the PC consisting of TV display of screen, keyboard and mouse is based on a 30-year-old invention of the optical mouse. While the hardware form of the PC (keyboard, mouse) and software form (button pushing, windows, point and click) has stabilized over time and has created rich genres of multimedia documents, it is clear that this form needs to be re-questioned as paradigms of information access move from personal computing to ubiquitous, mobile and physical & tactile computing.

Culturally rooted Computing

Over the past decade there has been an increasing interest in bringing computing to developing cultures, and within these cultures bringing computing to untapped markets in rural areas. Since rural areas of the world represent the last remaining areas of living, “analog” cultures in the world, i.e., cultures that rely on hand based skills, our work seeks to integrate traditional knowledge, hand-skills and body-friendly design in new interface technology and learning applications.

In this paper, we present three examples that explore culturally rooted computing which shows how interaction with cultural domain can help in the re-design of the form of the computer itself. It is our hope that ‘culture’ doesn't remain only within the confines of museum walls, but becomes an important driver for the design of richer computing interfaces.

2.0 The Crossing Project

The term "Crossing" is related to the Sanskrit term for a pilgrimage site, i.e., pilgrimage site as a crossing point into a space of learning, reflection and transformation (see Makkuni, 2003). The Crossing project has created a physical/virtual multimedia exhibit shown in Bombay, New Delhi, New York and Linz that allowed learners to connect to the living knowledge traditions of Banaras, India, a pilgrimage site by the river Ganges, and a 2000 year old centre of learning. The technologies invented illustrate a new form of body-friendly, culture-friendly, tangible interfaces into digital content.

The Crossing Project brought together futuristic, mobile, multimedia technology and archetypal content, dealing with the culture of one of the world's most ancient living cultures, Banaras. With respect to technology, it questioned the very form of a computing system and the Graphical User Interface paradigm, which has served as the substrate of modern computing systems for thirty years; (see Wellner, 1993, Ishii and Ullmer, 1997; Want et al., 1998). The Crossing technology presents alternate paradigms of information access, integrating the hand and the body in the act of computer-based communication and learning. With respect to content, it brought to focus a traditional society's notion of eco-cosmic connections through mobile, multimedia technology-based connections. With respect to design, it incorporated the expressions of traditional arts and crafts in the design of expressive information delivery devices.

The exhibit created 41 installations that illustrated alternatives to users interacting with a computing workstation form -- consisting of keyboard, mouse and display. These included the users' touching, turning, and tilting of interface objects to access learning content; (see a range of interfaces developed by the Crossing project in Figure 1).

3.0 Vrindavan Physical-Virtual Authoring Tools

3.1 Physical -Virtual Authoring Tools

The Crossing project was disseminated principally as a museum exhibit. However its contribution extend to fields of product design and user interaction paradigms. In the Vrindavan Physical-Virtual Authoring Tools project, we extend the tactile physical icons concept developed by the Crossing Project to explore continuous authoring activities using physical and virtual media. In doing so, we examine how physical interactions with computing representations present us with a new medium for creative expression. At the higher level, the development of such interfaces could be applicable to cultures where keyboard and mouse paradigms may not make sense.

3.2 The Vrindavan Content Domain

The Vrindavan project explores new forms of Physical-Virtual authoring tools, in which children can compose multimedia representations using physical icons as well as virtual multimedia.

To explore the new media, we worked with the children from Vrindavan, a culturally rich city in North India. The city of Vrindavan, the domain of research, is a site of sacred geography, and has been for many hundreds of years associated with the mythology and legends of the cowherd god Krishna, and his consort, Radha. Since places in Vrindavan are physical embodiments of mythology, the city becomes a living document enacting ancient mythology.

3.3 Workshops

A series of experiments in visual and tangible multimedia composition allowed village children to understand examples of form and composition in modern multimedia. Second, a series of experiments in “representation” allowed these children to represent concepts, calendars and develop storyboards, and to plan and execute a multimedia presentation.



Figure 2. Media workshops

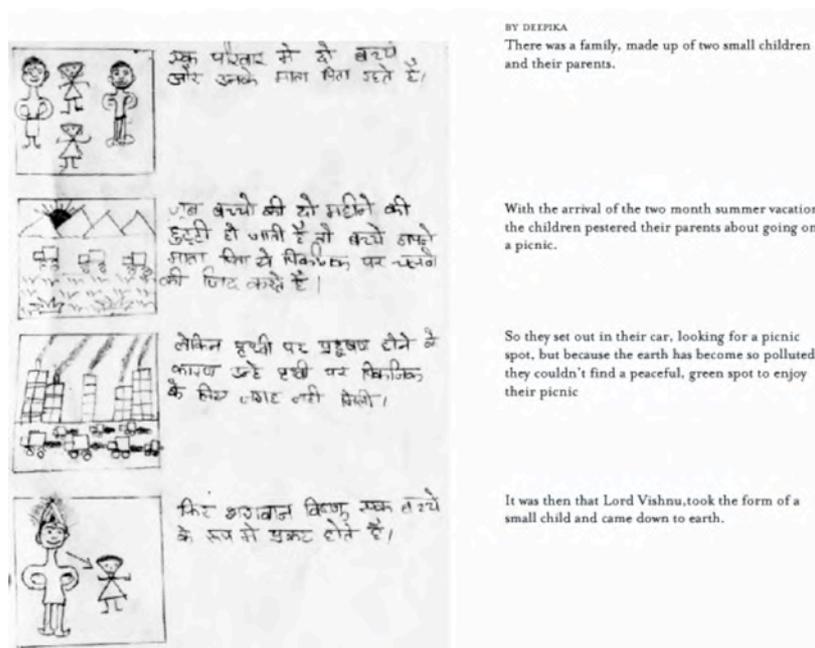


Figure 3. Example of children's storyboard

3.4 Work Process

Children huddle around a shared representational and display space when composing work in traditional media. As shown in Figure 4, children are working together on clay icons, seeing and interacting with each other socially, observing each other's tools and the emerging forms of the shared emergent artifact. This is in contrast to most modern workstations, which function as individual workspaces with no provision for social sharing or for people to access shared representations of the “collective” or the “sense of periphery of the collective” (see Figure 4).

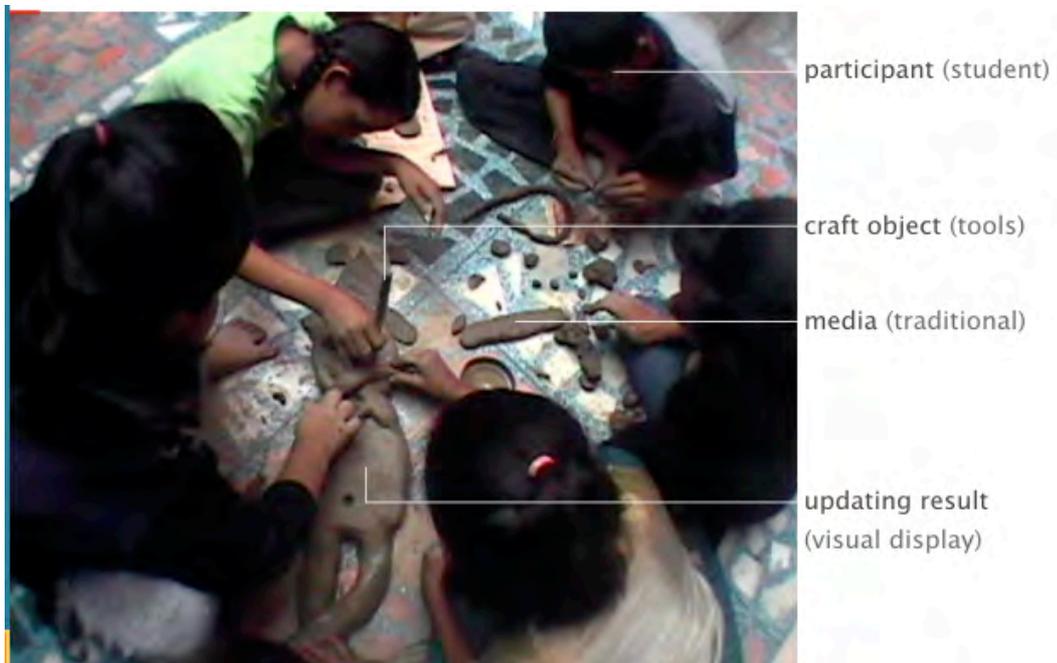


Figure 4. Traditional work process

3.5 Physical and Virtual Authoring Medium

Inspired by the form of a huddled group of children around a shared work and presentation space, we recreated a computational display and interface where a group of children could huddle together around a shared representation (a combined display screen and interface) and use tools to compose a multimedia presentation using physical tactile and digital multimedia. We call this process ‘PV’ – physical and virtual authoring. The size of the display allows a group of 7–8 children to work together around a shared

surface and compose a map of their city. Children see each other around a shared display, share each other's tools, while display also functions as an interface. Children can place physical objects on the surface to affect the state of the presentation, so that an interface action and the resulting display-update occur on the same surface (see Figures 5-8).

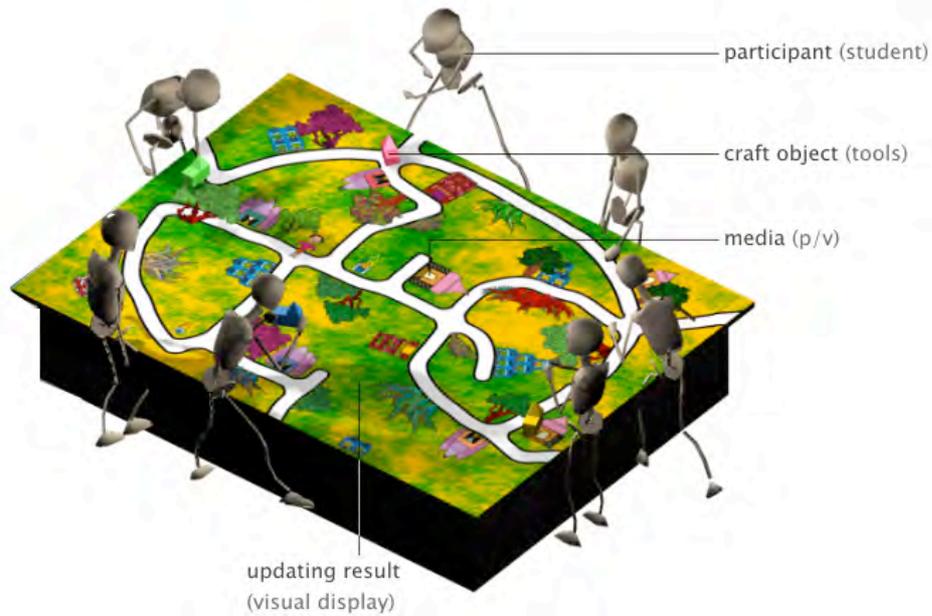


Figure 5. P V Authoring Tool



Figure 6. Child interacting with Physical-Virtual authoring tools.

By positioning tactile physical icons with computational controls on the virtual display, the child can specify positions of temples and trees on the map of Vrindavan.

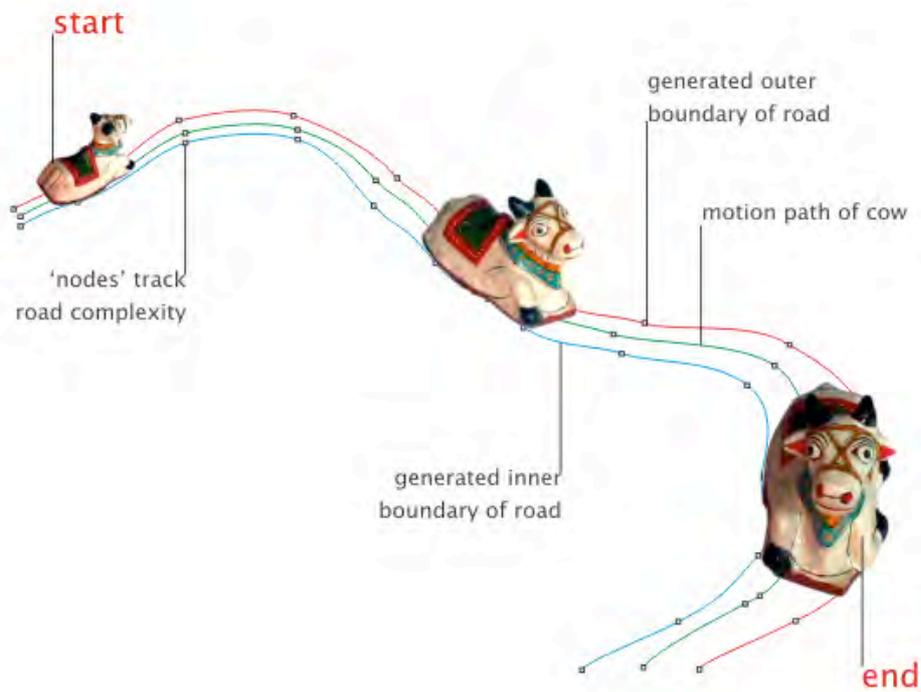


Figure 7. The Cow digitizer allows a child to specify road maps of the city.

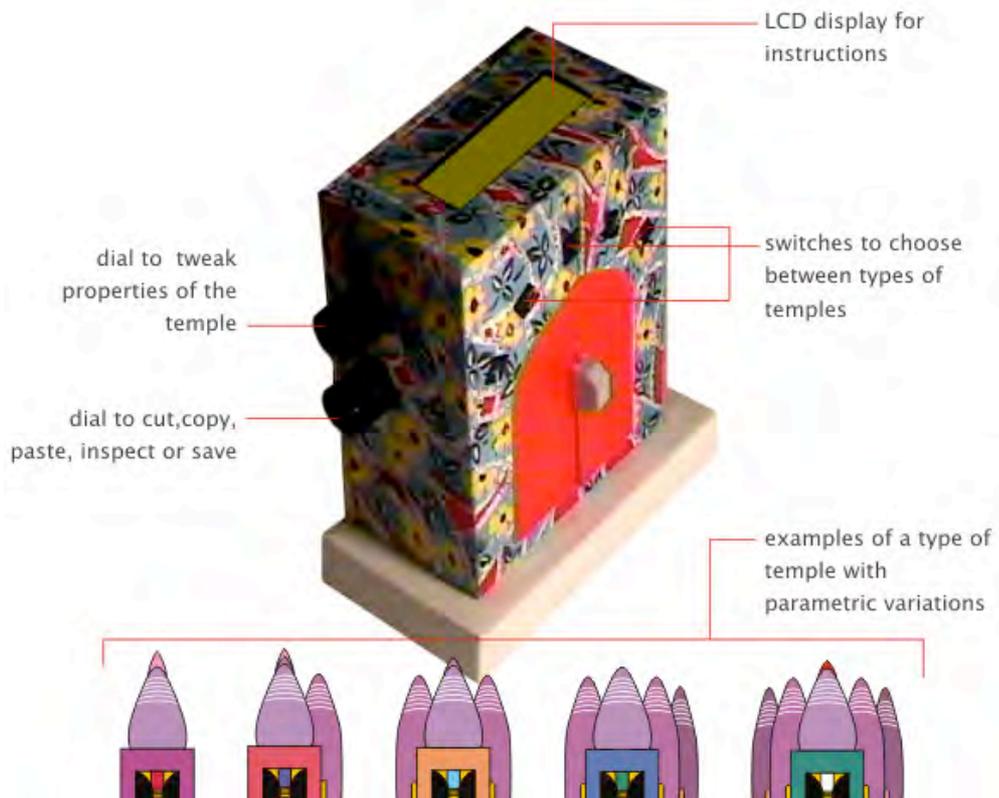


Figure 8. Physical-Virtual temple editor. Positioning the editor on the map allows a child to draw an image of a temple. Manipulating the knobs on the editor allows a child to explore parametric variations of temples.

3.6 Composition Tools and Process

We used this new display and interface media to allow children to compose a map of their city, Vrindavan. Vrindavan is a city of temples and gardens, with mythological stories associated with physical spaces. The map of the city consists of roads, temples, trees, and gardens. Children compose the map by composing roads, positioning temples and trees, and associating different elements on the map with associated video links. The links play back videos composed by the children. In total, the selection of images, arrangement of images on a map, and the creation of links to joints in the map roughly allows the child to compose a reasonably complex multimedia document (see Figure 9).

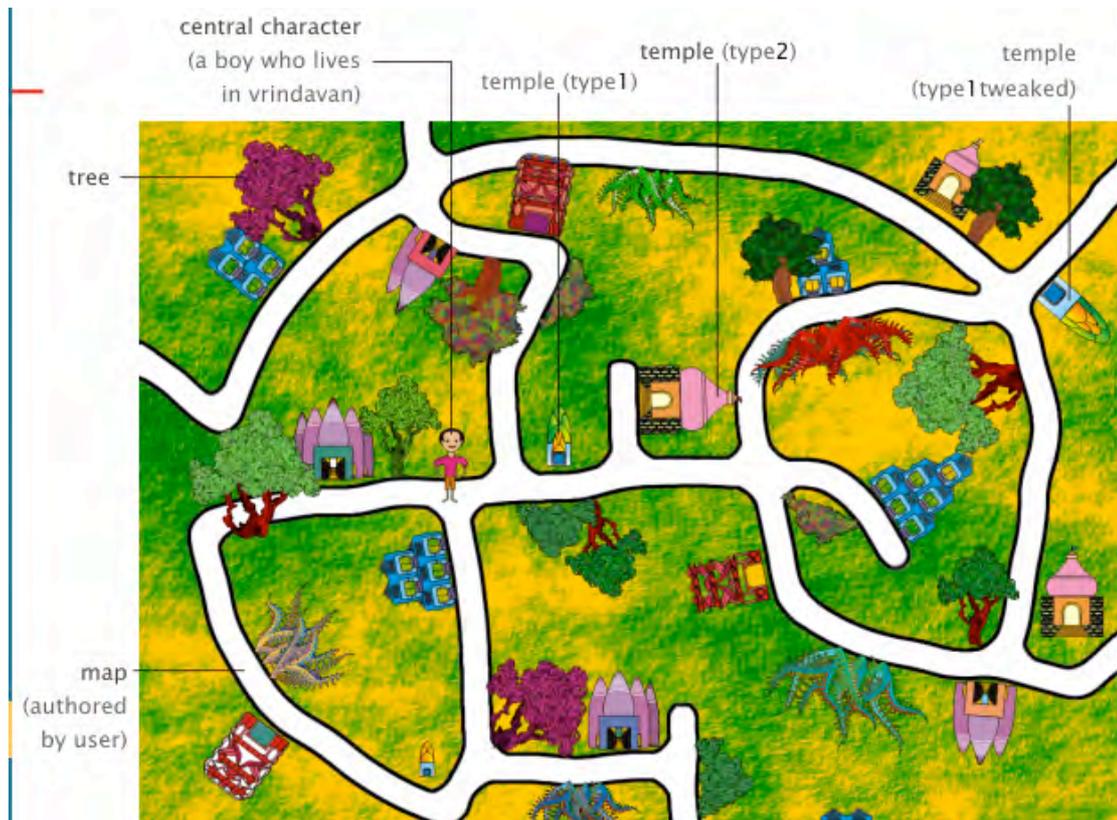


Figure 9. Representation of Vrindavan maps and links

Personalization of Transportation Technology in Asia

A wide spectrum of public transportation is used in Asia, such as rickshaws, and taxis. These functional modes of transportation that serve millions of people are adorned by communities who personalize them with their own narratives. In essence, the technologies that would otherwise homogenize the users thrive as platforms for cultural expression (see Figure 10-12).



Figure 10. Ornamentation of Taxis in Bombay.



Figure 11. Ornamentation of Taxi accessories.



Figure 12. Rajkot Chakdas expressing community identity

Communities of users personalize their vehicles to different degrees of ornamentation. The resulting array of graphics, textures, patterns, motifs, paintings, embossing, composite materials, talismans, quotes and decorative accessories present us with an amazing variety of anonymous artists and their indigenous art. This culture of ornamentation sustains street artists, who work with different styles of vehicle personalization, such as hand painting, poster art, paper cutting, audio mixing and accessory art.

One can delight in the diverse ways in which different communities collectively express their identities. This study focuses on vehicular graphic art as a point of departure to explore how the need to ornament is fundamental to Asian cultures. Since global companies are becoming interested in the dissemination and accessibility of ICT for emerging economies, this study in particular provokes one to understand the process of personalization so that future products and services respect this fundamental cultural need. This study infers that culturally rooted technology is a means to increasing accessibility of ICT in emerging economies.

In this era of globalization, we therefore deduce that technologies that provide for personalization can enable cultures to preserve their identities.

Conclusion

These projects present us with beautiful examples of how technology that “ceases” to be just a “technology” becomes an extension and experience of identity of a community. Engagement with such cultural content provoked innovation at fundamental levels of user interfaces as well as highlighted designers’ awareness for ornamentation, customization and personalization. The rich technologies described in this paper actually become a valuable benchmark and set an important design value towards the design of culturally appropriate computing in developing and developed nations.

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