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Siftables Offer New Interaction Model for Serious Games

by James Figueroa

Taking inspiration from traditional children's blocks and Legos, developers at MIT Media Labs have created a new model for computing that has some big potential for serious games. Called Siftables, the technology combines a technical user interface with a wireless sensor network into a platform that lets users physically grasp information and sort it interactively. Small, cookie-sized blocks are equipped with display screens and can be used in a variety of ways. For example, you can upload images on each block to physically sort digital photos, tune each one with a musical beat to form songs, and display letters on each block to play word games.

David Merrill, who was a doctorate student at MIT when he collaborated with Jeevan Kalanithi and advisor Pattie Maes to create Siftables, wowed onlookers at the Technology, Entertainment, Design (TED) Conference with his presentation in February and had many people in the serious games community buzzing.

"Spatial reasoning is deeply connected to how we understand a lot of world around us," Merrill said at the conference, referencing wooden blocks as an important learning tool for thinking and solving problems. "I started to wonder what if when we used a computer, instead of having this one mouse cursor that was like a digital fingertip moving around a flat desktop, what if we could reach in with both hands and grasp information physically, arranging it the way we want it."

The Siftable devices include an LCD display encased with a microcontroller, accelerometer, wireless radio, and four Infrared Data Association (IrDA) transceivers for networking.

According to Merrill, who recently visited China to explore manufacturing options, the TED presentation elicited plenty of feedback from companies interested in developing games and other uses for the devices. "There seems to be terrific interest in playful and education applications," he said.

Computing Becomes Tangible

Siftables is the latest example of a tangible user interface (TUI), an emerging technology that aims to use physical objects as interfaces for computing needs. MIT has been a pioneer in the field. Hiroshi Ishii and Brygg Ullmer outlined a model for TUIs in 1997 that they called Tangible Bits, which described three key concepts—interactive surfaces, ambient media, and bits represented by everyday objects. One example was the marble answering machine, a prototype that used marbles to represent incoming messages.

The Tangible Bits vision has been the basis for several projects and prototypes originating from MIT. Similar ideas have sprung up from other institutions—for example, phidgets (physical widgets representing a GUI) from the University of Calgary.

Siftables, however, differ from traditional TUI models with the addition of a sensor network user interface (SNUI), which gives them a groundbreaking level of coordination and interaction.

"They are a generic interaction platform that combines the flexible graphic display capabilities of the GUI with the physicality of a TUI, coupled with the capabilities of a sensor network," Merrill's team wrote in their 2007 report for the first International Conference on Tangible and Embedded Interaction. "In contrast to TUIs that provide handles to a projected digital representation of data, a SNUI operator holds a representation of the data itself that can be perceived and altered directly."

Merrill explained further that the display screen was an important aspect that essentially let people put GUI features in the palm of their hand.

"There is already a lot of great research out there towards bridging the physical and digital worlds, but the limitation that we saw in much of the work was that without a screen on the manipulatives, they could not be as flexible," he said. "Pixels are more easily changed than bits—at least for now. So by putting a graphical display on each Siftable, we made an interface that could be arranged and manipulated easily with the hands and fingers, but that retains much of the useful flexibility of a graphical user interface."

Siftable Learning

Lynn Marentette, a school psychologist and counselor who writes a blog called Interactive Multimedia Technology, has seen first-hand the limitations of desktop computers in a traditional classroom setting. It's not easy to coordinate a group of young children at rows of desks in front of individual monitors, where they must point and click at the same time to follow the lesson plan. When the classroom is set up with each computer facing a wall and away from the teacher, coordination can be even more difficult.

Siftables could help overcome these problems by giving children an interactive platform that's instantly recognizable as a system of blocks that don't require computer knowledge.

"We could put them to use right away," said Marentette, who envisioned lots of possible

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uses for the devices. "Siftables look like they would be great for working with young people who have autism or social communication problems. I think that games and activities using TUIs support learning and memory because of the hands-on motor component, and by doing so, they can provide a multi-modal means of getting in and around the brain."

Marentette offered several possibilities for Siftables games, including "feeling games" to help students understand facial expressions with video, storyboarding, memory games, and outdoor treasure hunts for science.

Eliane Alhadeff, who blogs about Future-Making Serious Games, also saw plenty of potential in Siftables. "As thinking toys they intrinsically have many of the serious games attributes, making their use possible for learning math, ESL, history, geography, etcetera," she said. "The other possibility I'm envisioning is their early use at school—for instance, kindergarten to second grade—as an appetizer for further serious game converted curricula. If we welcome the idea that serious games are the new common language for learning, then Siftables could eventually become the great instrument to 'alphabetize' very young students, introducing them to the world of games and simulations."

Although Siftables were created as a broad general-purpose platform for anything from business to media manipulation, Merrill acknowledged that serious play applications were an important part of the design process.

"Humans have played games with small blocks and tiles for a long time—like chess, mahjong, and dominoes," he said. "Education theory has also noticed the value of physical manipulatives, starting with Froebel's gifts and with contemporary Montessori schools leading the charge. It's natural that a flexible, digital version of these established ideas has the potential to be really compelling. One of the great strengths of tangibles is that they support trying lots of different possibilities quickly, a search pattern that tends to lead to more and better solutions."

Sorting It All Out

Marentette noted that the final product would have to be rugged, able to withstand heavy use by young children who wouldn't understand the difference between wooden blocks and delicate electrical components.

Durability was among several challenges as Merrill and Kalanithi moved to market Siftables. They've partnered with fellow MIT graduate Brent Fitzgerald to form a company called Taco Lab and finalize development.

Among their concerns was ensuring low power consumption with a long-lasting rechargeable battery and making the devices inexpensive enough that a lost Siftable wouldn't cause too many problems. Most of those concerns may have been addressed with Merrill's visit to China, which he said was productive.

There's no set timeframe for Siftables to become commercially available, and Taco Lab simply lists their release as "soon." At this stage, it's too early to tell what kind of impact Siftables will have once they hit the market, but it's easy to visualize them as part of a new wave of technology that includes a range of interactive TUIs and wireless networks. For now, Merrill is simply hoping that people will have fun with them.

"The most important thing to us is that Siftables are easy and delightful to use," he said, "and that will drive our process as we move towards commercialization."

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