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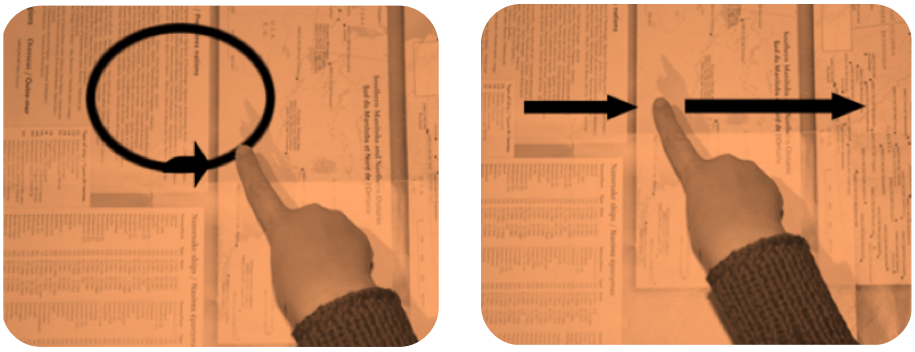
Characterizing Real-World Gestures to Improve Non-Verbal Communication

By Aaron Genest and Carl Gutwin

Pointing gestures - sometimes called deictic gestures - are an important part of human communication over work artifacts. Pointing and deixis allow people to greatly simplify their communication, using words like "this one" or "that one" along with a pointing gesture, rather than complex verbal descriptions.

Pointing gestures are ubiquitous in the real world when people work over tables and whiteboards. However, when collaboration occurs across distributed surfaces (that is, digital surfaces that are separated by distance), the visual representations used to embody other members of the group often fail to convey the details of these gestures.

Although both gestures and embodiments have been well studied, there is still very little information available to surface designers about what components and characteristics of deictic gesture are most important for conveying meaning through remote embodiments. To provide this information, we have developed a framework based on three observational studies in which we recorded and analysed more than 450 deictic gestures.



Contour atom (left) and stroke atom (right). Arrows indicate movement of the finger.

Our framework incorporates four issues that are important for the design of embodiments on surfaces: what parts of the body are used to produce a deictic gesture, what atomic movements make up deixis, where gestures occur in the space above the surface, and what other characteristics a gesture exhibits in addition to pointing.

Our observations provide a new design understanding of deictic gestures. We use our results to identify the limitations and capabilities of current embodiment techniques in supporting deixis, and show that both realistic representations such as video, and abstract representations such as telepointers, have differing strengths and weaknesses in conveying gesture. We combine the strengths of these two approaches to propose new hybrid designs that better represent the range of gesture behavior seen in real-world settings.

This research will be presented by PhD student Aaron Genest at the European Conference on Computer-Supported Cooperative Work in Aarhus, Denmark in September 2011.

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The Proximity Toolkit: Prototyping Proxemic Interactions in Ubiquitous Computing Ecologies

By Nicolai Marquardt, Robert Diaz-Marino, Sebastian Boring and Saul Greenberg

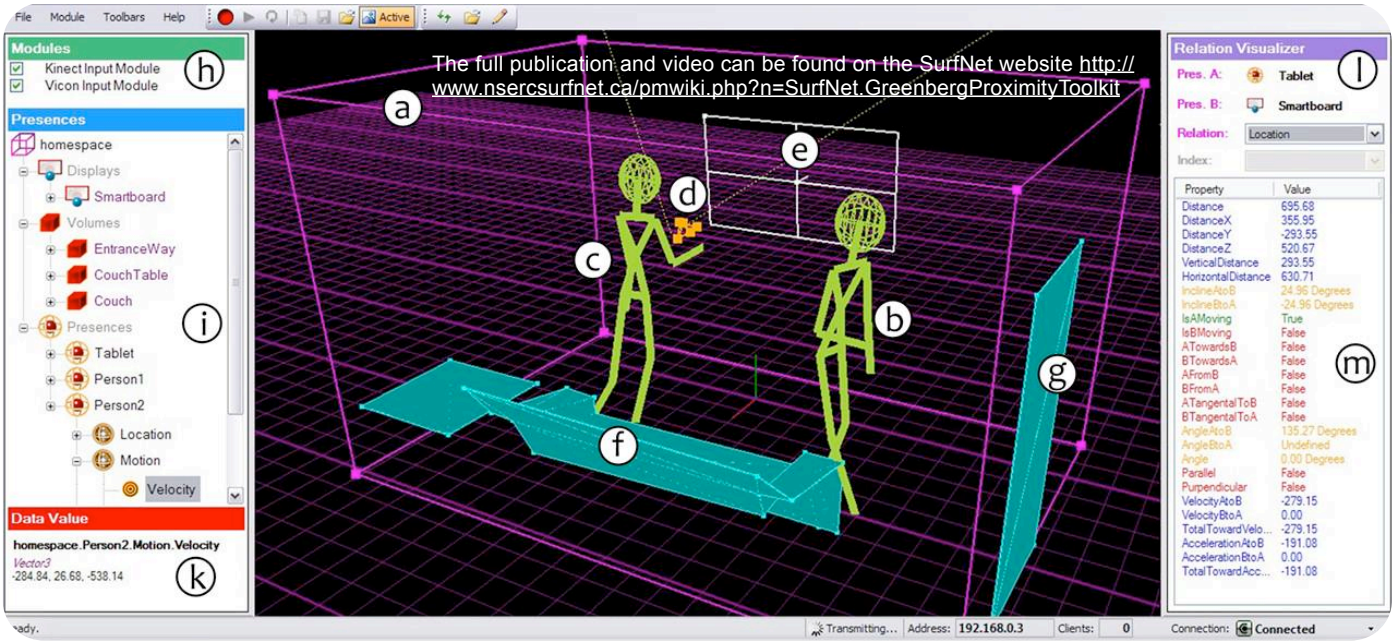
People naturally understand and use proxemic relationships in everyday situations. However, only few ubiquitous computing (ubicomp) systems interpret such proxemic relationships to mediate interaction (proxemic interaction). A technical problem is that developers find it challenging and tedious to access proxemic information from sensors. Our Proximity Toolkit solves this problem. It simplifies the exploration of interaction techniques by supplying fine-grained proxemic information between people, portable devices, large interactive surfaces, and other non-digital objects in a room-sized environment. The toolkit offers three key features.

1) It facilitates rapid prototyping of proxemic-aware systems by supplying developers with the orientation, distance, motion, identity, and location information between entities.

2) It includes various tools, such as a visual monitoring tool, that allows developers to visually observe, record and explore proxemic relationships in a 3D space.

3) Its flexible architecture separates sensing hardware from the proxemic data model derived from these sensors, which means that a variety of sensing technologies can be substituted or combined to derive proxemic information.

Using our toolkit, a developer can create a basic and reasonably robust proximity-aware application in a few hours.



The figure illustrates the Monitoring Tool included in our toolkit: the tracked ubicomp environment (a), the visual representation of tracked entities in space (b-g), list of available input modules (h), list of all tracked entities (i,k), and relation visualizer (l,m).

Upcoming Event

Industry Open House | University of Calgary, ICT 122 | September 1, 2011 | 8:30 am - 12:30 pm

This Open House will provide the general public the opportunity to view demos on the latest surface applications and to ask questions of our researchers and students. Registration is required. A registration form will be posted on our website very soon at http://www.nsercsurfnet.ca/pmwiki.php?n=SurfNet.2011IndustryOpenHouse. Guest speeches are:

- "Game Architects Play" by Philippe Kruchten of the University of British Columbia
- "Exploring the Potential of Surface Computing Interfaces in Complex Task Environments" by Stacey Scott of the University of Waterloo

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