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Trip report by Ross Shannon, Systems Research Group

User interface and interaction design is an area of heavy research. Here we report on some recently presented research shown at Advanced Visual Interfaces 2006 (AVI06) in Venice, attended by three of the Systems Research Group's PhD students.

This long-running biannual international conference was concerned with advances made in visual interfaces, as well as interaction metaphors, contextual interfaces and ambient information display.

Multimodal interaction was a major research topic. A number of touch-sensitive displays were shown, like Mitsubishi's DiamondTouch table that we have installed in our department (though the DiamondTouch system itself was rarely mentioned by name, even by researchers from MERL). Collaborative environments built using a touch-sensitive table to allow multi-user interactions—an approach being actively researched in the SRG—were described in one of the conference's preceding workshops, as well as in the conference proper. Updated drivers for the table were displayed, introducing new gestures. Another demo from MERL and the University of Calgary used a touch-sensitive table, complemented by voice recognition, to control characters in a gameworld.

Speech was also used in MERL's investigation into the possibilities of using speech to control textual search, in this case using TV programme listings. This presentation included interesting ethnographic research, particularly on participants' reactions and modification of strategies when a search failed.

Beyond the touch-sensitive tables, alternate display devices were largely absent, apart from an evaluation of various aspects of vision on volumetric three-dimensional displays from the University of Toronto, in particular focusing on a user's perception of depth.

Context in advanced interfaces was a research topic that had a workshop devoted to it. This workshop contained discussion on how the user's context may be used to modify the interface in interesting ways. This might relate to the number of users in the room in a collaborative environment, and their respective positions, devices in use etc.

Providing feedback to users of complex pervasive systems was discussed. One program used Chernoff faces (in the form of simple smiley faces) to imply the state of a complex pervasive system. This is similar to potential research by our group involving using a highly-articulated 3D human character to add unobtrusive cues to a user during the visualization of a pervasive system.

Two types of context were identified: context that can be technically mea-

sured, such as position, time, orientation; and social, user-perceived context that is generated when users work together. Between these two levels of context there is the inferred overall context (referred to by some as the user's "situation"). It was noted that a user's perception of measurable cues are less accurate than the same technical measured context (for example, their geospatial position in a building). This lead into another discussion, lead by Lancaster University's Alan Dix, on the providence of context—when it makes sense to cull certain elements from the sensed data set to simplify computation. This is similar to the filtering step most researchers will apply to their data before generating a visualization from it.

Many systems were presented for tasks like photo sharing and organisation. A novel photo-sharing application was shown in which the photos travel around the table on a literal 'current' (modelled with real fluid dynamics), which allows more users to use the table simultaneously since they do not have to reach across the table to get access to certain elements—they may simply wait until the stream makes the content available. Giving users access to elements like this facilitated organisation of photos into storyboard-like representations. This demo was very impressive, both visually and theoretically, and showed advanced control techniques for managing the size and speed of the stream. It also raised questions about managing groups of collaborating users when they all have equal power to change the display, thus affecting others. There is an interesting conflict resolution problem involved, when two users for example try to change the flow of the data in a tug-of-war manner.

In a similar vein, an approach to visualize conflicts and resolutions was presented by Intel researchers which involved the placement of elements in a 3D space. When an element is moved by another user, a path between its current and previous positions are displayed to the user the next time they use the system. Users may merge the changes into a compromise of the two choices, or may drag an element back to its original location.

Other approaches to the image browsing problem involved mapping grids of photos onto 2D paths and 3D structures, such as cylinders, as well as more unconventional and somewhat haphazard mapping techniques. These presentations were shown experimentally to improve visual search time in comparison to searching 2D grids of images.

There is some interesting work going on in the field of improving various well-known interaction paradigms prevalent in common software, for instance Microsoft Office programs. One approach proposed replacing the one-dimensional listbox used for things like typeface choices with a two-dimensional 'listmap', which confers revisitation benefits due to the spatial layout. Users were found to be able to find previously-chosen elements much faster in the listmap than in the exclusively alphabetic representation in the listbox, but found searching for elements for the first time slower.

Though not the main focus of the conference, researchers from the Georgia Institute of Technology presented their efforts to formalise the area of ambient information displays, based on properties like informational capacity, intrusiveness and representational fidelity.