

SOUND AND VISION HAVE BEEN SORTED OUT, BUT HAVE YOU EVER FELT YOUR DATA?

The gentle touch



AS FAR AS COMMUNICATING with computers goes, sight and sound have been figured out. But have you ever wondered what it would be like if instead of just visualising your data you could touch it too?

Touchy-feely interfaces, or 'haptic systems', have been around for some time. Games enthusiasts blast away using devices such as the Microsoft SideWinder joystick, or the more recent Logitech WingMan force-feedback mouse, but as a general-purpose method for human-computer interaction, touch has been little explored. Recent advances in the technology mean a whole range of haptic applications are on the horizon – from virtual surgery training to 3D sculpting.

A system called ReachIn (www.reachin.se) offers convincing evidence that the haptic interface is going to become very big news. ReachIn provides stereoscopic imagery and force-feedback using a customised PC configuration. The monitor is angled at 45

degrees down towards the desktop. In place of the keyboard is a mirror that reflects the monitor screen. Underneath the mirror is a force-feedback stylus that the user holds.

The stereo graphics are achieved using the CrystalEyes system (www.stereographics.com), which works on the principle that because our eyes are a few centimetres apart, when we view a real 3D scene each eye sees the image from a slightly different perspective. The brain then knits the two views together. Using CrystalEyes, the monitor switches rapidly between two displays of the scene: one as if viewed by the left eye only, the other as the right eye would see it.

Looking at the monitor with the naked eye, all you see is a shimmering blurry image. But when you put on the cordless CrystalEyes glasses you see a true 3D image floating in space. It works because each lens in the glasses is a liquid crystal shutter that can be electrically flipped from transparent to opaque. A small box on top of the monitor sends an infra-red signal to the glasses to tell them which image is currently on display. If it's a left-eye image, the left lens opens, and the right one shuts. And vice versa, at least 30 times a second. It might sound unlikely that this works, but it does, and the image quality is superb.

Below the mirror the user holds the stylus of a Phantom force-feedback device (www.sensable.com). The stylus, about the size of a ballpoint pen and attached to the body of the device by a lightweight linkage, can be moved around freely by the user. The device can also press the stylus back against the user, with three tiny motors under software control.

It's hard to describe how it feels to use the system, but the effect is stunning. At a recent demo I was not the first person in the room to shout 'wow!' as I dragged the stylus across an object floating in space in front of my eyes, able to feel the bumps on the surface. It was weird, to say the least, as you're seeing and touching an object you know does not really exist. Then I tried making an injection into a vein in a virtual hand, and the feeling of resistance as I pushed the 'needle' through the 'skin' was very creepy.

The haptic interface is compelling. As for the full virtual experience, it can only be a matter of time before we find ways for computers to stimulate our other senses too.

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