Informatics

Informatics Department Demonstration Handout

The Data Glove

1 An Introduction to The Glove

The DataGlove is a light-weight glove-shaped input device. It senses relative hand movement, position and orientation, in real time. It converts this information into a computer-readable form. The glove monitors flexion and extension of the fingers and the position and orientation of the hand. The glove is made of lycra and is correspondingly light and elastic. The currently available version is called "The Data Glove Model 2".

2 Virtual Reality

The DataGlove is an example of a device that begins to create a virtual world for its operator. Physical reality is the thing we find on the other side of our sense organs: eyes, ears, and skin. Virtual Reality (VR) is perceived when computerised clothing is worn over these sense organs to give the impression the wearer is in a different or virtual world. These suits are sometimes called DataSuits. Examples of the Virtual Worlds that have been created include:-

- The Undersea Kingdom, where the DataSuit is mapped onto a lobster. The user's eyes are presented with a view of the sea. They can then swim around and see other creatures, some of whom may be other people in DataSuits. What does it feel like to have a large tail, claws and no head?
- The Mad Hatter's Tea Party, where you can become Alice, the hare, or even the Hatter!.

3 Technical Details of the DataGlove

The information on relative hand movement is obtained from fibre optics. Usually fibre optic cables transmit light. In the glove, the fibre optic cables at the joints are treated so that light escapes when the fingers bend. The greater the movement - the greater the loss of light. The remaining amount of light transmitted is measured. The glove includes a Polhemus device to give absolute position and orientation. It can also detect Yaw, Pitch and Roll. It is possible to buy extra sensors to detect abduction (the movement of the finger sideways) and for the minor joints. The Glove comes in both right and left handed versions.

The glove supports RS232 and RS422 communications and returns up to 60 records per second. The software supplied can detect a variety of gestures. A library of 25 commands is available to interface to the glove.

Only one glove is being used, but two handed input may be important for some applications. A dual system synchronization package is available to integrate two handed input.

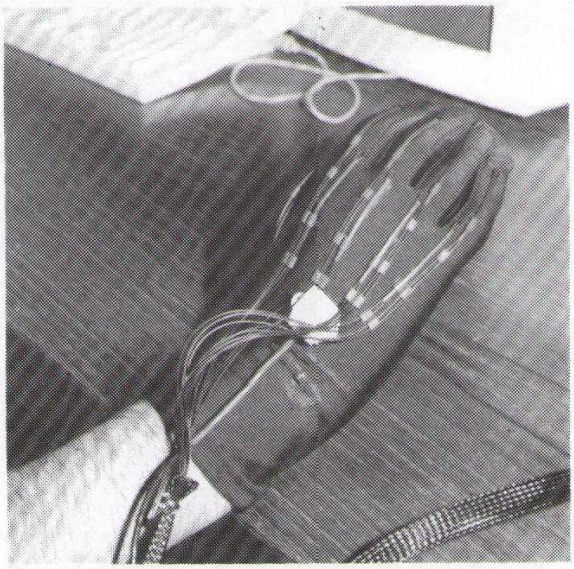
4 Feedback

Feedback is the information provided to the user about what they have done in the environment. Feedback would allow a user sense when they had 'touched' an object within the virtual reality. Currently the glove gives no feedback to the user but research is being actively pursued in this area. It could be possible to provided stimulation to the fingers to imitate tactile feedback, or sound could be used to indicate when an object has been *touched*. Some techniques for providing feedback are being considered :-

a Small solenoids derived from a blind reading system are being used. These push blunt wires on to the skin. The wires are rather large at a third of an inch thick!

b Piezoelectric crystals can be employed. These vibrate when activated by electric current. The mind interprets this as pressure.

c Memory metals change shape with temperature. An electric current heats the metal which provides pressure feedback to the fingers.



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