

3-D graphics applications easy to prototype while providing the functionality required to build complex applications. A key feature of World-ToolKit is its hardware independence. For example, source code written for the PC will compile on the Silicon Graphics Reality Engine. This support for cross-platform development gives a WorldToolKit developer significant flexibility and expandability.

Sense8 Corporation

Sense8 was incorporated in 1990 as a software company dedicated to providing affordable, real-time 3-D graphics for the interactive visualization and simulation of data, designs, concepts, and physical systems. Sense8's product, World-ToolKit, was born out of the desire to provide a powerful yet easy-to-use software system accessible to a wide range of users. WorldToolKit is available directly from Sense8 as well as from a worldwide network of distributors in the United States, Japan, United Kingdom, France, Germany, Italy, Finland, Portugal, and Spain. Sense8 can be reached at 4000 Bridgeway, Suite 101, Sausalito, CA 94965, (415) 331-6318; fax: (415) 331-9148.

Wearable Virtual Reality and Network Management

Current virtual reality systems lack two things: ease of use and applications. Future Vision Technologies has solved these problems by developing a new turnkey hardware platform and a host of applications.

Easy-to-Use, Powerful Hardware

Current VR systems are clumsy desktop or desk-side systems that chain the user to a limited radius. FVT's hardware system, code named "Motion," is a wearable computer capable of generating a completely self-contained synthetic environment (see Figure 1). Motion provides the user with the following features: real-time, 3-D graphics rendering stereo or monoscopic HMD,

16-bit stereo sound, real-time head orientation, hand controller input, and expansion capability.

The Motion architecture is designed for expansion and versatility. A unique aspect of the unit is the head-mounted display (HMD) subsystem. The HMD can be configured for either stereo or monoscopic viewing, depending on the application. The HMD also contains a patent pending tracking system called the Head Orientation Sensor (HOS). This device, a two-degrees-of-freedom sensor (pitch and yaw), measures the orientation of the user's head

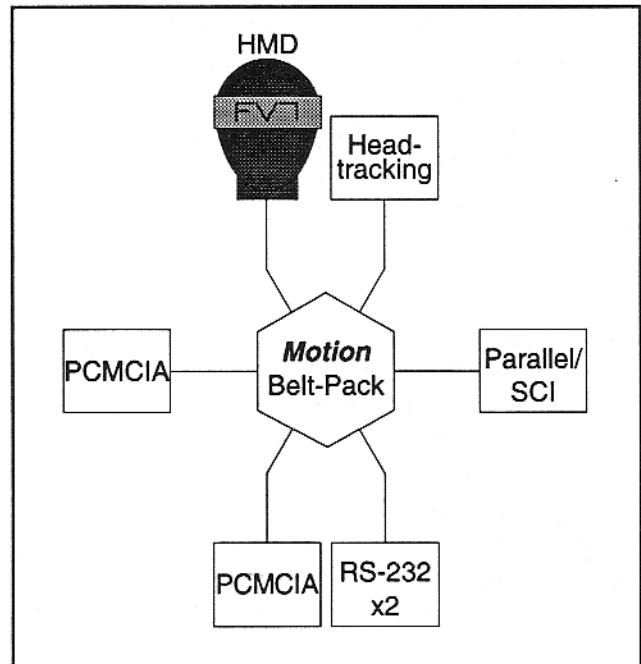


Figure 1. FVT Motion block diagram.

relative to the user's torso. The "sourceless" nature of this device allows the Motion system to break free of the desktop. Integrated stereo headphones complete the HMD, providing the user with 16-bit digital sound.

Motion has multiple expansion ports allowing the system to be custom configured around specific applications. The parallel/SCI port provides parallel or synchronous serial input for items such as hand controllers. The RS-232 ports grants access to any RS-232 device including cellular modems and GPS units. The PCMCIA slots can be used for peripherals such as flash RAM cards and Ethernet and token ring network cards. In addition, certain developer versions of the platform will also contain a

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processor direct expansion slot. This will allow new Motion hardware features to be implemented quickly. Motion is an open architecture that can be expanded to meet the user's needs.

Future Directions

The physical layout of the Motion architecture currently requires the use of a belt pack in order to accommodate the many I/O ports. In the future, downsized versions of the Motion hardware will be available. These systems will be configured so that the entire rendering system can be mounted on the user's head with only a single PCMCIA slot and a hand controller port. This configuration can be used for more simplistic applications such as a wearable infostation or a portable gaming unit.

Applications

Most VR platforms are designed for the individual developer and not the consumer. The user is required to cobble together a hardware platform from various vendors and acquire a software development tool kit to write one-off applications. FVT's Motion provides simple-to-use, turnkey solutions in a wearable package. FVT is developing the following application solutions for the platform: 3-D Portable Network Management, Personal Data Assistant, Tourist Guide Station, and Police/Military Reconnaissance.

Application Overview: 3-D Portable Network Management

Enterprise network managers who use today's workstation-based SNMP management packages know that the current 2-D graphics method leaves much to be desired. There is only so much information that can be displayed on a 17-inch CRT, even in a windowed environment. This problem causes the user to click and drag between multiple windows to get a look at information that should be viewed in a single glance. Current mapping systems are also inadequate. The correlation between logical and physical locations is vague. Most importantly, when the manager goes to fix a suspected problem, information vital to the process is left on

the workstation screen, useless to the user in the data closet. FVT's 3-D Portable Network Management system solves these problems.

The manager walks into the data closet to do a check of the system. No one has reported any problems, but the response of some servers on the net seems to be awfully slow. He pulls the HMD visor down into view, plugs the network connector into the hub, and presses the hand controller. Suddenly, the corporate network comes into his vision, stretching off into the distance. The view defaults to the physical location of the host hub. The manager turns his head to scan the topology. Off to his left, a bright line represents the FDDI link that connects this hub to the router/hub in the next building. Under normal circumstances that line would be solid but it is currently blinking. Quickly he turns to the local hub and twiddles the hand controller to call up its SNMP stats. The local configuration of the link is OK, but the dual attached ring has wrapped, indicating a failure on the other end. He raises his head to look off into the distance. "Good, the SDS 56 backup route is still operating through a third location." The manager uses the hand controller to travel to the remote hub. The FDDI card in the hub is blinking along with the link that goes into it. Calling up the SNMP stats shows a complete failure in the card. With that, the manager lifts the visor, unplugs the cable and heads for the warehouse to get a new FDDI hub card.

This illustration shows the powerful capabilities of a portable VR-based network management package. All the necessary information is presented in the most intuitive way at the user's fingertips. Topology/location, SNMP statistics, problem alerts, and performance graphs can be displayed to the user one at a time or simultaneously. These features in a wearable package keeps the information where it is needed — with the user.

The 3-D Portable Network Management system consists of a Motion belt pack, HMD, and HOS with a PCMCIA network card, a PCMCIA program card, and an eleven-button hand controller.

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