

Sandal

● Title : Sandal

● Concept :

We propose a foot input device for controlling movement in a virtual environment(e.g, a CAVE). The device is assumed to be used by a standing person. The user can express where she want to go through intuitive actions with sandal device. In the demonstration, the device should help control player movement during game play in the virtual environment.

● Estimate of amount of time of demonstration:
about 1.5 to 2 minutes.

● Summary :

A person usually uses her own legs for walking. In virtual space, an input method for walking by foot is more natural than hand input with a controller, stick or mouse. Therefore, we have created a device which accepts foot input, and will give a demonstration of the effectiveness of this device.

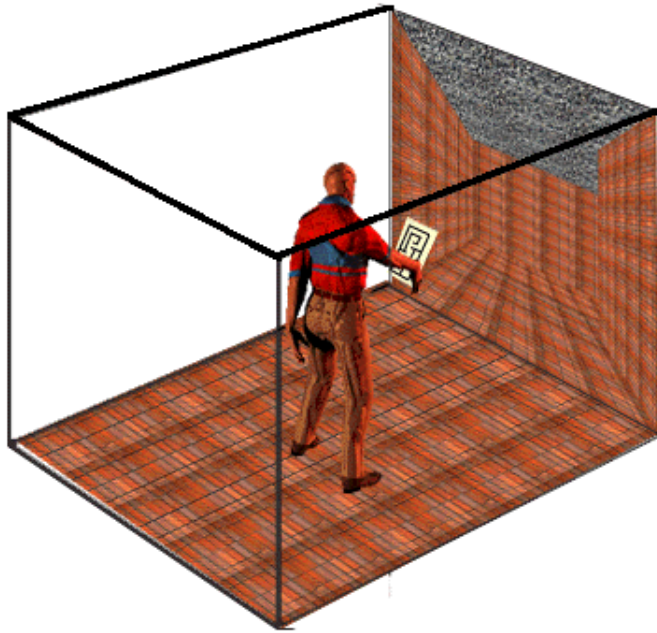
1. Contents of the demonstration

Each user (explorer) in the virtual environment (a Virtual 3D Maze) will have a map, and put on a foot device (a sandal). Two users enter the maze at the same time, and walk around according to the map. The first user who gets through the maze wins. On the way to the goal, several enemies and barriers (ghosts and pitfalls) wait for the players. But,the users have a ghost sensor which roughly tells users the position of ghosts by a specialized sound.The game is over when a user touches a ghost or falls into a pit. Let's escape from this maze with some treasure!



Click this image to large image.

This picture shows an image of virtual maze exploration in a CAVE.



An image of demonstration

2. System overview

This demonstration system consists of a few small systems.

* Sandal

A foot input device (a sandal), and a computer for checking sandal sensors.

* Graphics System

A screen and graphics computer for displaying the 3D maze.

* Sound System

Each system has some speakers and amplifiers. Also, this system includes a Personal Computer for driving the speakers.

Demo System

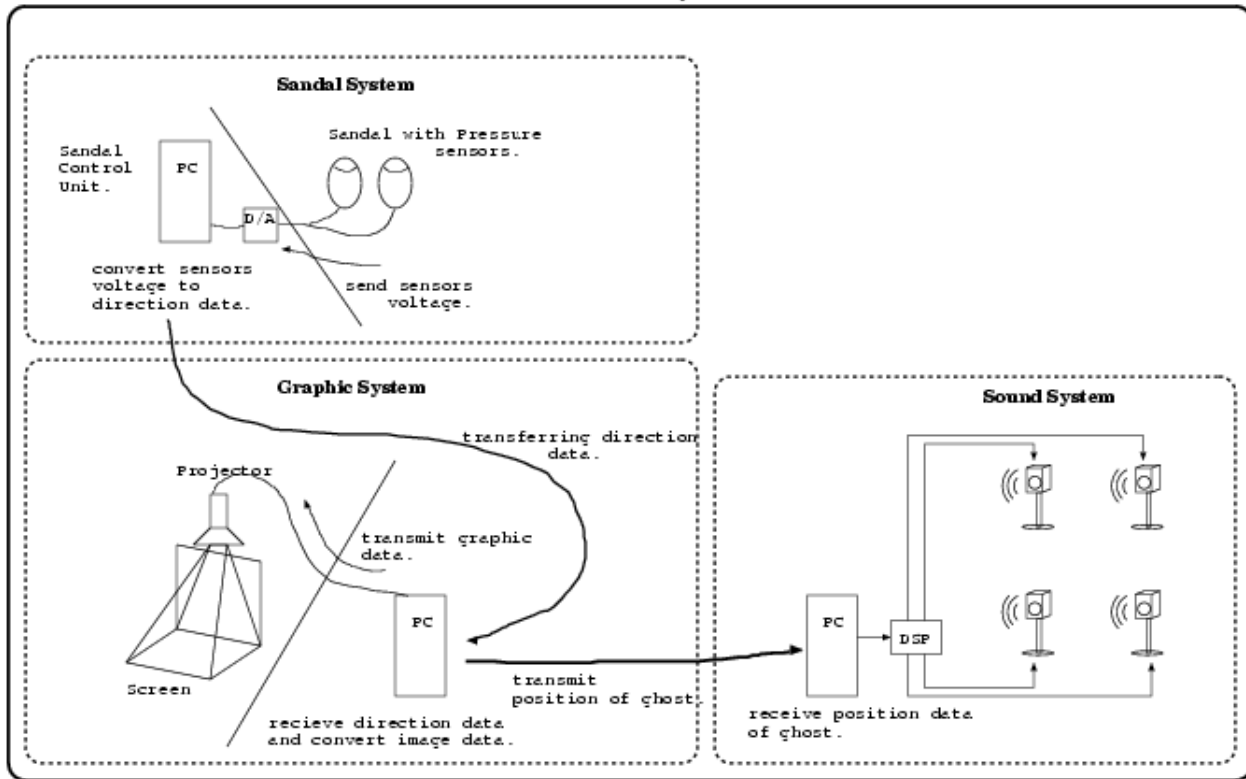


Figure.1

System overview image

2-1. Sandal System

* Sandal

The sandals will have four or five pressure sensors on each foot sole. Because it's difficult to measure backward weight shifts, we attached a projection in the center so that we can measure backward pressure.



[Click this image to large image.](#)

- * Sandal Control Unit (Personal Computer)

When we input voltage to a PC, we must convert analog voltage data to a digital signal. The sandal is connected to an A/D conversion board, and analog voltage data is converted to digital data through this board.

The PC watches for changes in voltage, and calculates and sends direction data to the graphic system according to increases or decreases in voltage.

2-2. Graphics System

- * Graphics PC

When this machine receives direction data, it redraws a picture according to that data. More precisely, it received direction data from the Sandal control unit, reconstructs the maze picture and transmits it to the projector. For example, if the sandal control unit indicates a leftward movement, the graphics PC generates a new series of pictures sliding the view to the left. Also this machine sends ghosts' position data to the sound control unit.

- * Projector

Projector displays the maze scene.

2-3. Sound System

- * Speakers

Some speakers are placed so that they surround the users.

- * Digital Signal Processor(DSP)

These generate the spatialized sound source.

- * Sound Control Unit(PC)

In order to produce the required sounds, this PC receive the ghosts' position data, and it controls the DSP according to that data.

3. Required equipment

- * Screen for projecting a picture

- * Projector (Front x 1, Lower x 1) or CAVE like system (4 display)

- * A foot device

- * Personal Computer for controlling the foot device

- * Personal Computer for display the virtual space

- * Personal Computer for controlling the DSPs

- * Power unit for the foot device