Garage Virtual Reality

How to develop your own
low cost VR system

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Why Virtual Reality?

- Gestures, Gestures, Gestures
- Springboard for Learning
- Computing's Third Wave

Topics

- Garage Virtual Reality
- Mattel's PowerGlove
  - A low-cost, rugged input device
- AVRIL
  - An API for developing your virtual worlds
- Coding Example

Garage Virtual Reality

- Virtual reality is a computer-generated simulation of some three-dimensional environment, in which the user is able to both view and manipulate the contents of that environment.
- "Garage" suggests a VR system under $2500, including the *reality engine*.

PowerGlove

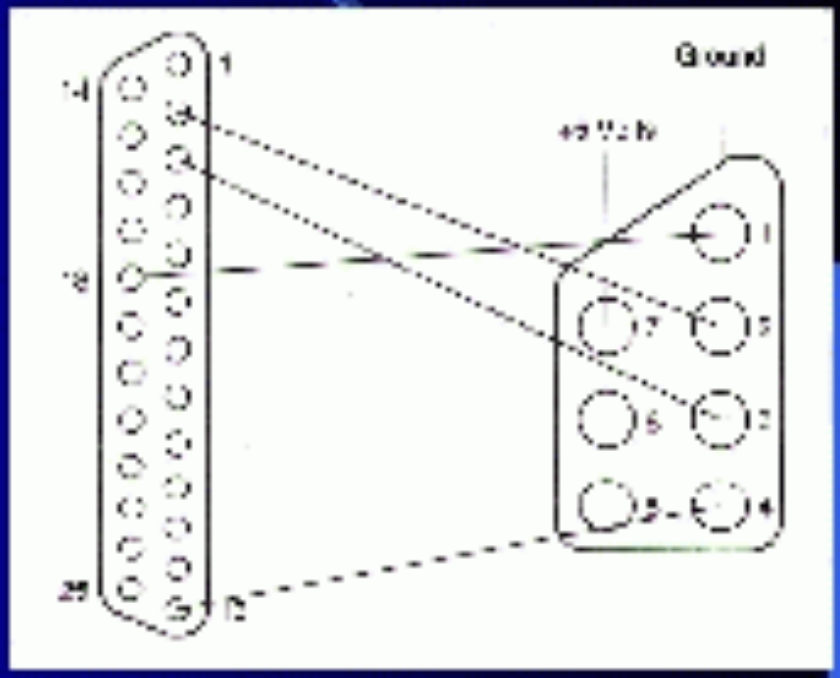
- History
  - Has a pedigree which can be traced back to the VPL Dataglove
- Benefits
  - low cost ($90-$120), rugged
- Drawbacks
  - ultrasonic tracking systems are neither rugged nor robust.
  - hard to find since production stopped in early 1990's due to patent disputes

Operation

- Position tracking
  - achieved by transmitting ultrasonic pulses from the two emitters on the back of the knuckles and measuring the time taken for these pulses to reach the 3 receivers
- Finger flexion
  - performed by measuring the electrical resistance of a conductive ink which is painted onto the plastic structure that covers each finger
- Black box
  - contains a microprocessor which coordinated the pulses and packages data for transmission

Building the Interface

- Info you'll need
  - color pattern
  - Using Pins 1,2,3,4,7 which correspond to black, orange, yellow, green, and red
- Parts you'll need
  - Soldering iron
  - Power Supply
  - +5 Volt. Regulator
  - DB-25 male connector (crimp pins)



AVRIL

- is a library of C routines for creating virtual worlds.
- written by Bernie Roehl
  - software developer at Univ. of Waterloo
- designed to be very "programmer friendly"

Benefits of AVRIL

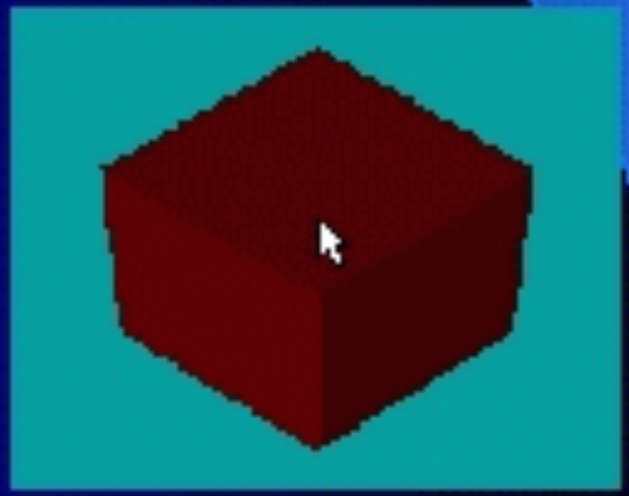
- easy to use
- portable
  - can use Turbo C, Borland's C++
  - other versions will be available soon
- well documented
- it's FREE

Coding Example

```
#include "avril.h"
#include <string.h>
void main()
{
 <initialization commands>
cube = vrl_ObjectCreate(vrl_PrimitiveBox(100, 100, 100,
    NULL));

vrl_ObjectRotY
(cube, float2angle(45));

light = vrl_LightCreate();
```



Coding Example

```
vrl_LightRotY(light, float2angle(45));
vrl_LightRotX(light, float2angle(45));

camera = vrl_CameraCreate();
vrl_CameraRotX(camera, float2angle(45));
vrl_CameraMove(camera, 0, 500, -500);
vrl_SystemRun();
}
```

Summary

- Garage VR
- PowerGlove
  - easy to interface, inexpensive to buy
- AVRIL
  - an API for the rapid development of virtual worlds
- Coding Example

Resources Used

- *Virtual Reality Creations* - Waite Group Press
- *Garage Virtual Reality* - SAMS Publishing
- *Virtual Social Interaction* - WEBTechniques July 1996
- *"Reach Out and Touch Your Data"* - Byte July 1990
- E-mail from Bernie Roehl