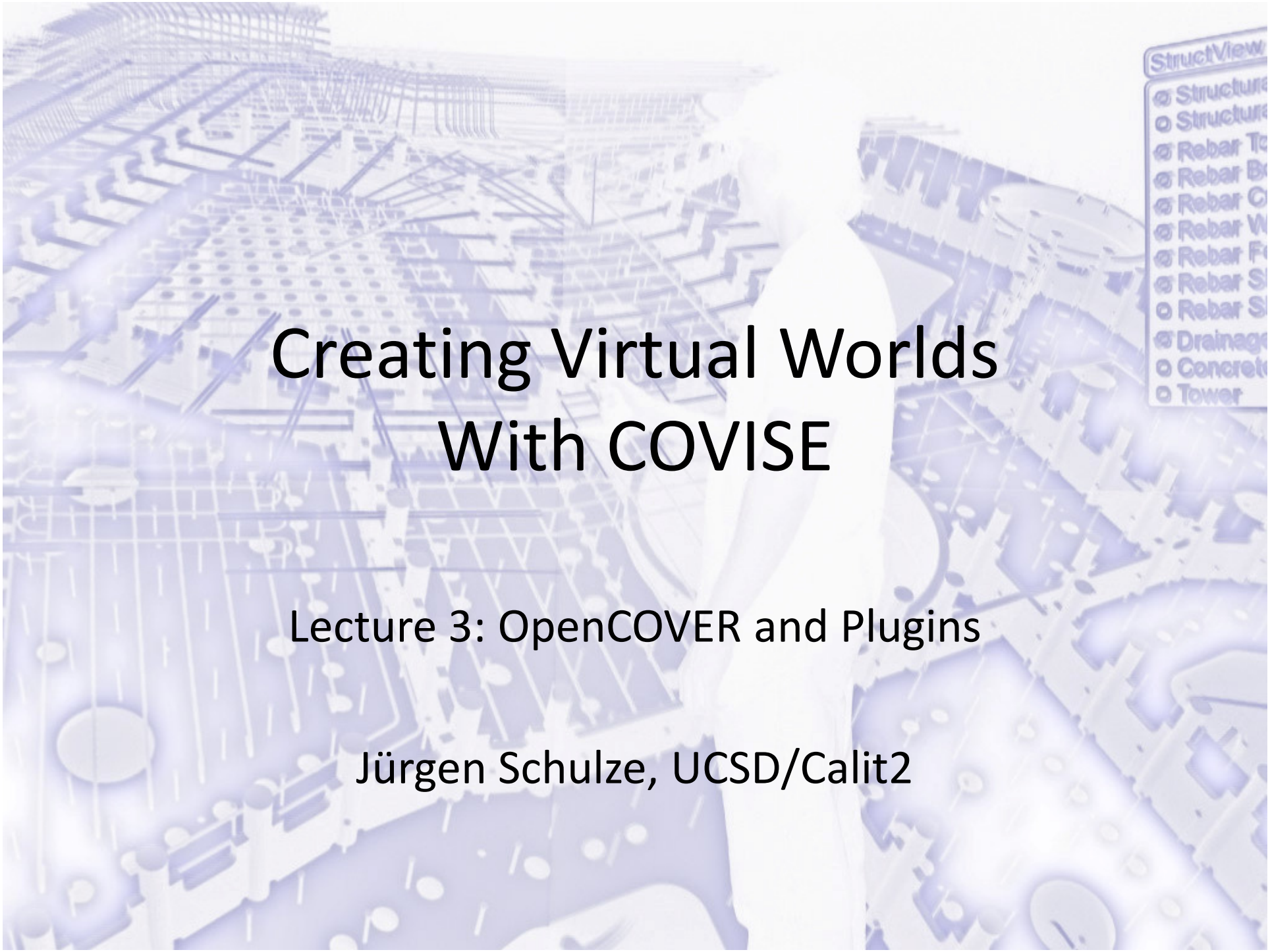


Creating Virtual Worlds With COVISE

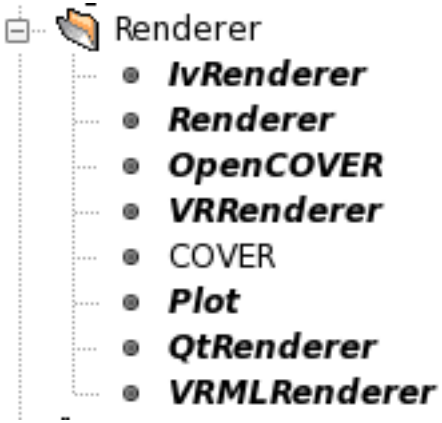
Lecture 3: OpenCOVER and Plugins

Jürgen Schulze, UCSD/Calit2

Course Overview

- Lecture 1: COVISE Overview
- Lecture 2: Map Editor and Modules
- Lecture 3: OpenCOVER and Plugins
- Lecture 4: OpenSceneGraph
- Lecture 5: User Interaction
- Lecture 6: Collaborative Applications

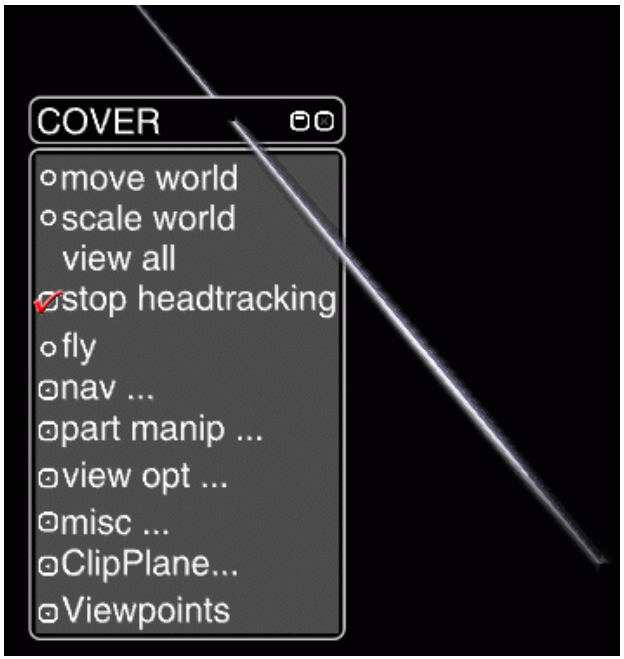
Renderer



- Renderer / QtRenderer
  - Desktop Renderer
  - OpenInventor based
- COVER
  - Virtual Reality Renderer
  - OpenGL Performer based
- OpenCOVER
  - VR Renderer
  - OpenSceneGraph based
- OpenSG-Renderer
  - OpenSG based
  - Can be integrated into map editor
- Plot
  - 2D graph display

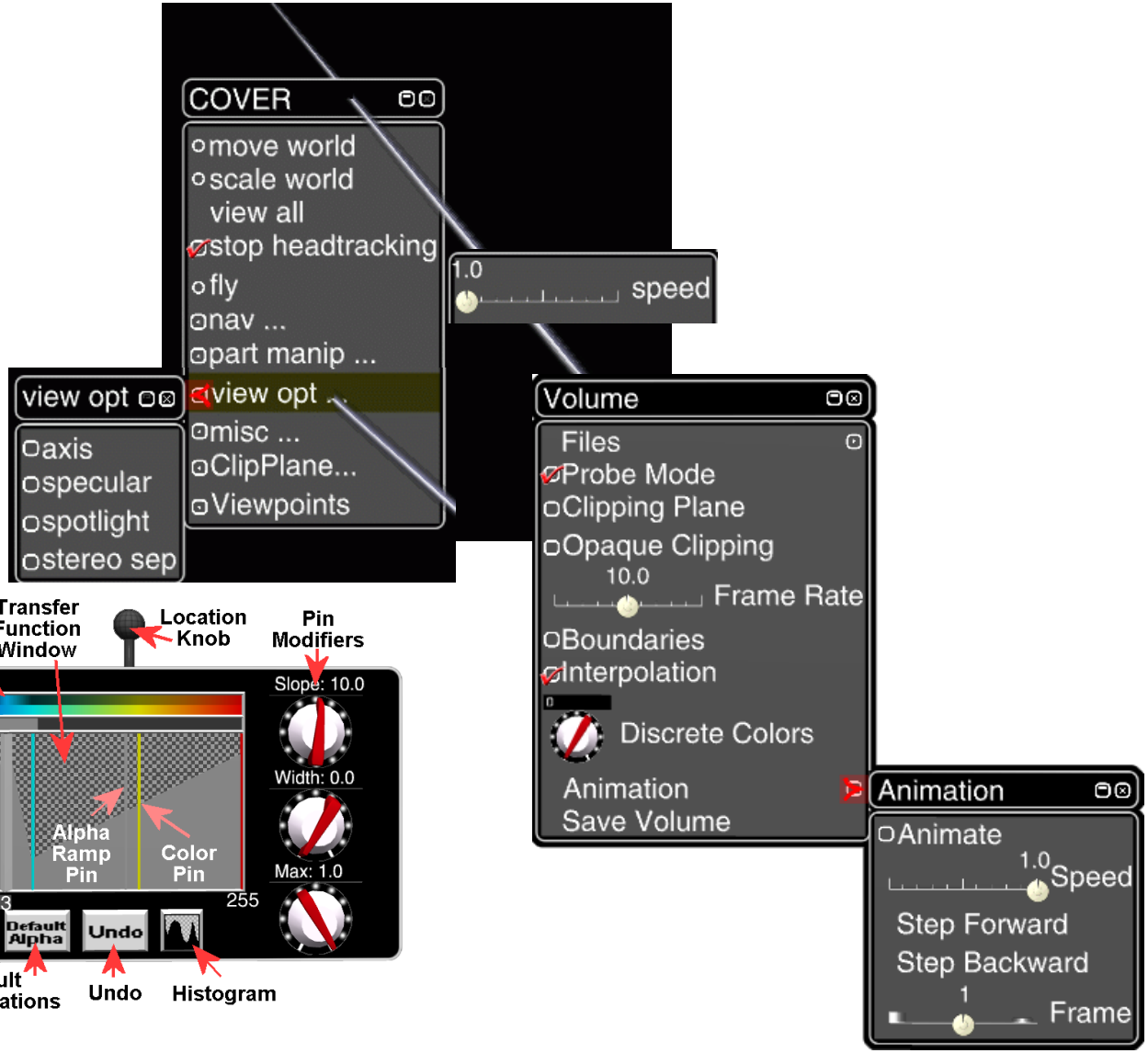
Menu System

- Hierarchical menu system
- Allows selection of:
  - Navigation mode
  - Manipulation mode
  - Viewing parameters
  - Data parameters
- Move menu with laser click on title bar
- Supports collaborative work:
  Automatic synchronization of parameters, depending on coupling mode (loose/tight)



Menu Widgets

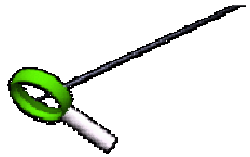
- Function
- Toggle
- Slider
- Dial
- Sub-menu



Navigation Mode „Move Word“

- Translates and rotates object space
- Moves relative to hand
  Hand is center of rotation
- Default function of third button on wand

Navigation Mode „Scale World“

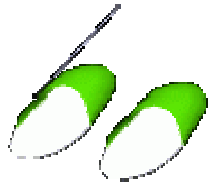


- Scales object space
- Wand position at mouse click is center of rotation
- Scale up: move wand to right (positive x axis)
- Scale down: move wand to left (negative x axis)

Navigation Mode „Fly“

- Moves the viewer through object space
- Click and hold mouse button, move in direction of flight
- Velocity is proportional to distance of wand to starting position

Navigation Mode „Walk“



- Move throught object space as if walking: if ground is close enough, user gets pulled to floor
- Allows user to walk up/down stairs

Navigation Mode „Drive“

- Moves through object space as if driving
- Z axis always points up
- Default interaction mode for second wand button

„View All“

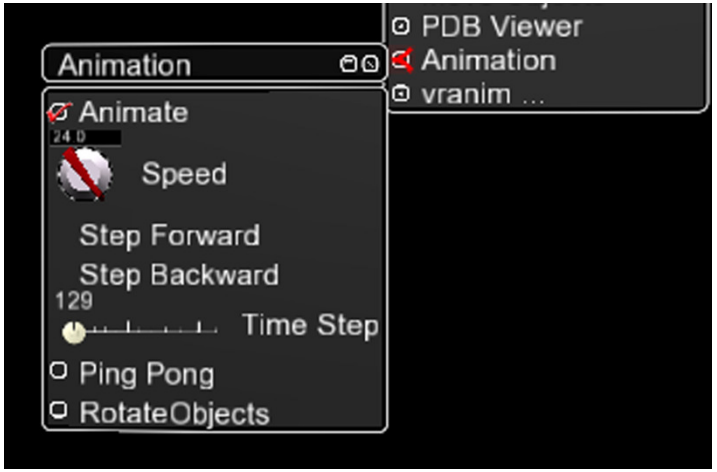
- Scale object space to bring entire scene into field of view
- Creates bounding sphere and sets its size to half of „SceneSize“ value
- Center of bounding sphere is in origin of room coordinates

„Stop Head Tracking“

- Deactivates head tracking
- Freezes viewer position and orientation
- Useful to take photographs

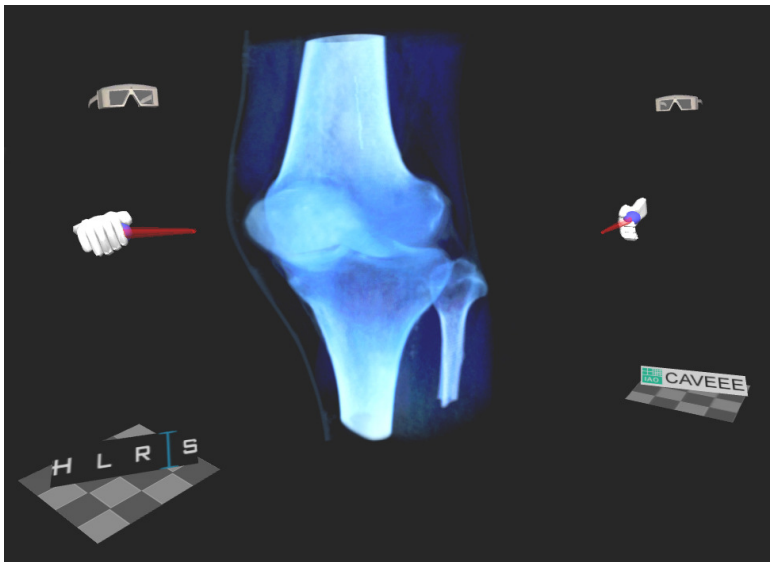
Animation Control

- Animate: start/stop animation
- Speed (fps):
  Set to maximum to run at maximum possible speed
- Step Forward, Step Backward: single step forward/backward
- Time Step:
  Select time step
- Oscillate:
  Step through animation backwards once end is reached (don‘t jump to start)
- RotateObjects:
  Change reference coordinate system for rotating objects



Collaborative VR

- Collaborative VR:
  - Joint Research
  - Expert consultation
  - Teaching
  - Reviews
  - Presentations



Plugins

- Source code located at: covise/src/renderer/OpenCOVER/plugins/
- Compile into dynamic libraries
- Enabled in covise/config file, eg: <MyPlugin value="on" />
- Examples at: covise/src/renderer/OpenCOVER/plugins/examples
- Written in C++ using OpenSceneGraph API

Hello World Plugin

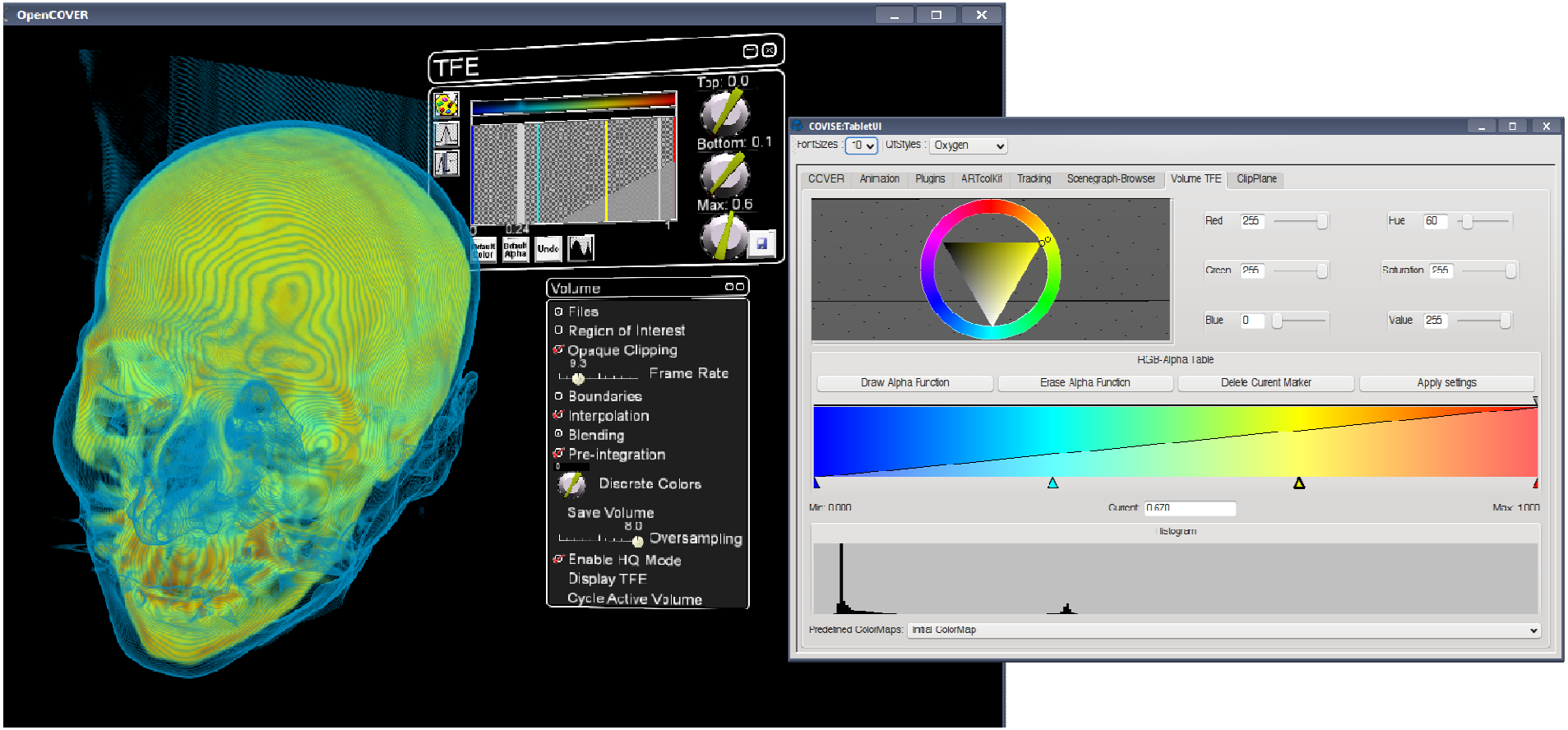
```
#include "Hello.h"
#include <kernel/coVRPluginSupport.h>
using namespace opencover;
Hello::Hello()
{
   fprintf(stderr,"Hello World\n");
}


// this is called if the plugin is removed at runtime
Hello::~Hello()
{
   fprintf(stderr,"Goodbye\n");
}

COVERPLUGIN(Hello)
```

Plugin Callback Functions

- init: called once at startup
- preFrame: called once per frame, before scene graph is rendered
- menuEvent: callback for menu interaction
- add/remove: display/remove COVISE data object

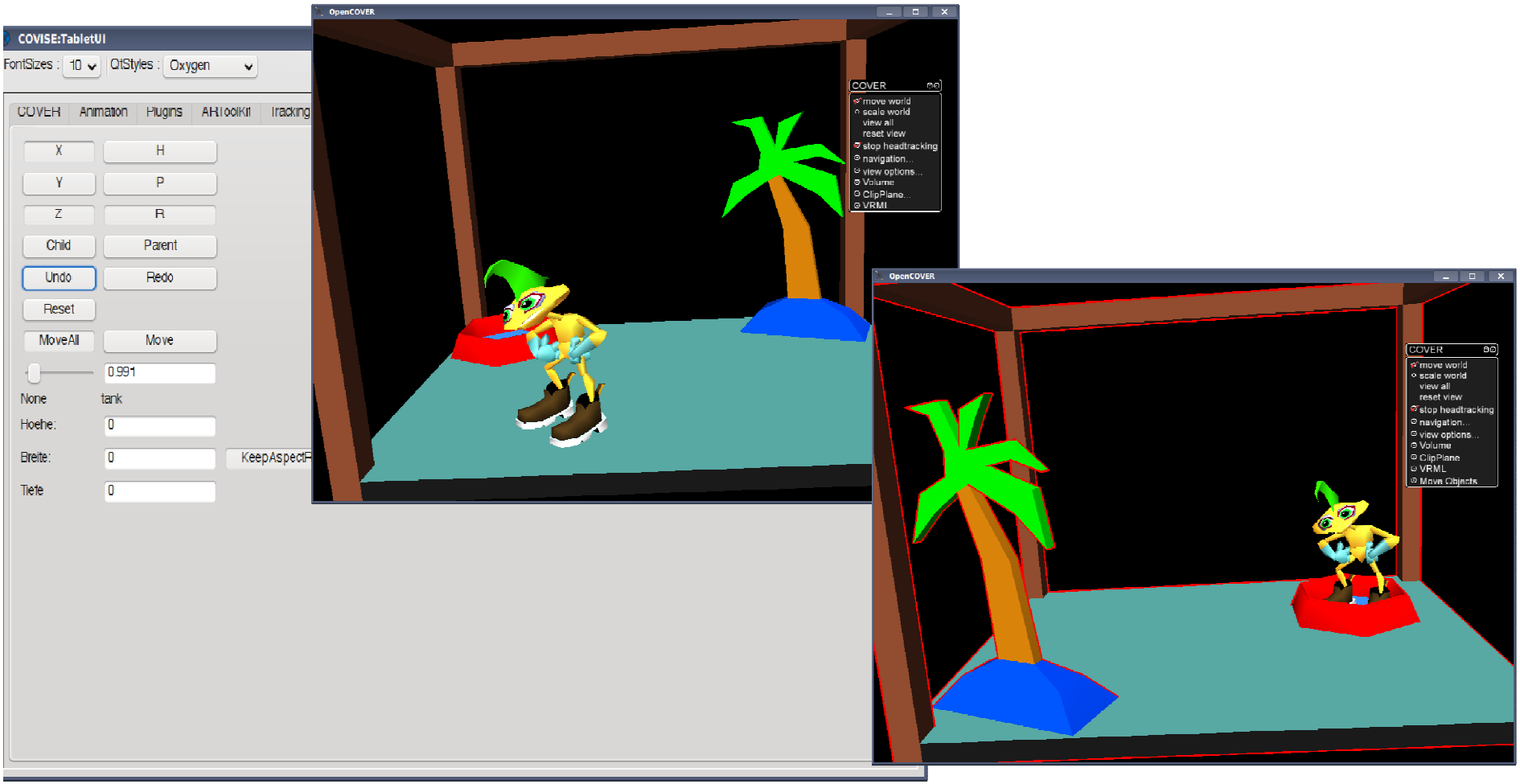
OpenCOVER Plugins: Volume

- Direct volume rendering of scalar and RGB(A) data
- Transfer function editors for OpenCOVER and TabletUI



OpenCOVER Plugins: Move

- Move arbitrary scene graph objects
- Example: VRML file



RemoteDT

VNC Viewer for VR

More Information

- Sample plugins:
  `covise/src/renderer/OpenCOVER/plugins/`
- `hlrs:`
  Plugins developed at University of Stuttgart
- `calit2:`
  Plugins developed at UCSD
- `examples:`
  Useful code samples for new plugins