eCAADe 2007
FRANKFURT

Combining CAD and GPS

Designing Virtual Models in Real Space

Werner Lonsing, Bonn, Germany

Combining CAD and GPS

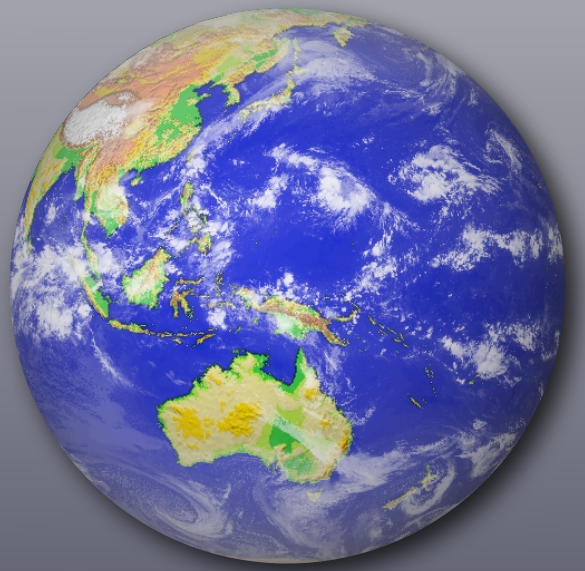
Designing Virtual Models in Real Space

Werner Lonsing, Bonn, Germany

Combining CAD and GPS

Designing Virtual Models in Real Space

- Purpose
- System
- Hardware
- Aspects of Software
- Gps

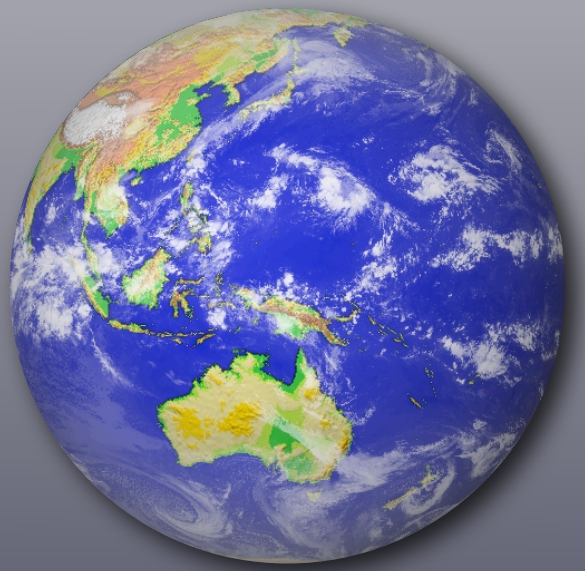


Werner Lonsing, Bonn, Germany

Combining CAD and GPS

Designing Virtual Models in Real Space

- Purpose



Werner Lonsing, Bonn, Germany

Composite Image

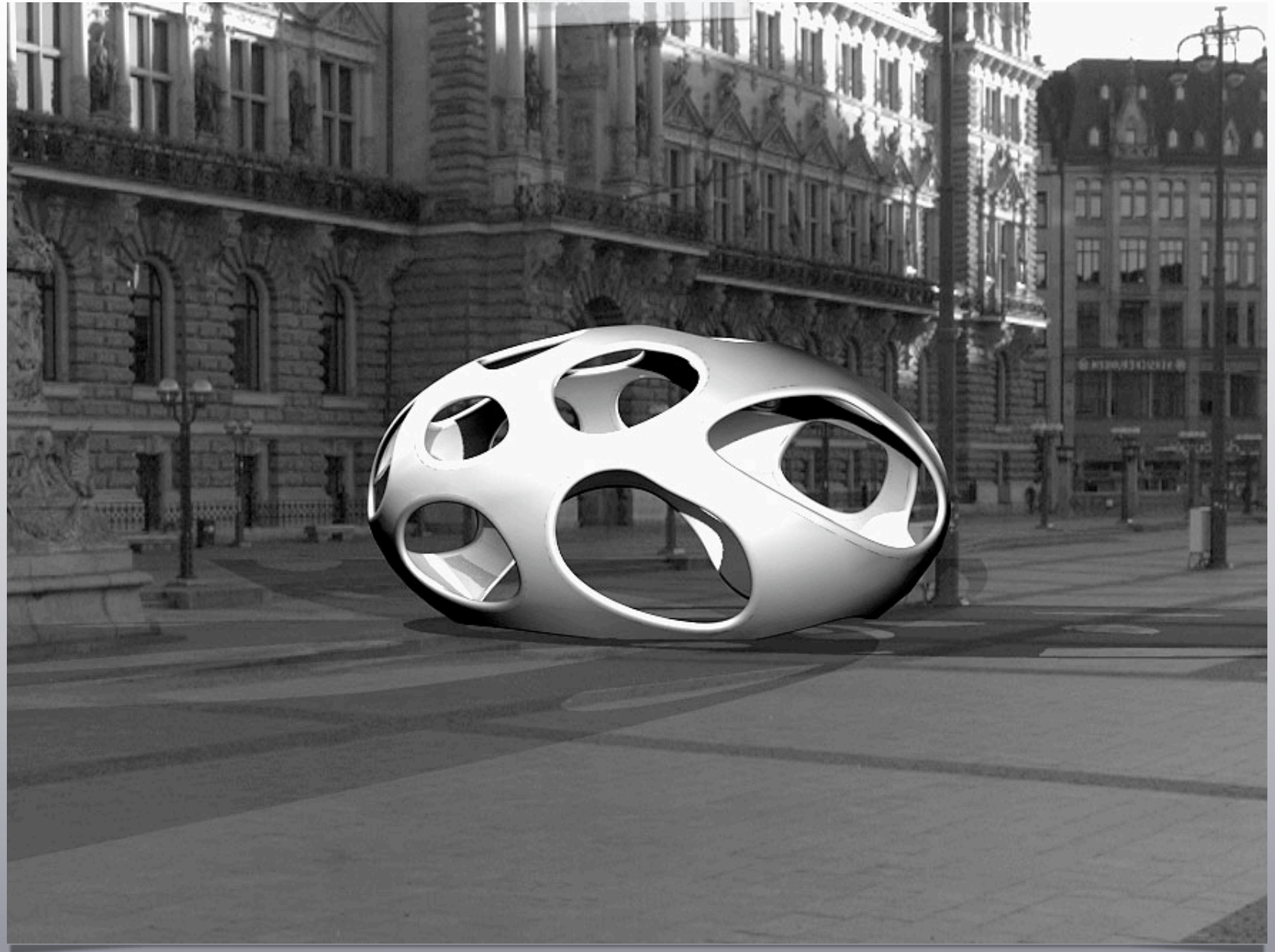
Jürgen Fedele di Catrano: Tetrapod Wie es (euch ge)fällt

TU Vienna (B. Martens)

Composite Image

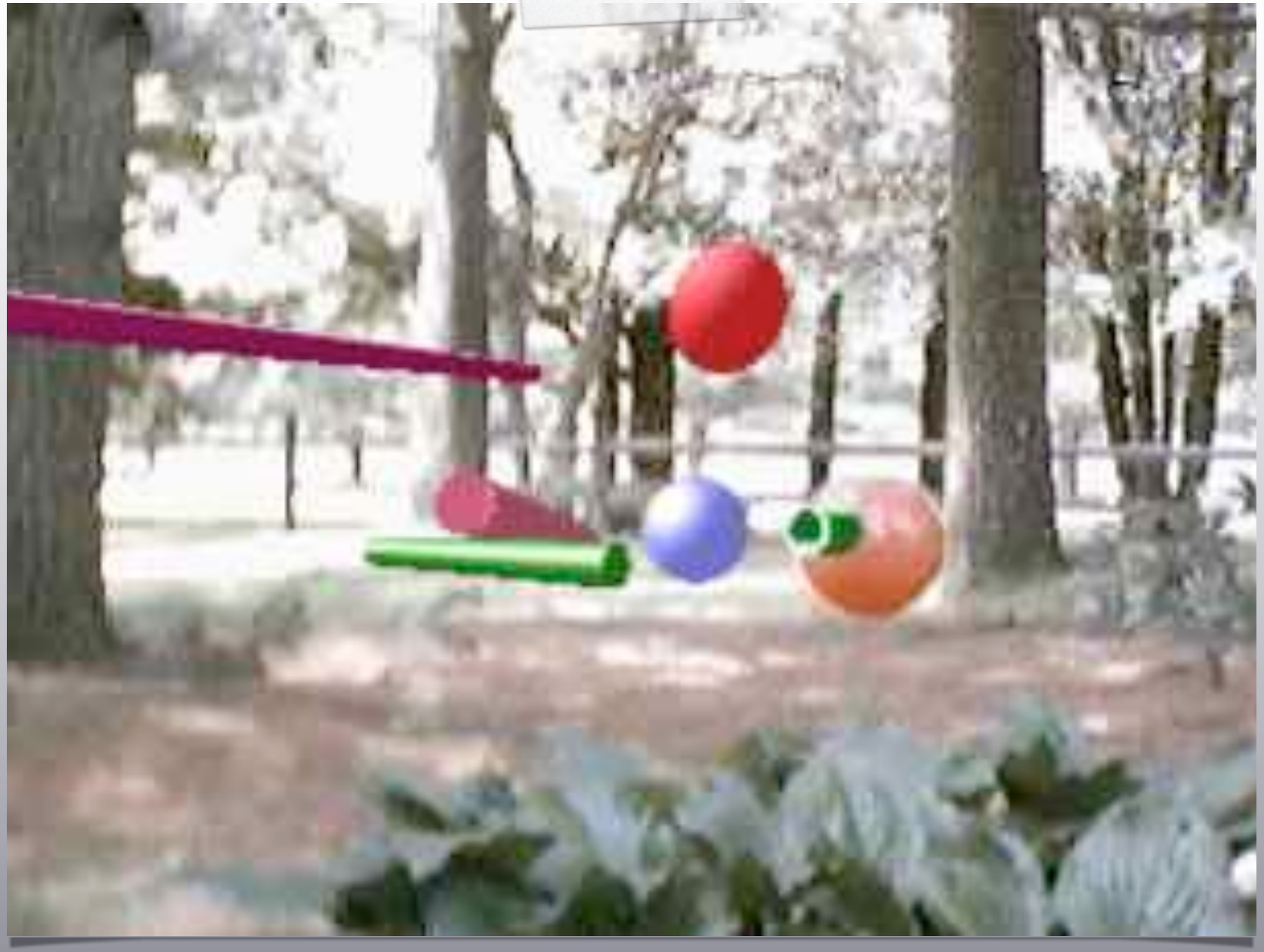
Michael Murauer: Stadtausschnitte

TU Vienna (B. Martens)



Composite Image

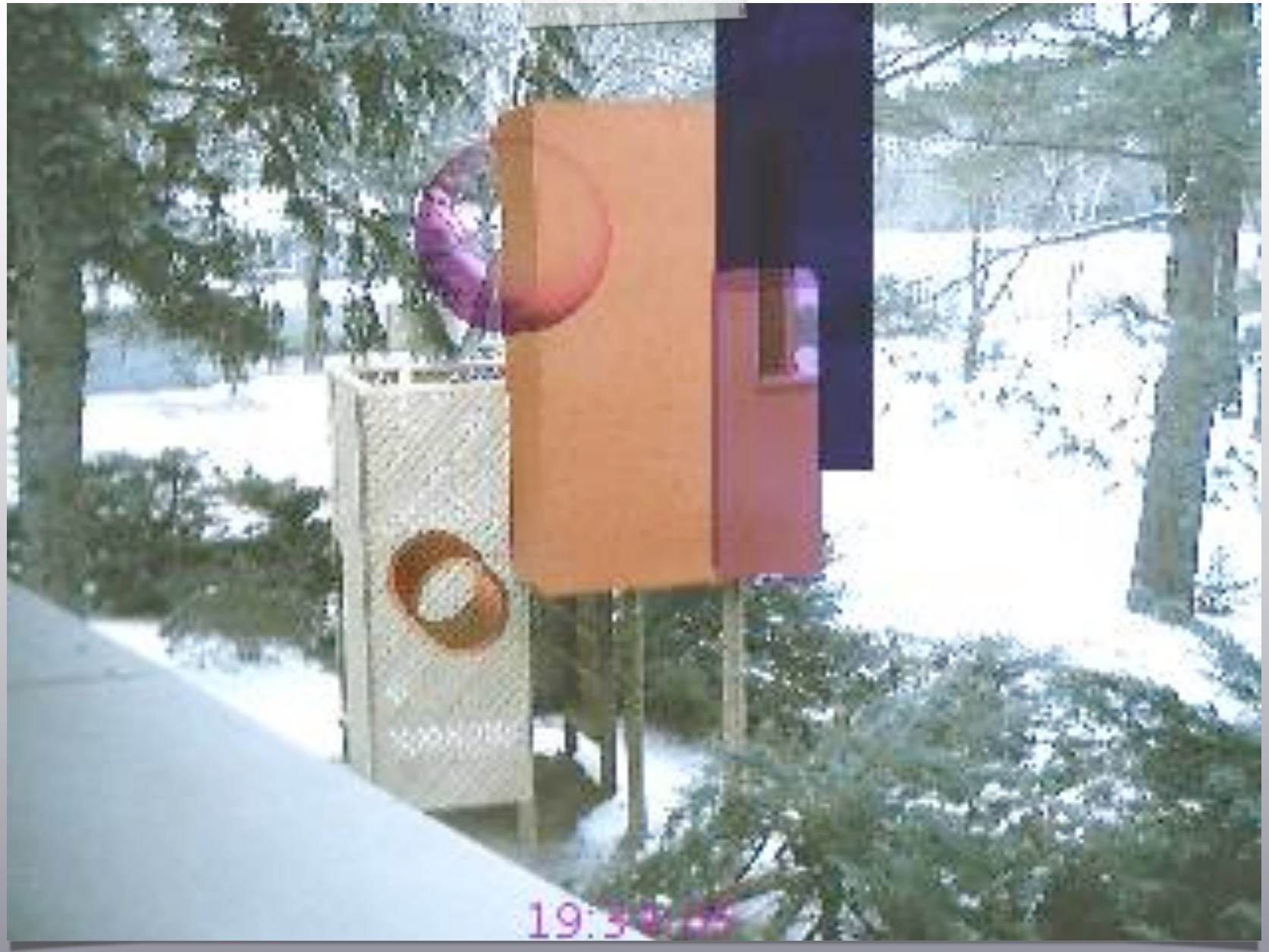
Michael Murauer: Stadtausschnitte
TU Vienna (B. Martens)



Composite Image

Peter Anders: Working with the AmbiViewer

Backyard in Midland, MI



Composite Image

Peter Anders: The K-house
Backyard in Midland, MI

Composite Movie

Movie with simple shapes created with the AmbiViewer

Frida in Mexico

Composite Movie

Movie with simple shapes created with the AmbiViewer

Frida in Mexico

Composite Movie

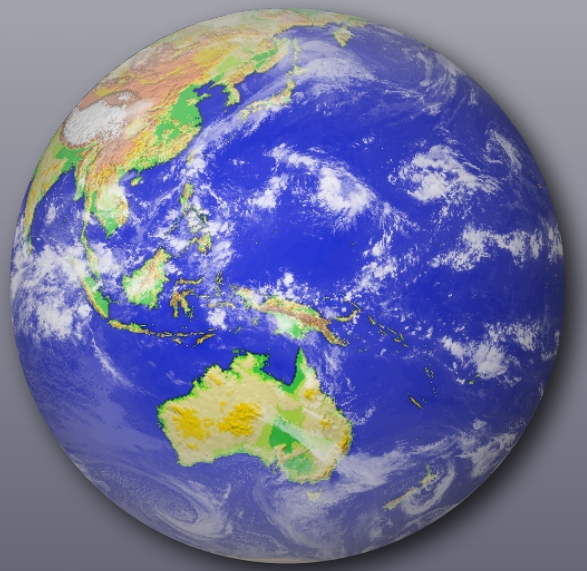
Movie with simple shapes created with the AmbiViewer

Frida in Mexico

Combining CAD and GPS

Designing Virtual Models in Real Space

- Purpose

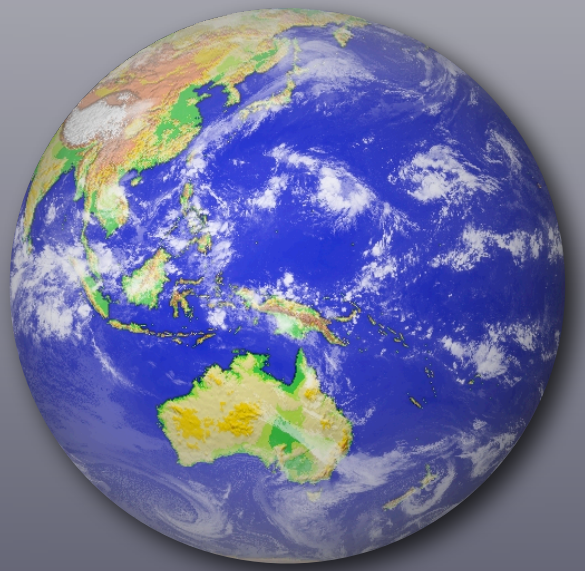


Werner Lonsing, Bonn, Germany

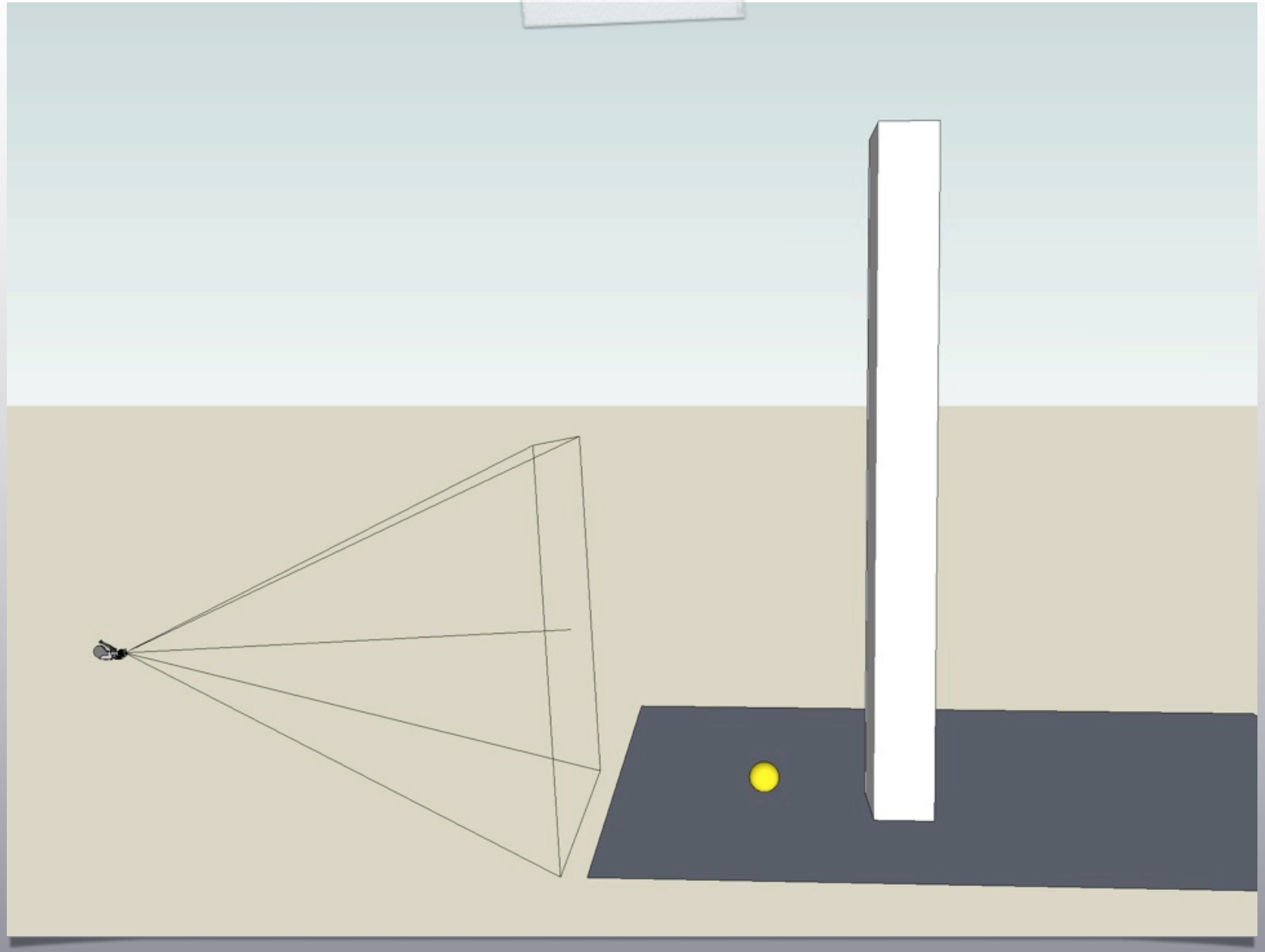
Combining CAD and GPS

Designing Virtual Models in Real Space

- System
- Hardware
- Aspects of Software



Werner Lonsing, Bonn, Germany



Principle Setup

Camera with viewing volume, model and fiduciary feature
with Google SketchUp

AmbiViewer-System

System with laptop, camera, 2 GPS-receiver and marker
Backyard in Mexico

Laptop with GPS

Laptop with camera and GPS-receiver
Backyard in Mexico

DV-camera with GPS

DV-camera (zoom) with attached GPS-receiver
Backyard in Mexico

Marker with GPS

Marker ball as fiduciary feature

Ball with attached Bluetooth GPS- receiver

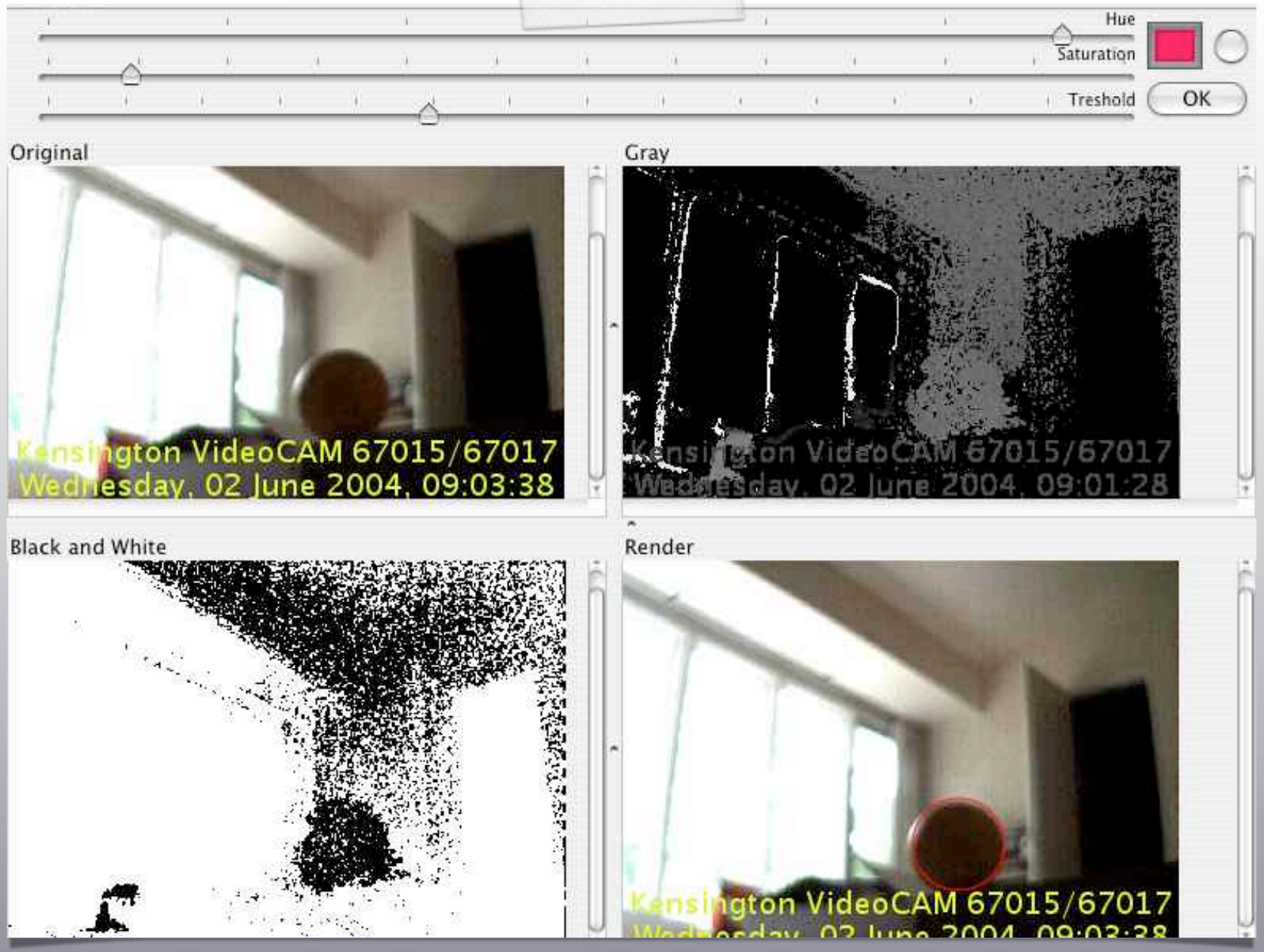
Set of Hardware

Set with camera, 2 GPS-receiver and inflatable marker ball

Everything fits in one bag.

Usage

The deployable system can be used almost everywhere.
Fits in the bag.



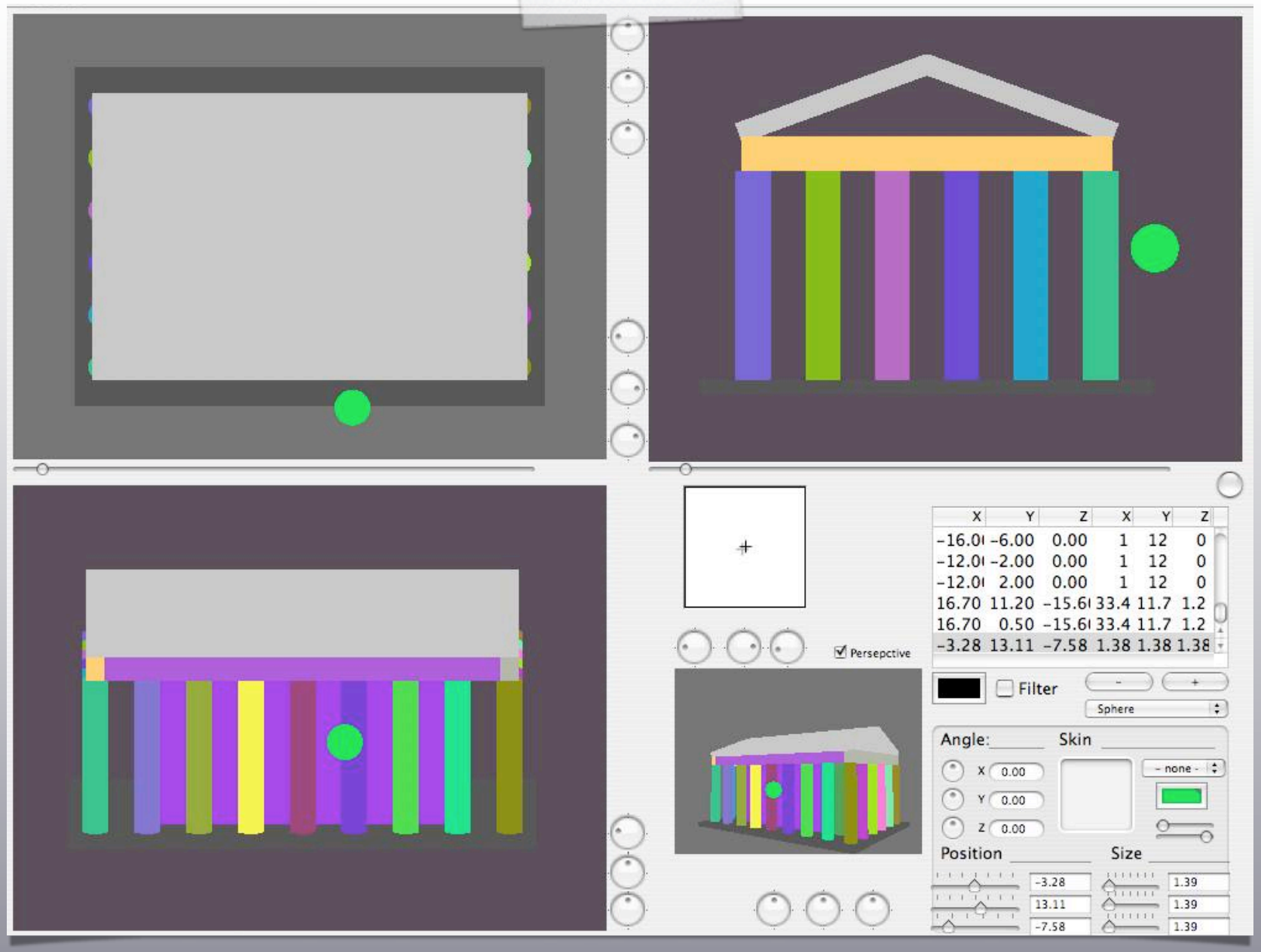
Detection of the Marker

Interface

Detection of the Marker

Result

Marker with overlaid circle



Interactive Modeler

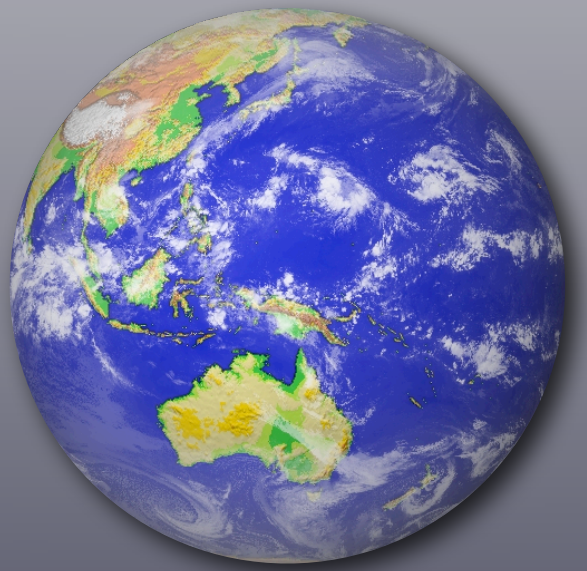
3-view graphical interface

Greek periopteros temple with marker

Combining CAD and GPS

Designing Virtual Models in Real Space

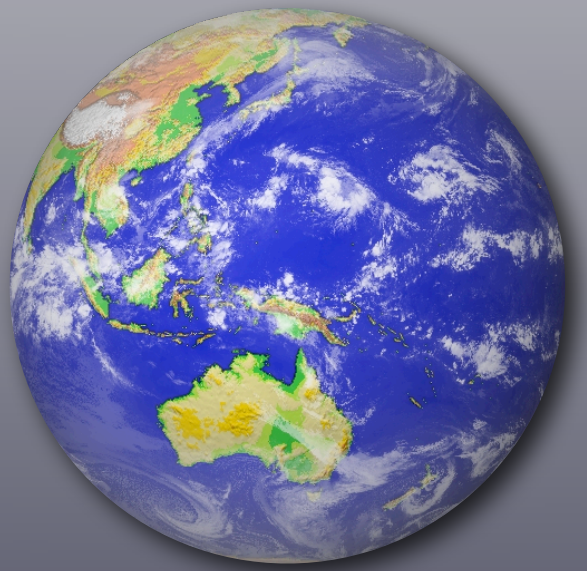
- System
- Hardware
- Aspects of Software



Werner Lonsing, Bonn, Germany

Combining CAD and GPS

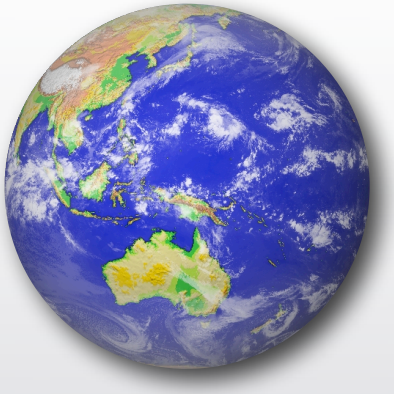
Designing Virtual Models in Real Space



- Gps

Werner Lonsing, Bonn, Germany

GPS

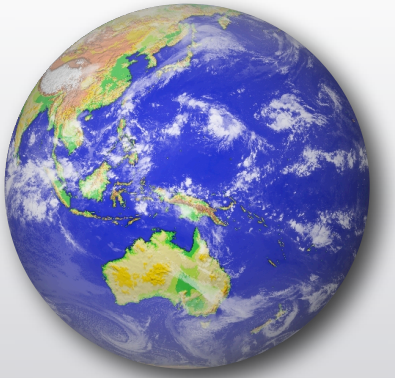


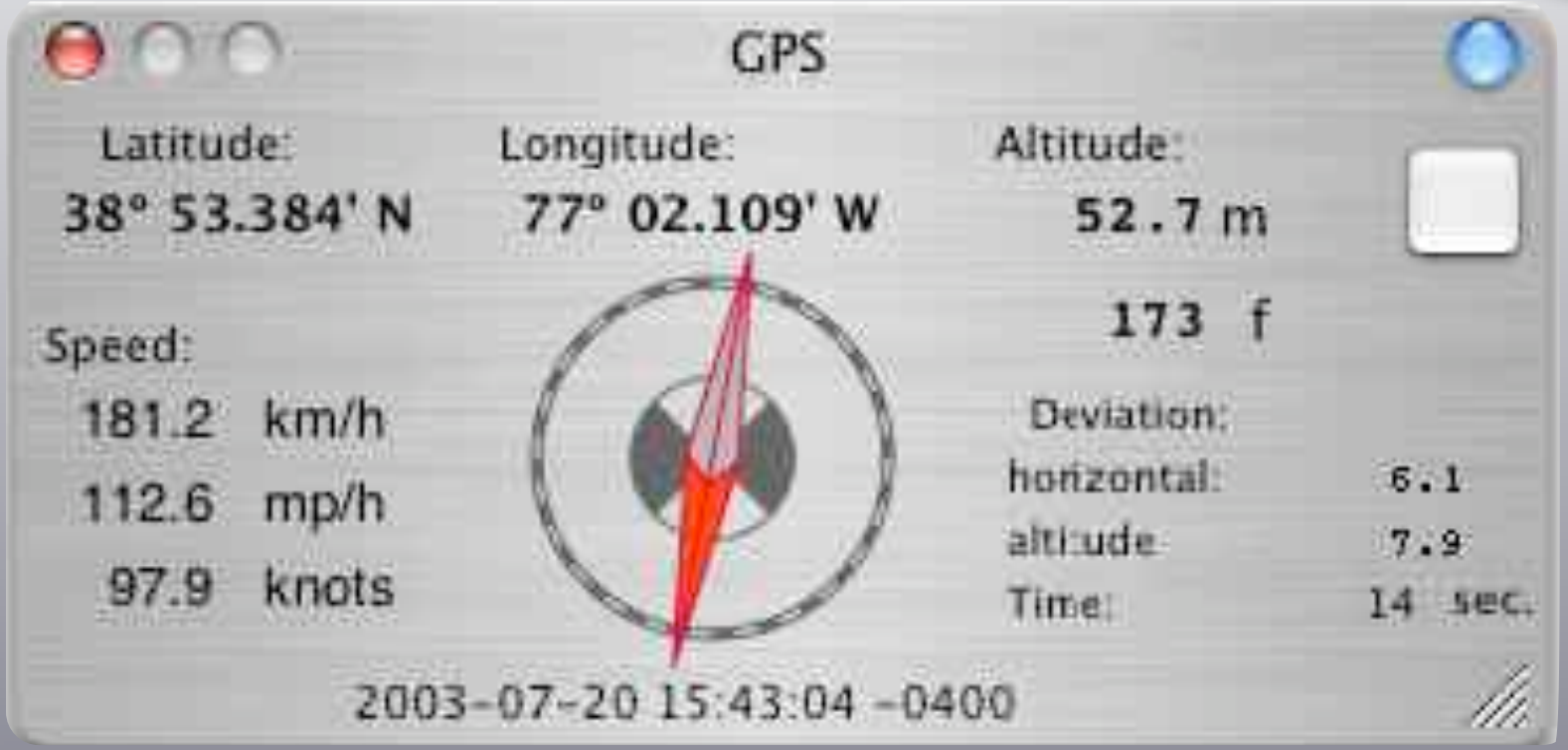
Usage

Two questions:

- Where am I ?
  Positioning, used to add Informations
- Where is he/she/it ?
  Tracking

GPS





Interface

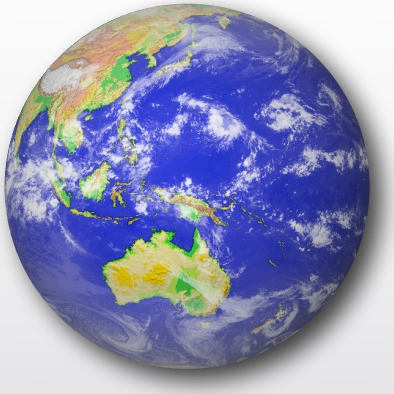
Interface used for a single GPS-receiver

GPS

Concept of satelite navigation

- Timebased signals
- Framing grid
- Geometric representation
  Ellipsoid as model of the Earth

GPS



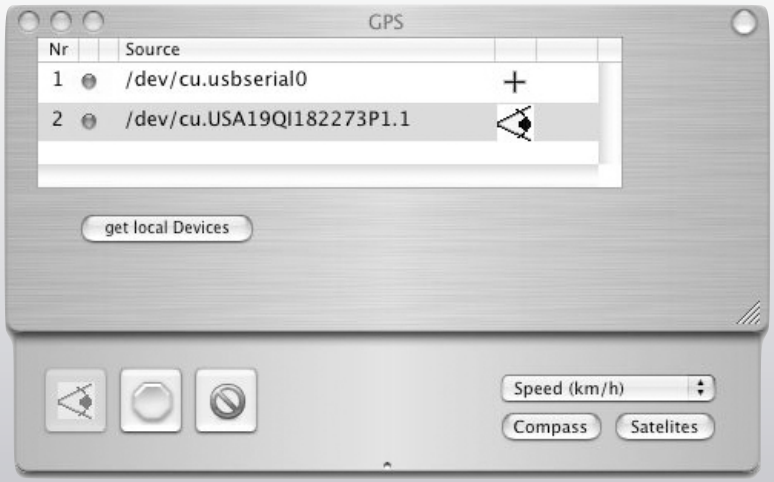
Accuracy

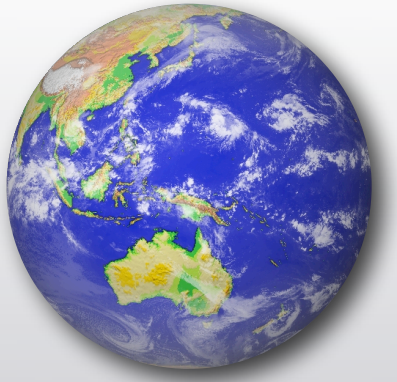
Satelite reception

- Accuruacy depends solely on the number of used satelites in view.

- More accuracy is available with corrected informations based on other known positions
  - Differential GPS
  - second GPS-receivers

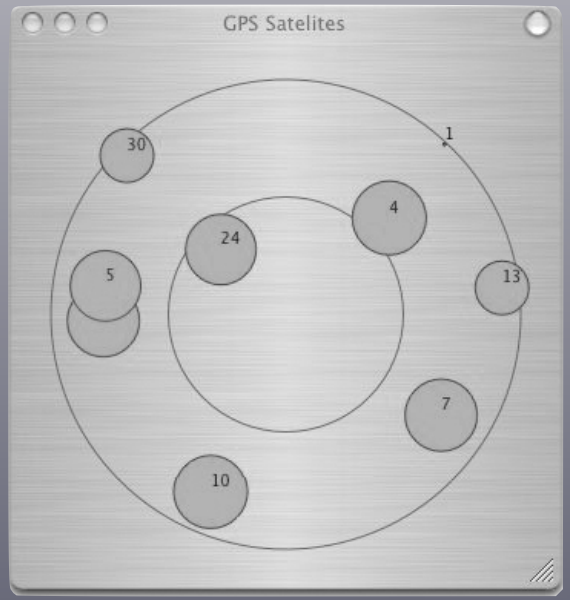
GPS

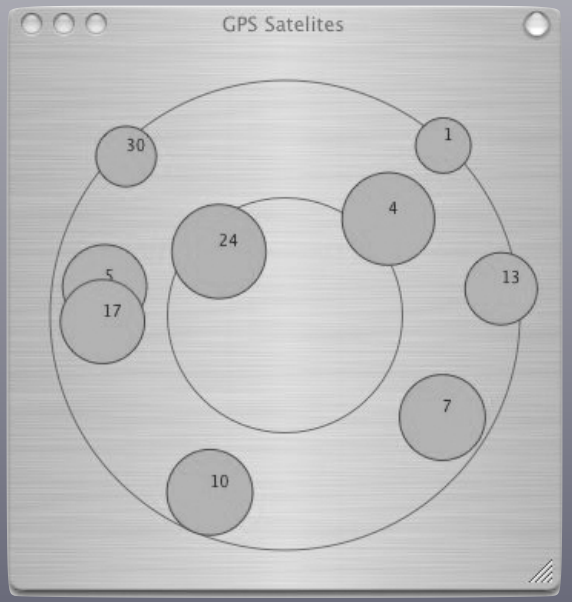




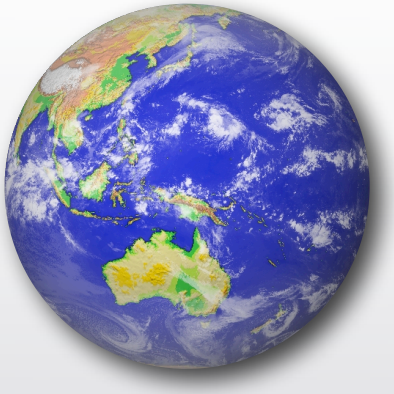
Multiple Devices connected to the computer

Satelites in view are almost the same





GPS



Transmission

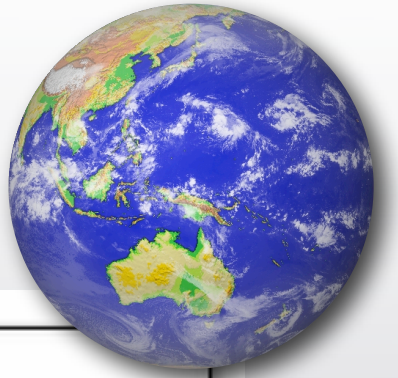
Transmitting the signal from a remote GPS-receiver is difficult

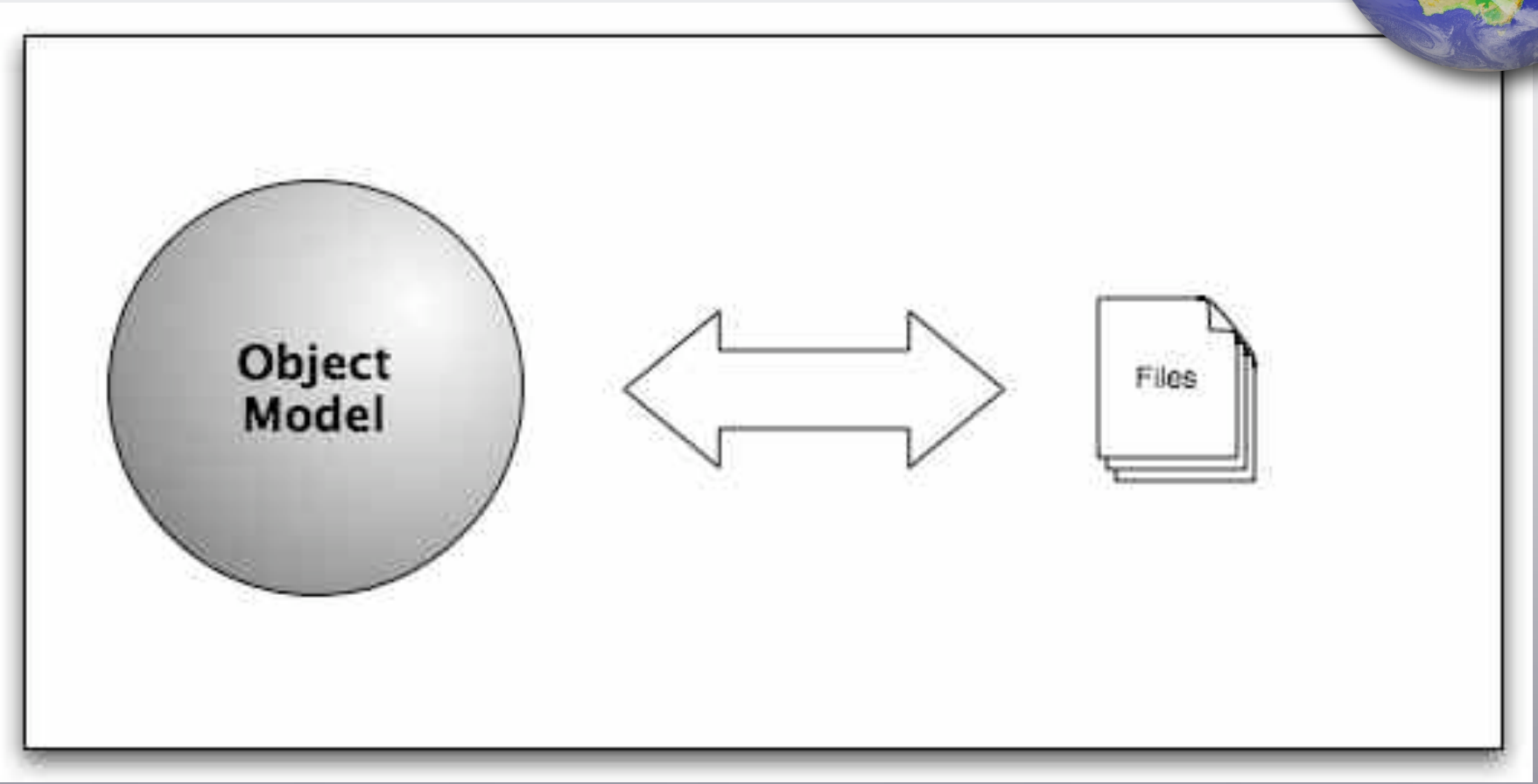
Two approaches:

- Transmission over an IP-network using Distributed Objects.
  Additional computers and network installation necessary on site.

- Bluetooth technology
  Low range, commonly lower than 30 m.

GPS

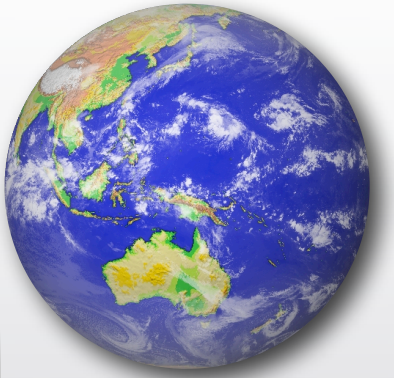


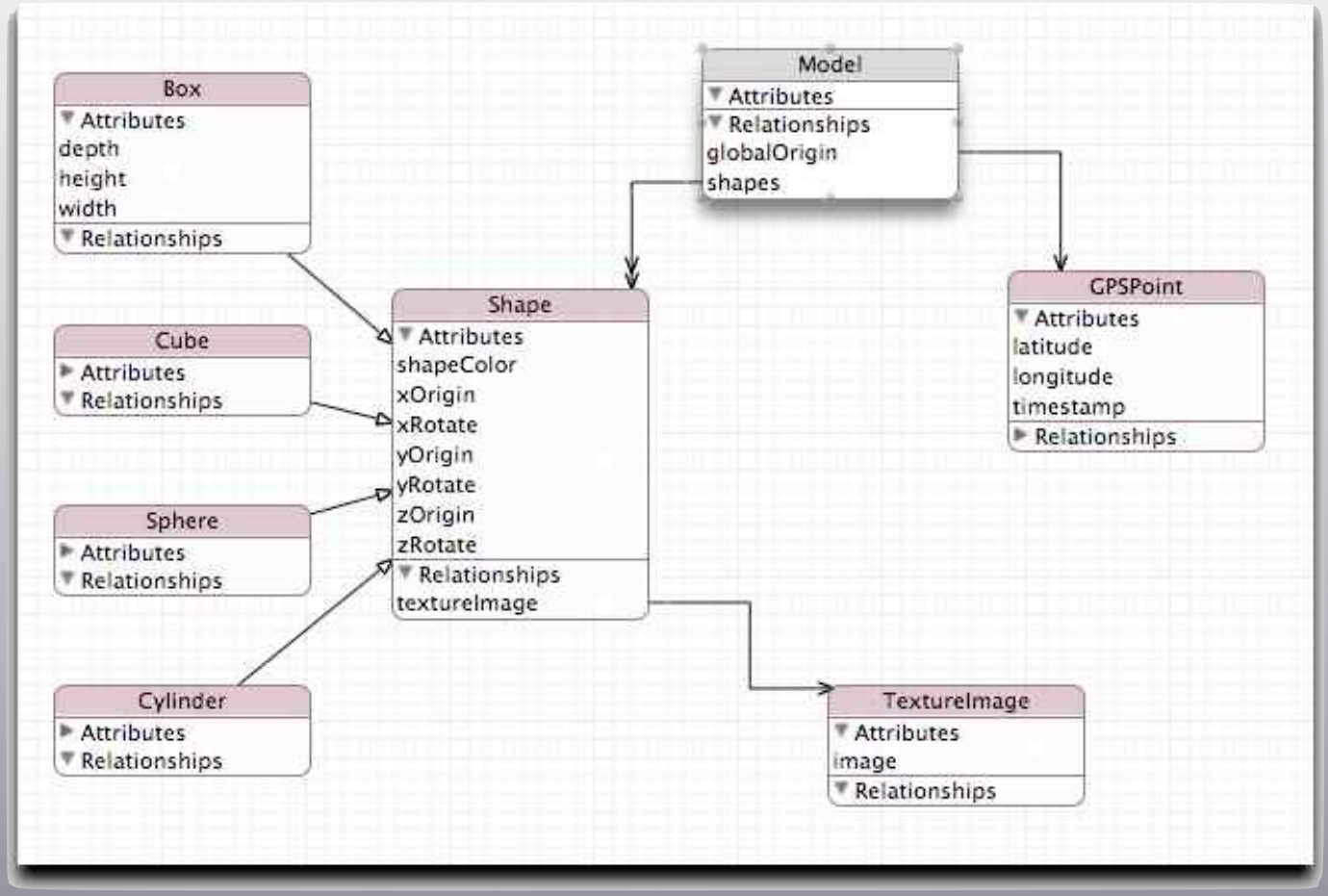


Model- data with GPS

There is no file-format to store CAD-data with global coordinates, except Google.

GPS





Proposed data-model

Layout for a proposed format with absolute coordinates

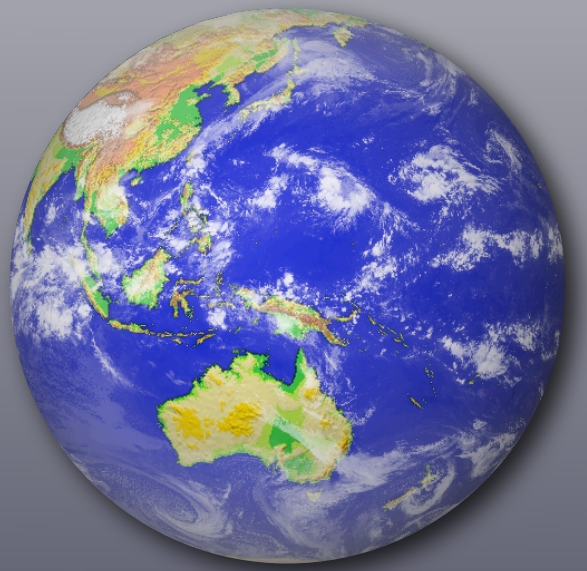
View of the satelites

View of the satelites

View of the satelites

Designing Virtual Models in Real Space

Combining CAD and GPS



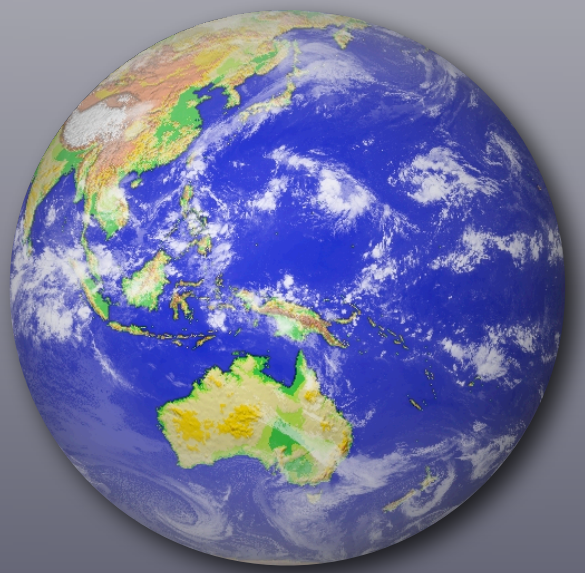
- Gps

Werner Lonsing, Bonn, Germany

Designing Virtual Models in Real Space

Combining CAD and GPS

Thank you



Werner Lonsing, Bonn, Germany