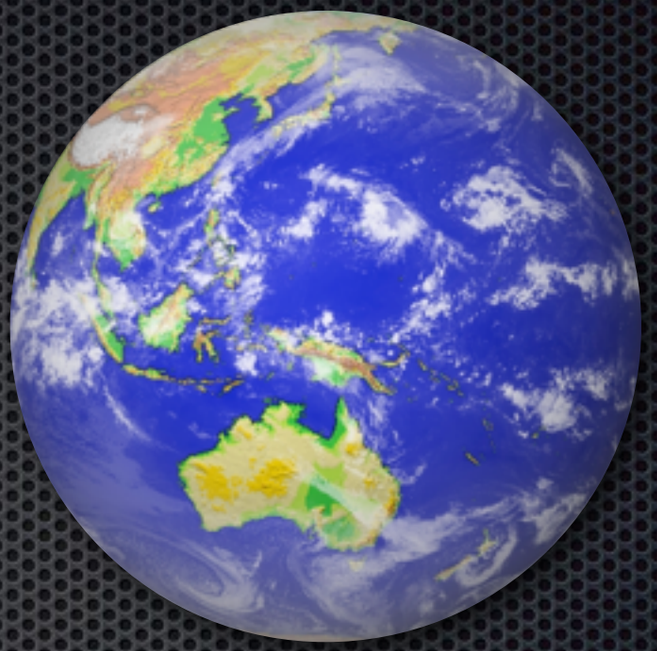
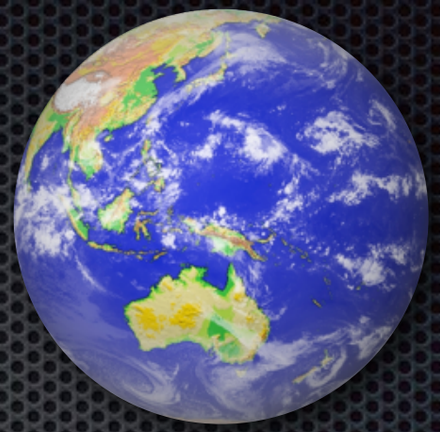
GPS

More tham WhereAmI



- Status
- Motivation, or The AmbiViewer-Project
- GPS on the Mac
- iPhone -The crippled Device

Status



Usage of GPS is usage of one single device.

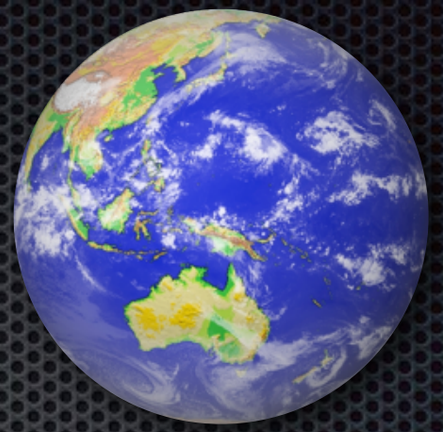
Questions are:

- Where am I, or is he/she/it?

and modifications like:

- Where to go? (mapping)
- Where was it? (tagging)

Status



Networking is missing

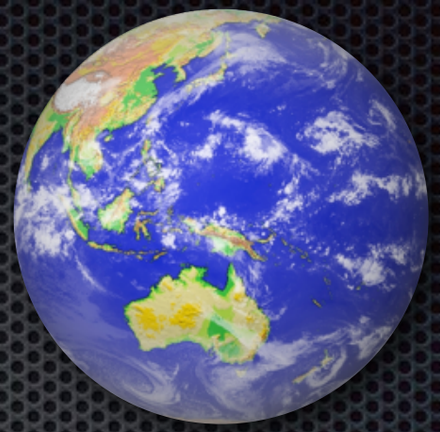
Usage of more than one GPS-receivers enables

- Measurement

and thus

- Networking between positions on this globe.

Status



GPS - Accuracy

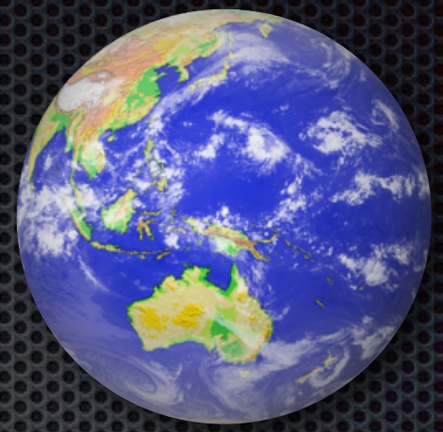
- Satelite reception

  Accuracy depends solely on the number of used satelites in view.

- Differential GPS

  More accuracy is available with corrected informations based on other known positions, e.g. a second GPS-receiver.

Status



GPS - Transmission

Transmitting the signal from remote GPS-receiver is difficult

Two approaches:

Transmission over an IP-network using Distributed Objects.

Additional computers and network installation necessary on site.

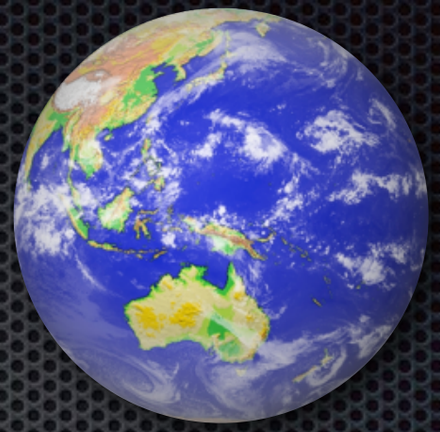
Bluetooth technology

Low range, commonly lower than 30 m.

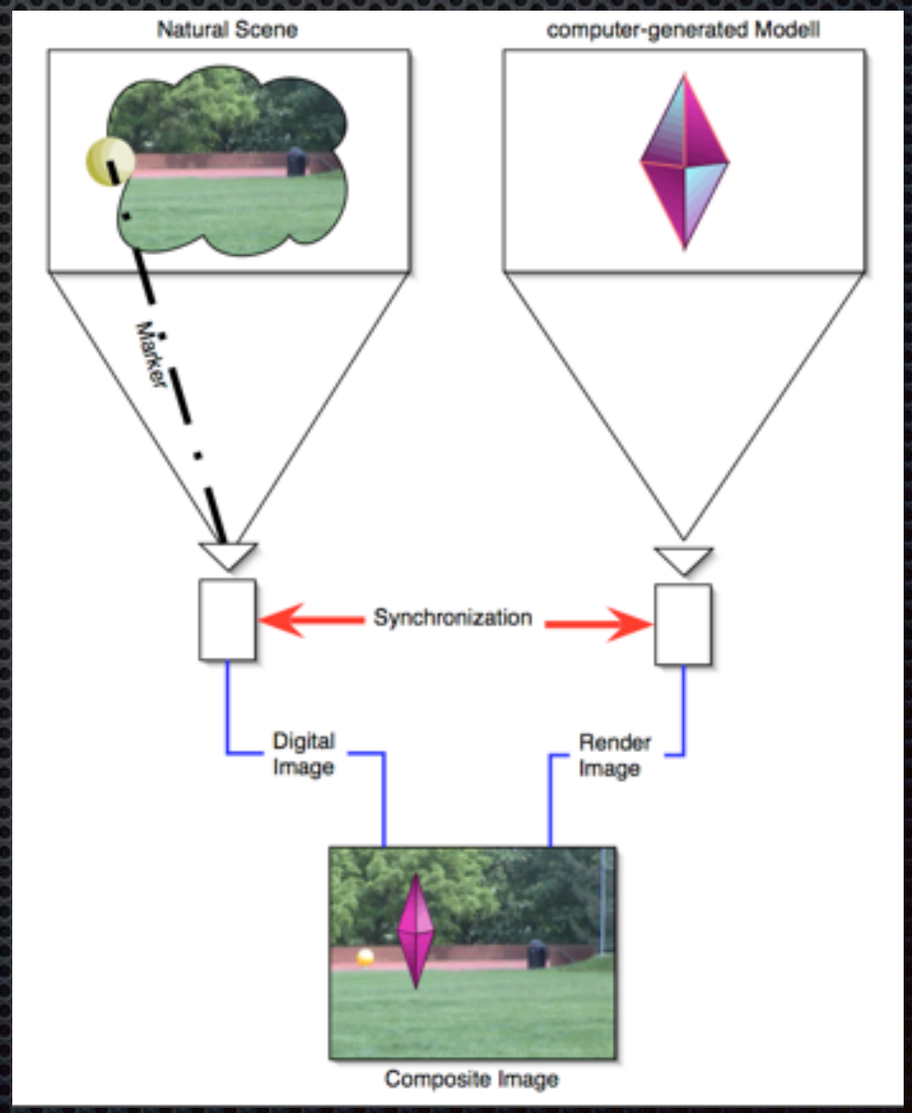
Not evaluated: ZigBee, Mobile phone

Motivation

The AmbiViewer-Project



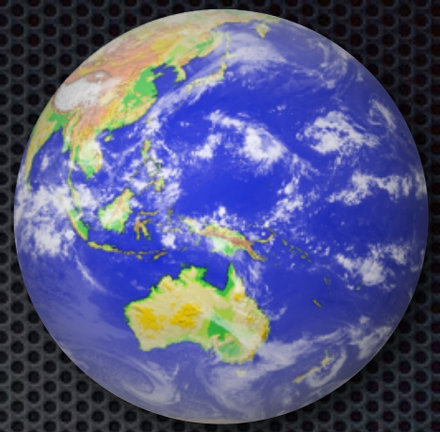
The AmbiViewer-system combines different technologies and devices like cameras and GPS-receivers to produce composite images with virtual objects while being on site.



GPS More than WhereAmI

Motivation

The AmbiViewer-Project

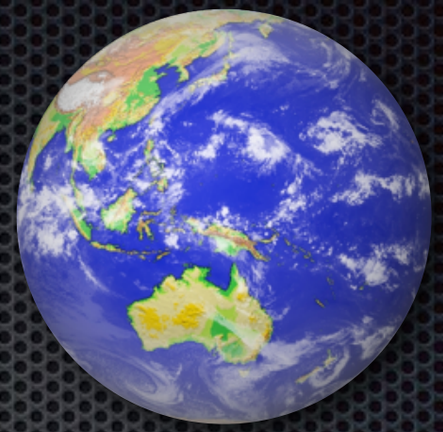


Laptop with GPS-receiver

GPS More than WhereAmI

Motivation

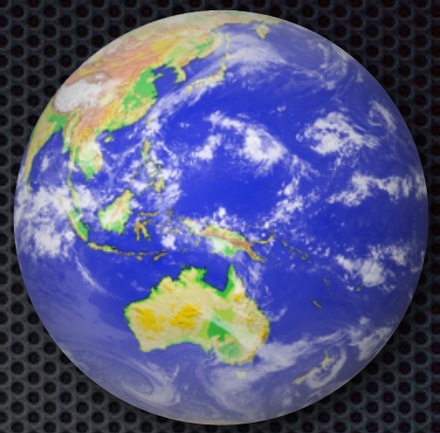
The AmbiViewer-Project



DV-camera (zoom) with
GPS-receiver

Motivation

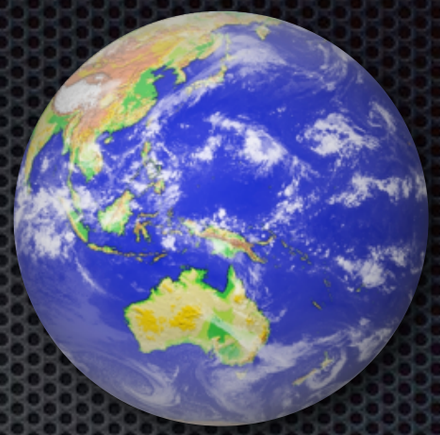
The AmbiViewer-Project

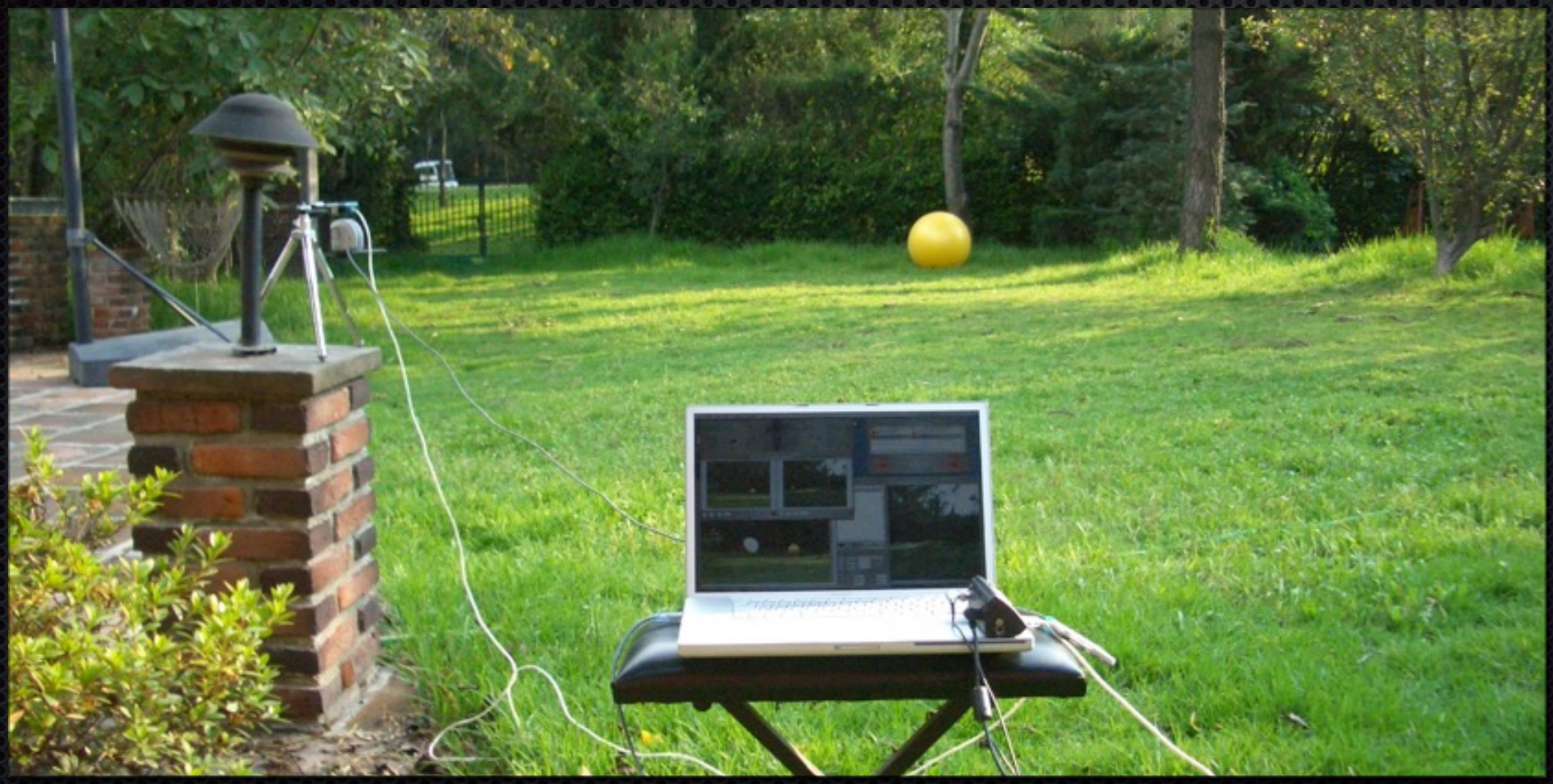


Marker ball with attached Bluetooth GPS- receiver

Motivation

The AmbiViewer-Project

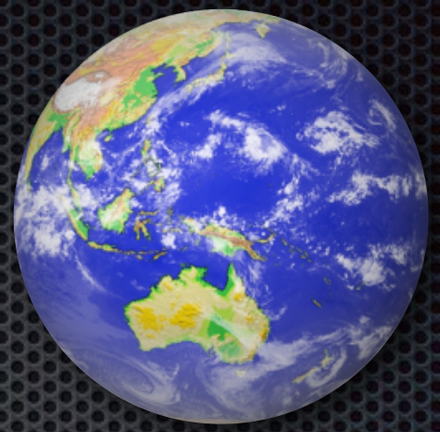


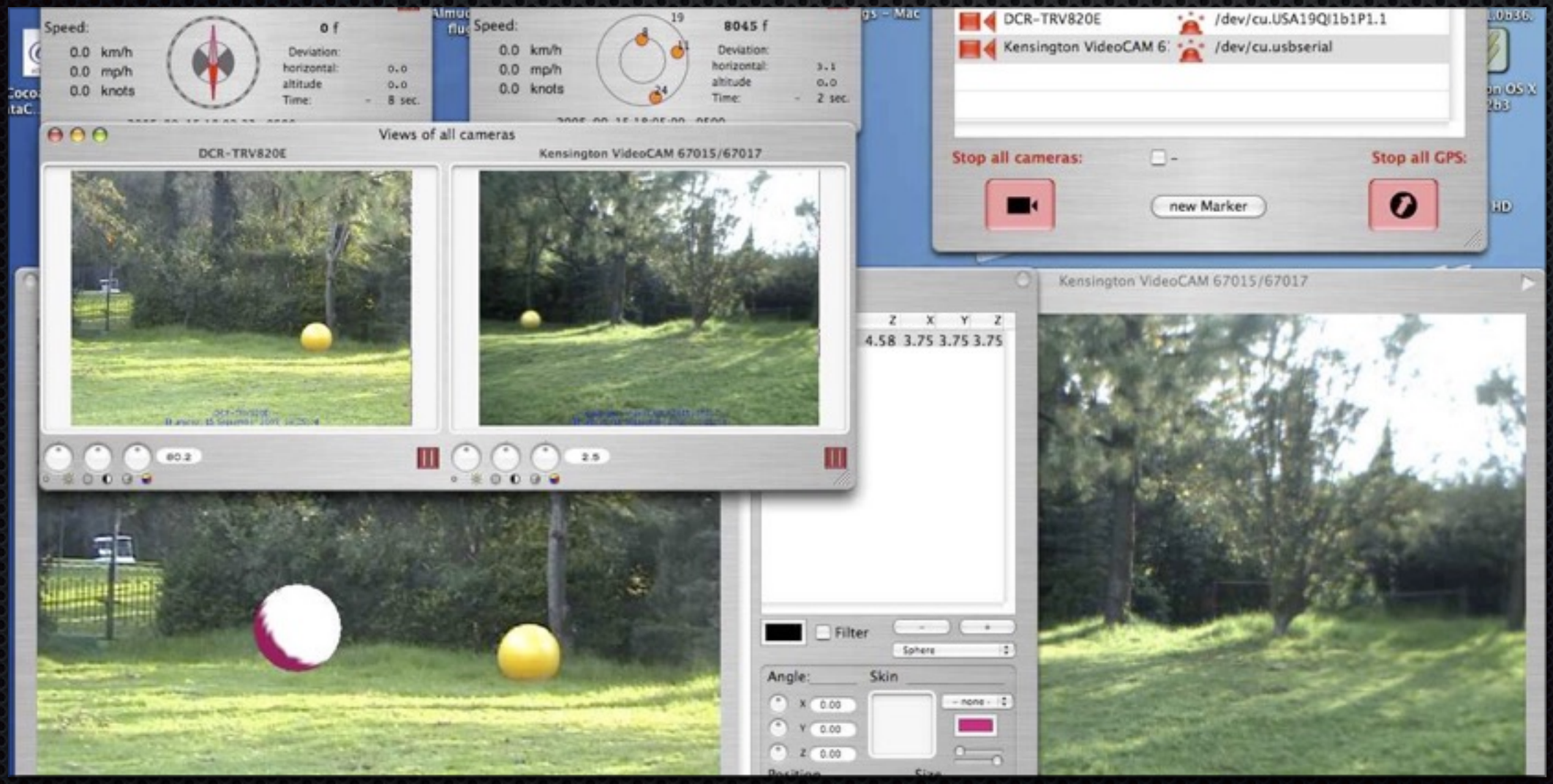


System with laptop, camera,
2 GPS-receiver and marker

Motivation

The AmbiViewer-Project

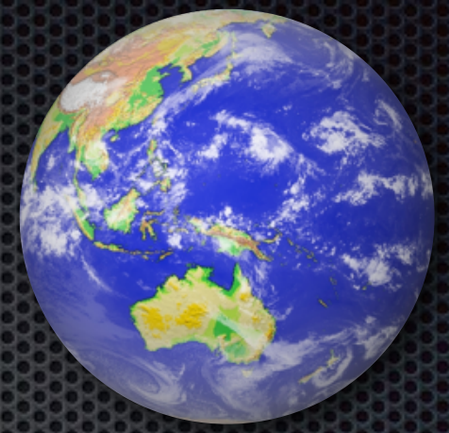


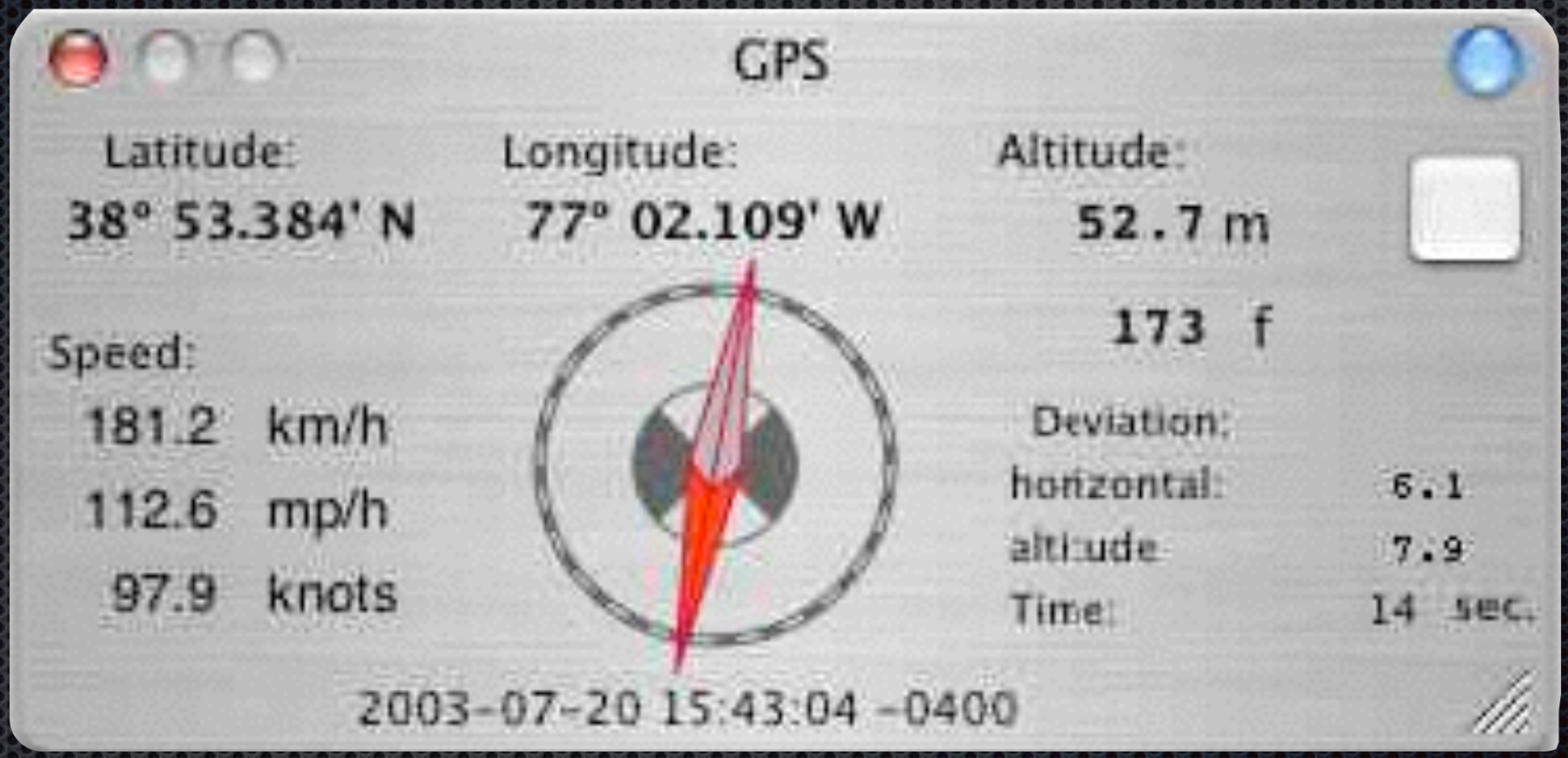


Classes of the GPS-tree

GPS More than WhereAmI

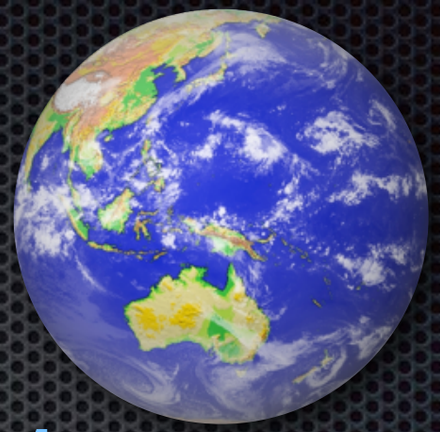
GPS ...on the Mac





Interface of SimoleGPS

GPS ...on the Mac

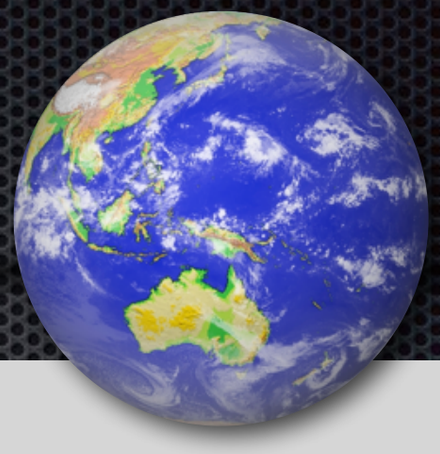


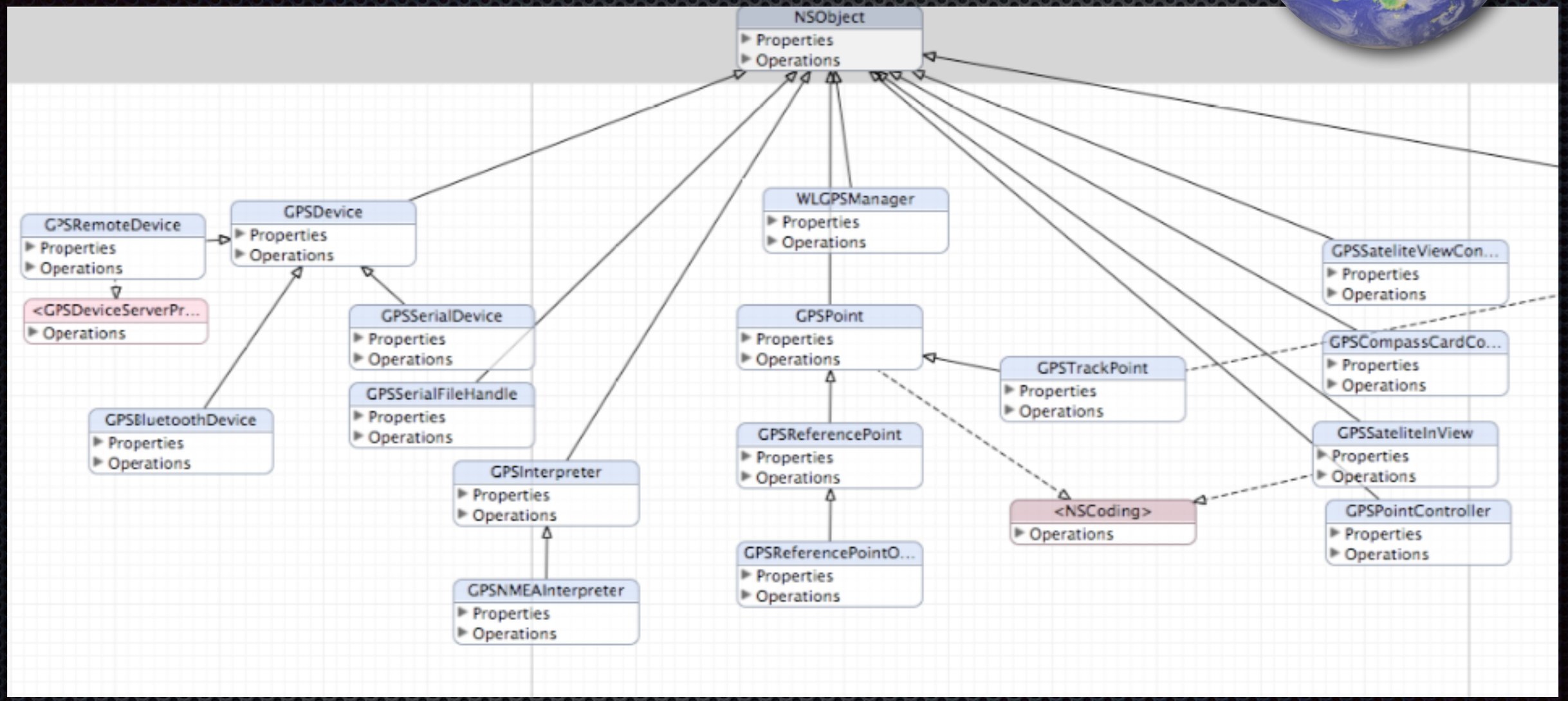
No Framework for GPS-support on the Mac

Steps to do it:

- Connect receivers and collect GPS-signal serial or BT-Interface
- interpret the signals, most common is NMEA
- Use the Data (!)

GPS ...on the Mac

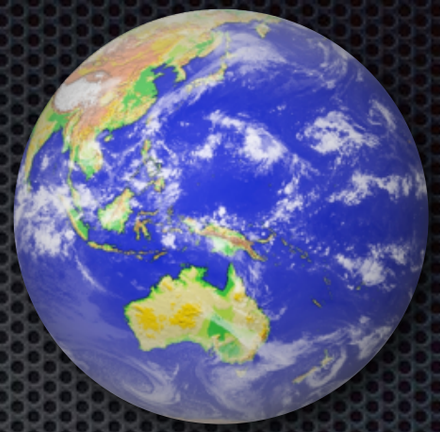




Classes of the GPS-tree

GPS More than WhereAmI

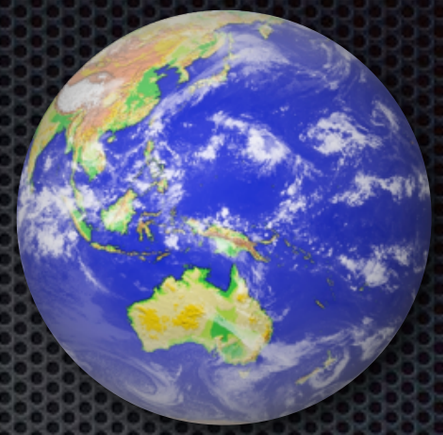
GPS ...on the Mac



```
@interface GPSPoint : NSObject <NSCoding> {
    double          gpsLongitudeDegree;
    double          gpsLatitudeDegree;
}
```

Interface of GPSPoint

GPS ...on the Mac

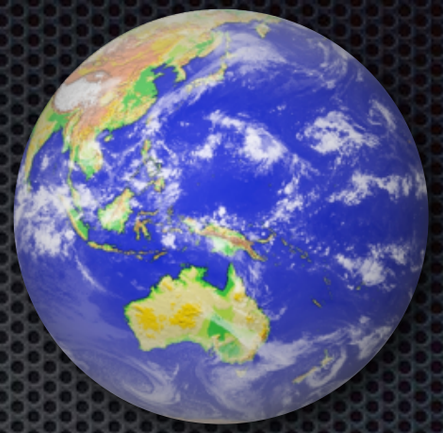


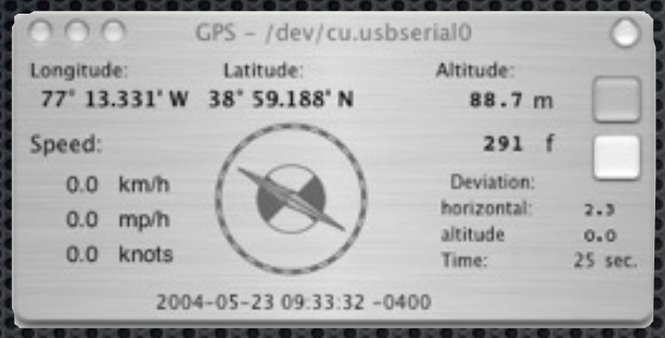
```
@interface GPSTrackPoint : GPSPoint <NSCopying>{

    NSCalendarDate  *sateliteTimeStamp;
    NSArray     *satelitesInView;
    char        mapDatum;
    int         gpsAltitude;
    float       gpsDirection;
    float       speedOnGround;
    float       gpsHorzError;
    float       gpsVertError;
    float       gpsSphereError;
    BOOL        isValid;
}
```

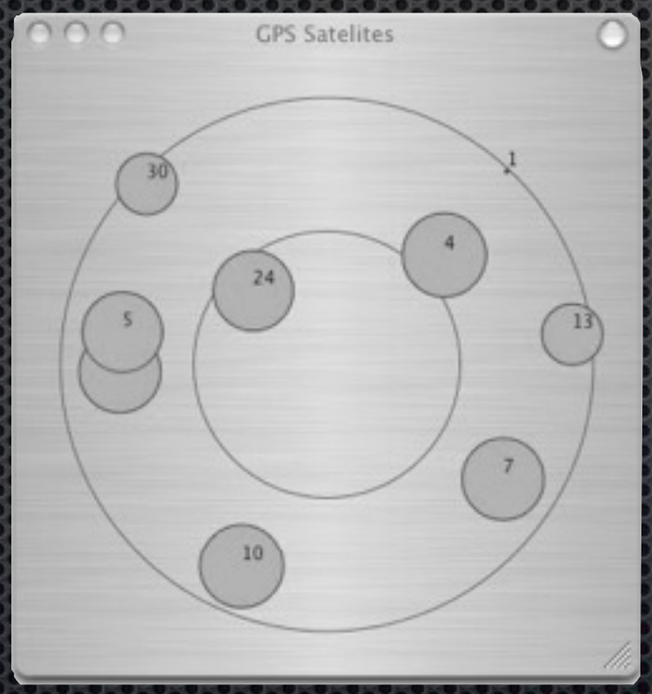
Interface of GPSTrackPoint

GPS

...on the Mac

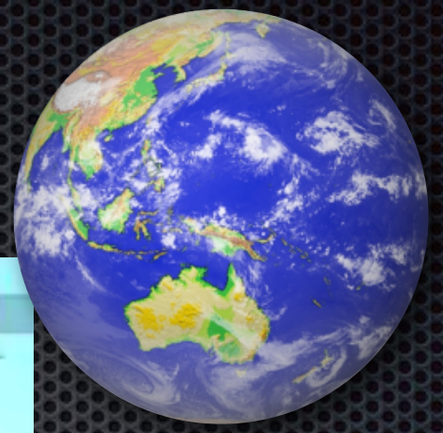






Multiple devices

GPS ...on the Mac

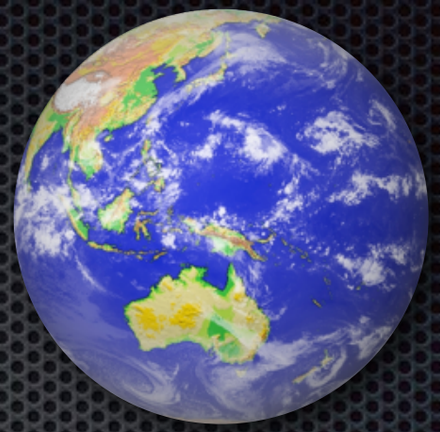


View of the satelites
Time-laps Movie, ~ 6h

GPS More than WhereAmI

iPhone

GPS on the iPhone

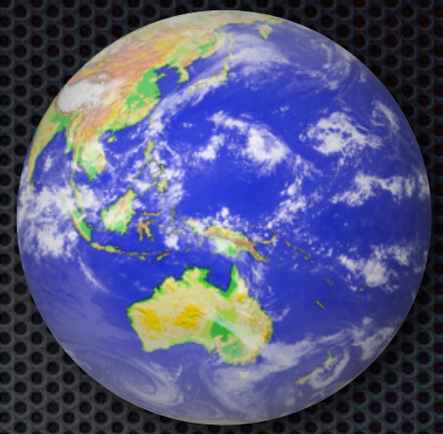


The iPhone figures out the location by

- Receiving GPS-signals
  (only 3G with build-in receiver, not external)
- Triangulating the location of nearby cell towers
  (map data from Google; not iPod touch))
- Fishing around for WI-Fi signals
  (Wi-Fi location details from Skyhook Wireless)

iPhone

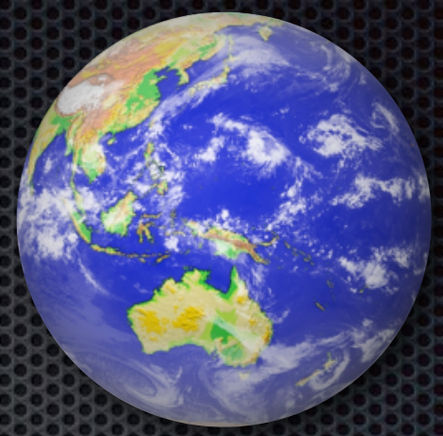
The crippled Device



All properties of CLLocation are readonly

- longitude and latidute as ‘CLLocationDegrees’ pair of ‘double’ in ‘CLLocationCoordinate2D’
- altidute as ‘CLLocationDistance’ (double)
- timestamp as ‘NSDate’
- horizontalAccuracy and verticalAccuracy as ‘CLLocationAccuracy’

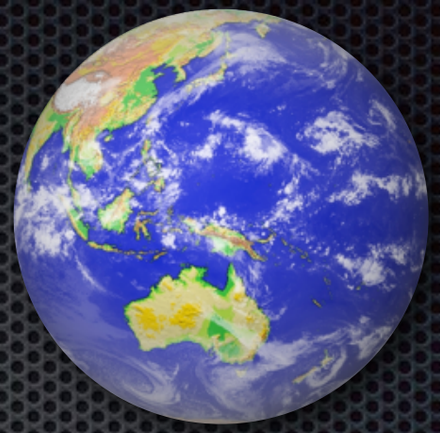
The crippled iPhone



Previous versions of the iPhone OS 2.1 contained the following API changes. The following have been removed in Beta 4:

- CLLocation.heading
- CLLocation.speed
- CLLocation.speedAvailable
- CLLocationDirection
- CLLocationSpeed

The crippled



iPhone

Nice looking anyhow.

GPS More than WhereAmI