

ACADIA 2009 : reForm()



Composite Images on Mobile Devices

Augmenting reality in an
outdoor environment

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Overview



- Augmented Reality
- Mobile Devices
- Demo
- Status

Augmenting Reality



- Augmentation

How can Reality be augmented?

- Composition

Compositions are demanding.

Augmenting Reality



Princip of Augmented Reality

- real-world image
- artificial image
drawing, rendering etc.

Augmenting Reality



Purpose of AR-systems:

- Visualizations from all reachable viewing directions
- New methods of design

Augmenting Reality



Principles of AR-Systems

- Tracking based Systems
- Marker based Systems

Principles



Tinmith project
University of South Australia

Tracking based System will estimate position and viewing direction with tracking devices.

While deployable, they lack quality in real-time composing.

Principles



Goblin XNA (ARtag) project,
Columbia University, NY

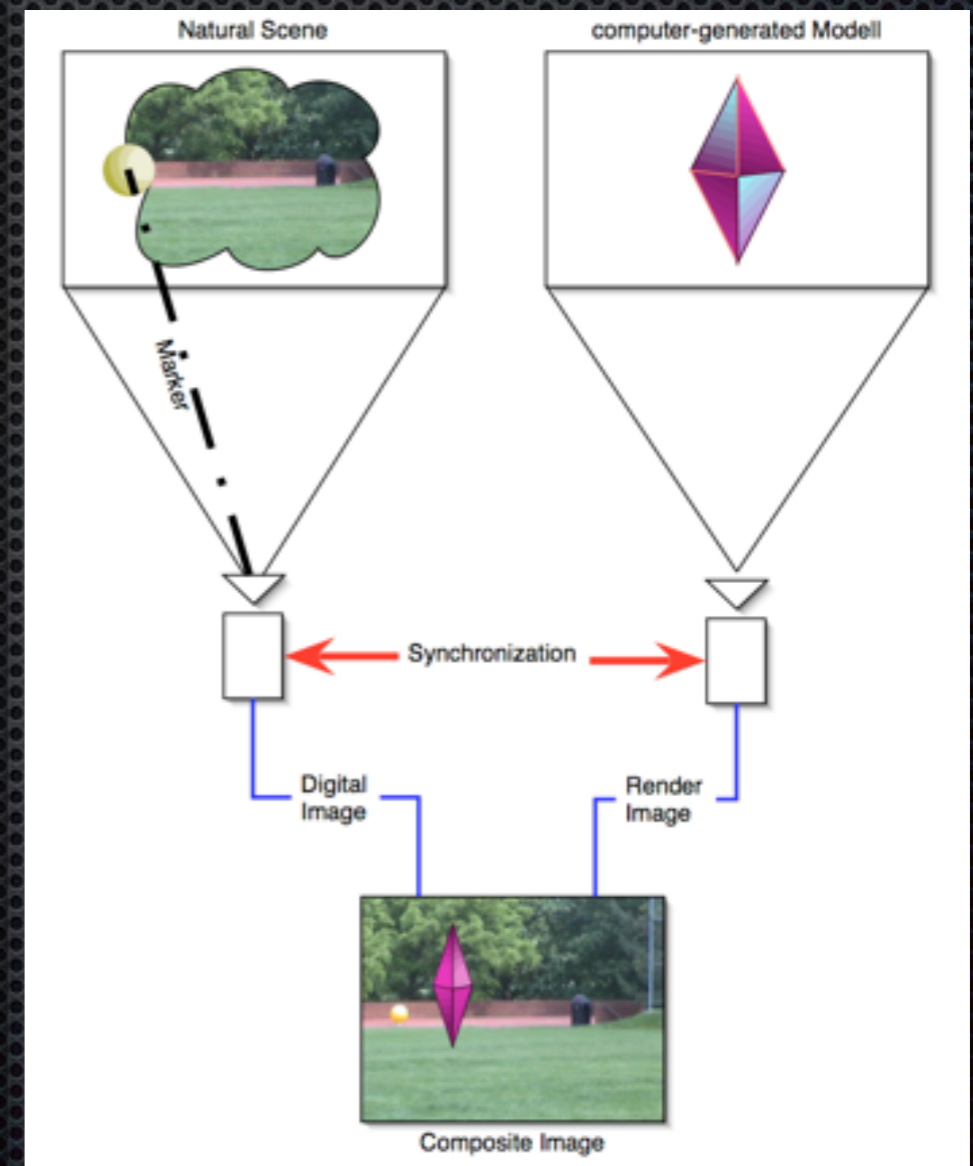
Marker based System detect multiple markers from an input image and calculate the camera's position and viewing direction in space.

AmbiViewer System



The-system combines both techniques:

- Partial tracking based on positional tracking via GPS and
 - Partial marker detection with one single feature.
- to produce composite images with virtual objects while being on site.



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The AmbiViewer-Project



Positional tracking via GPS on Camera and Marker



DV-camera (zoom) with GPS-receiver



Marker ball with attached Bluetooth GPS- receiver

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The AmbiViewer-Project



Marker detection



Detected Marker ball

The diameter of the marker is the single one needed feature.

Prototype 2005

The AmbiViewer-Project



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

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The iPhone



Sometimes the
crippled one

Pro: All-in-One:

- Camera
- Display
- GPS

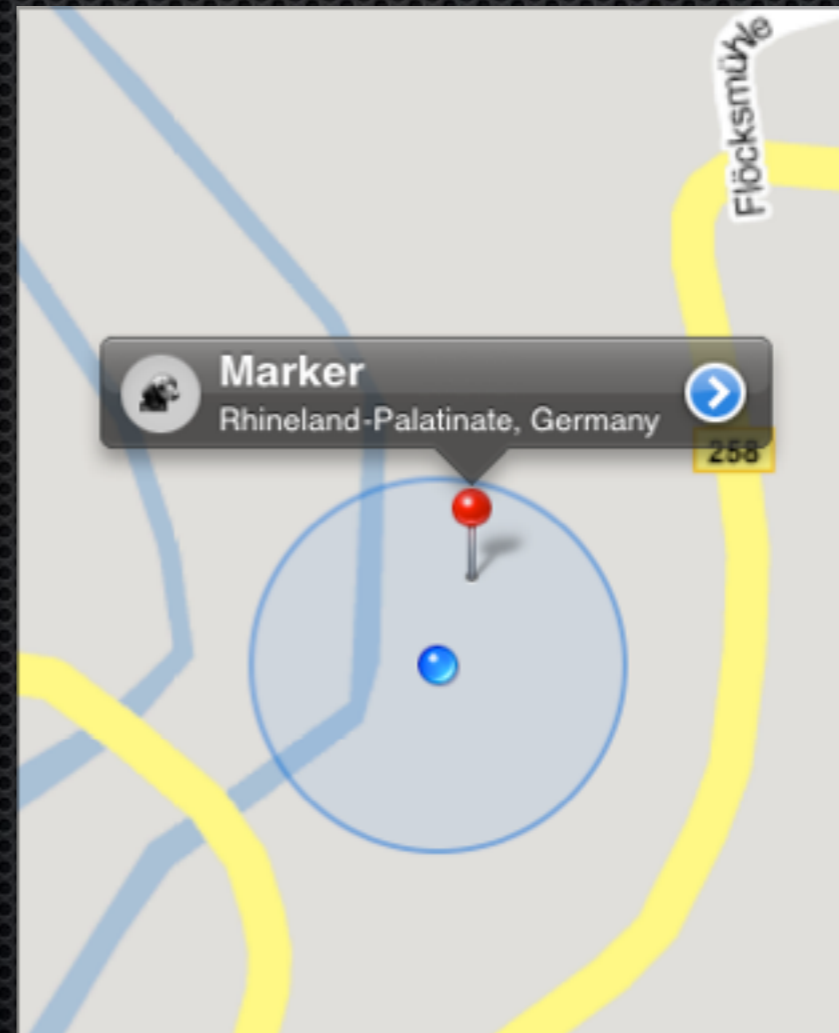
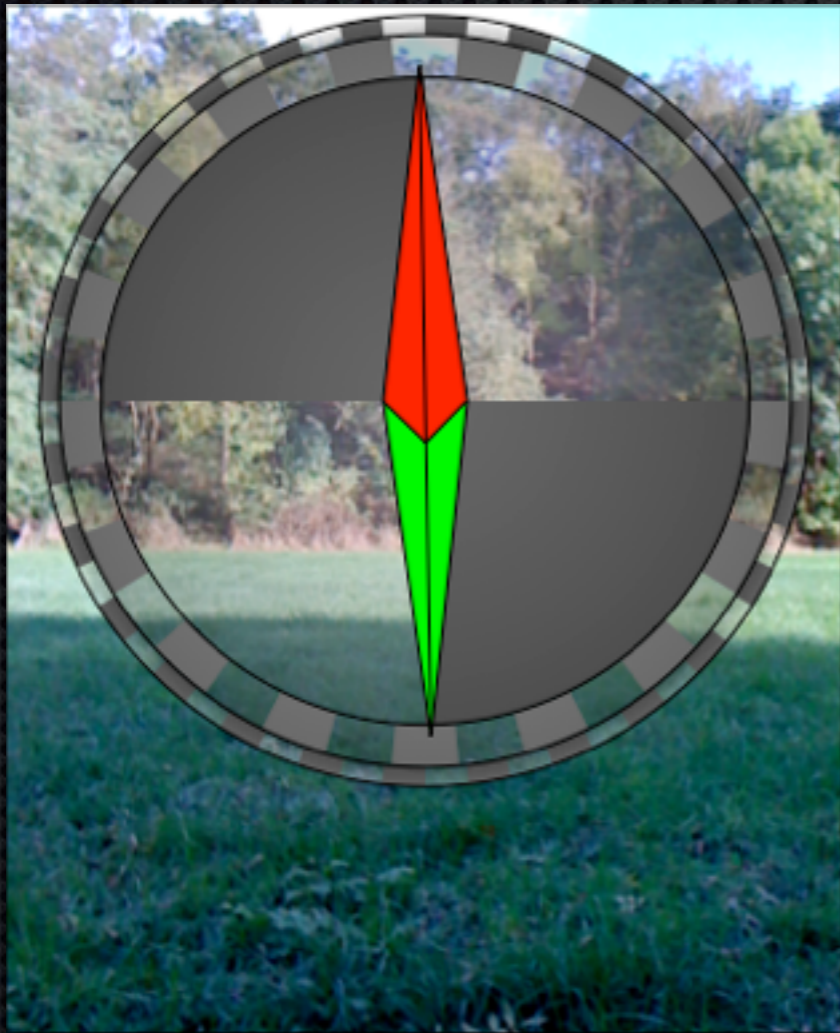
Contra:

Manufacturer and provider
have their hands on it.



AmbiViewer on the iPhone

Defining the location of the marker



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AmbiViewer on the iPhone



Defining a circle as shape



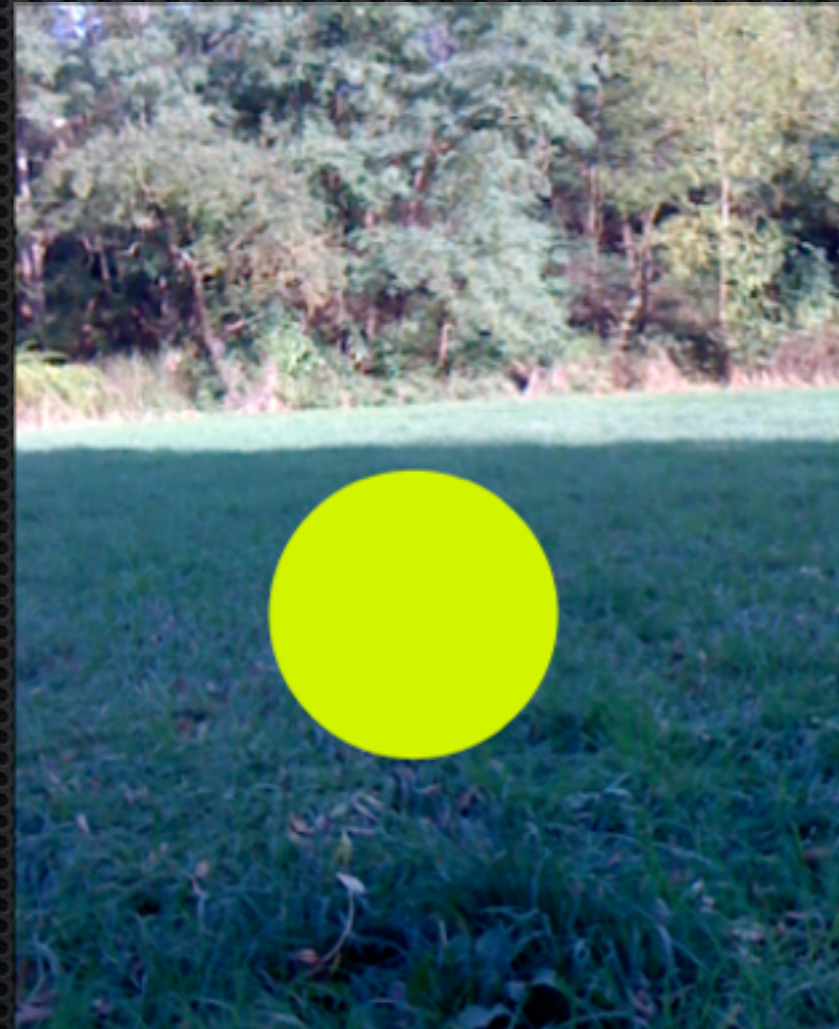
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AmbiViewer on the iPhone



Adjusting size and position of the circle



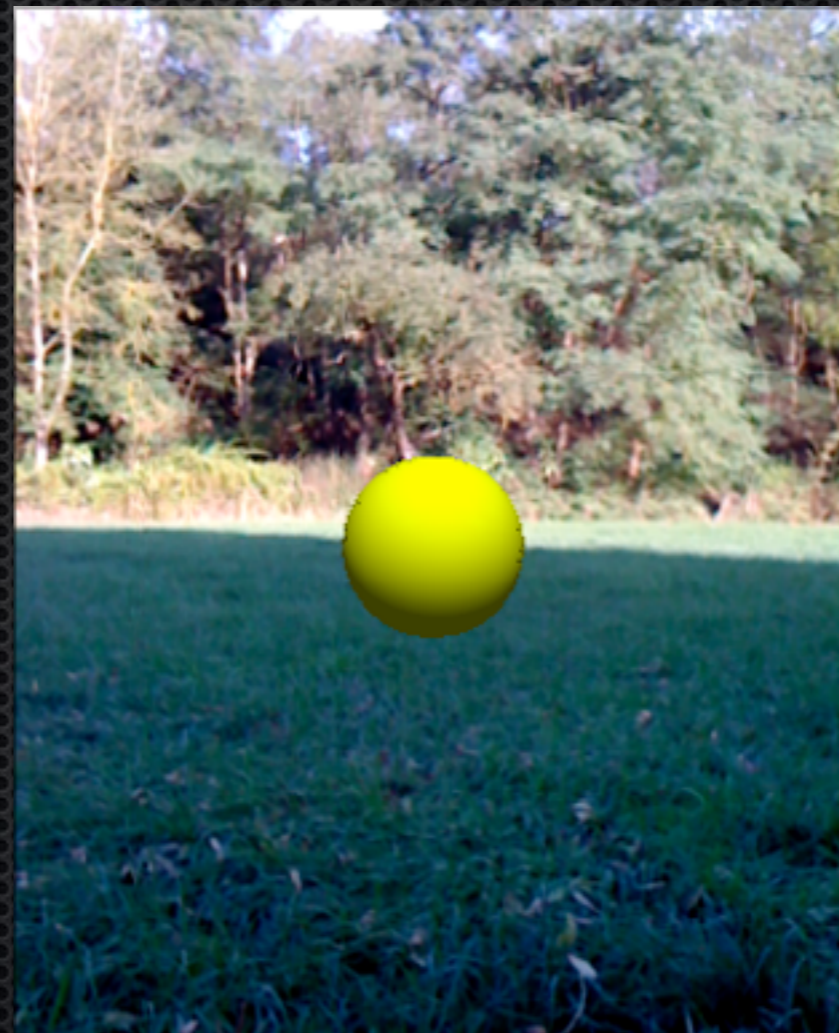
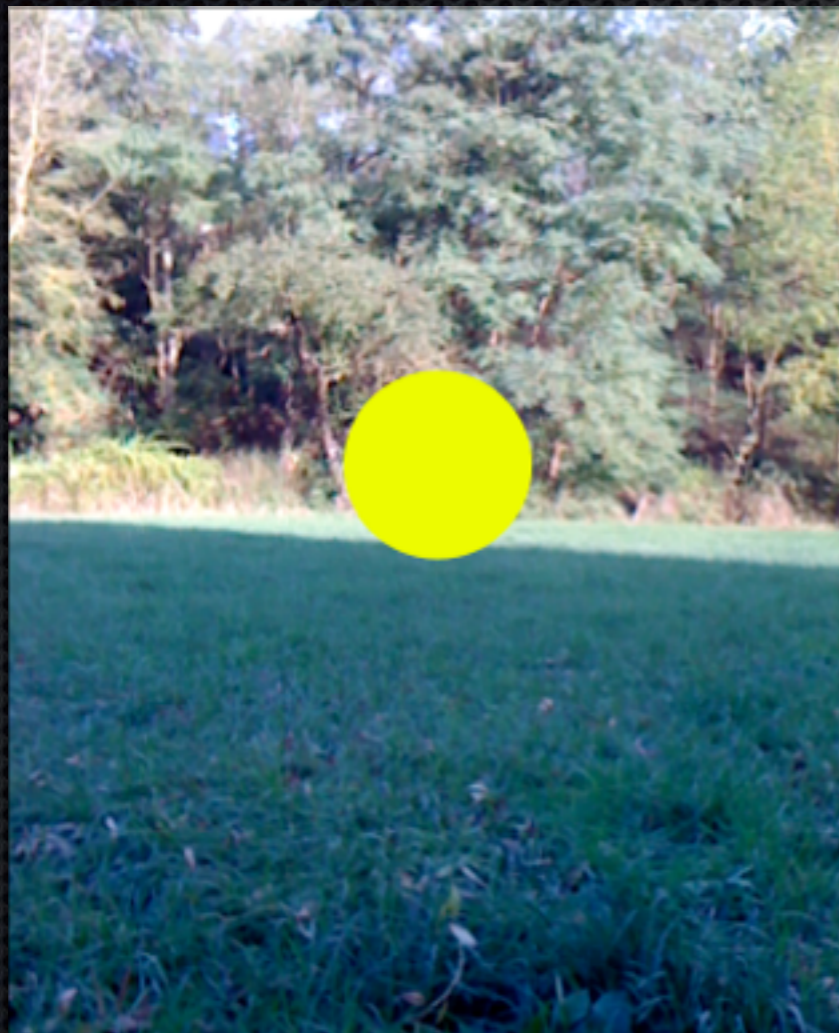
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AmbiViewer on the iPhone



Creating a three-dimensional ball



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Final Composition



Rendering the model and compose it with the image of the camera.

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Demo

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AmbiViewer on the iPhone



The iPhone can not yet track the Marker

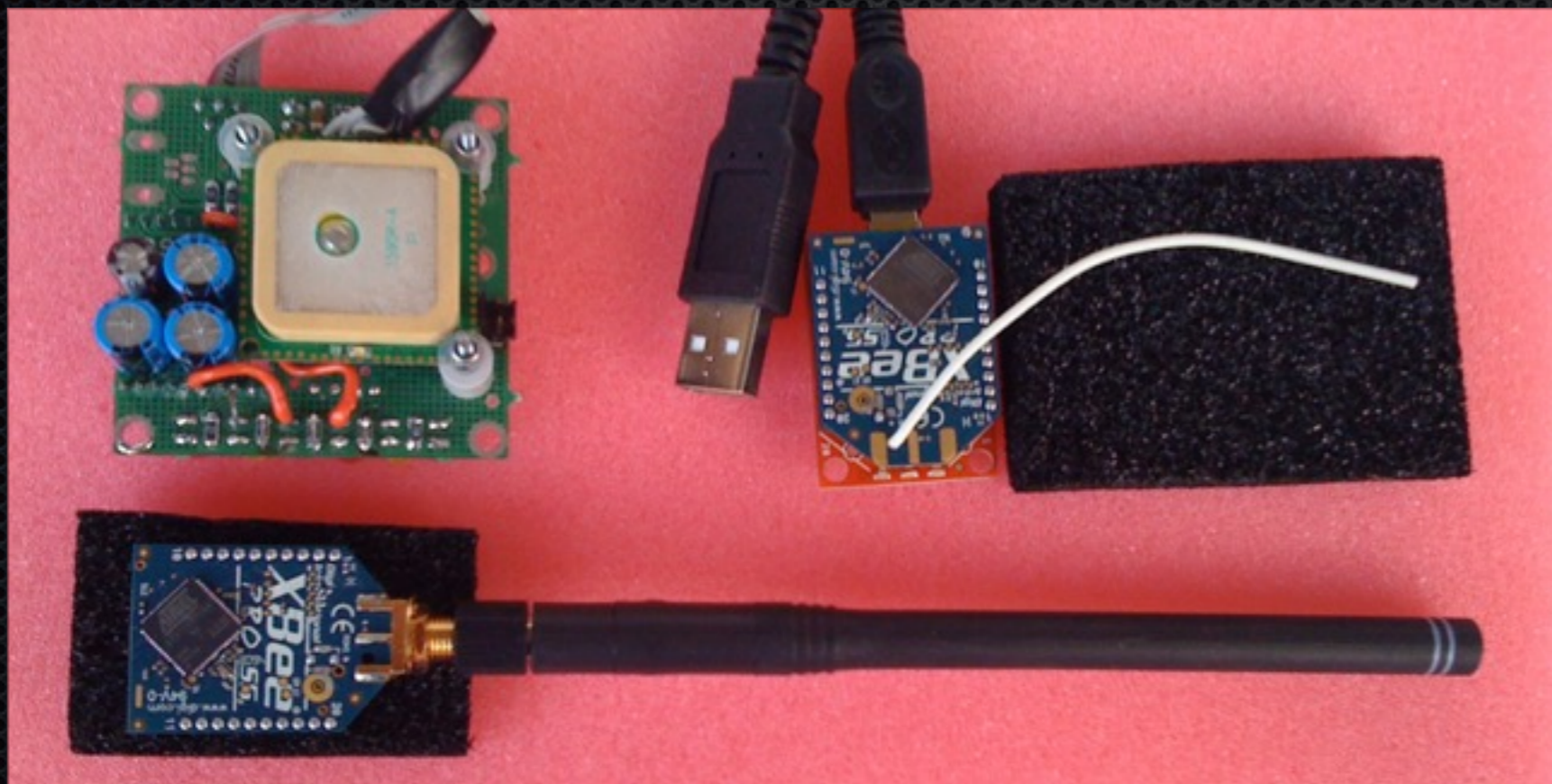
- Connect to the remote GPS
- Detect the Marker in real-time
- Stream Video real-time

AmbiViewer on the iPhone



Connect the remote Marker's GPS

Self made board with the chip-GPS-receiver
and Zigbee-transmitter with antenna



Computer is
connected via
USB,
Zigbee with
pigtail-
antenna

The iPhone is connected to the Computer
by networking means (whatever it may be).

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**Many Thanks to
Peter Anders**



United States Patent: 7391424

Method and apparatus for producing composite images which contain virtual objects.



To test:

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Thank You.

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