

# Augmented Reality Challenges

## Applications, UX and Open Standards



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# Fraunhofer IGD

Institute for Computer Graphics Research



- **Mission:** Technologies and Applications of Visualization, Interaction and Communication in the field of ICT
- **Director:** Prof. Dr. techn. Dieter W. Fellner
- **4 Locations:** Darmstadt, Rostock (Germany), Singapore and Graz (Austria)
- 180 Researchers (FTE)
- 14,7 Mio. € Turnover

-> **Department Virtual and Augmented Reality**

# Dep. Virtual & Augmented Reality

## Research Topics



# Dep. Virtual & Augmented Reality

## Application Areas





# » Evolution of Augmented Reality for Cultural Heritage«

# 2000 - 2002: Archeoguide

## Mobile AR at Olympia



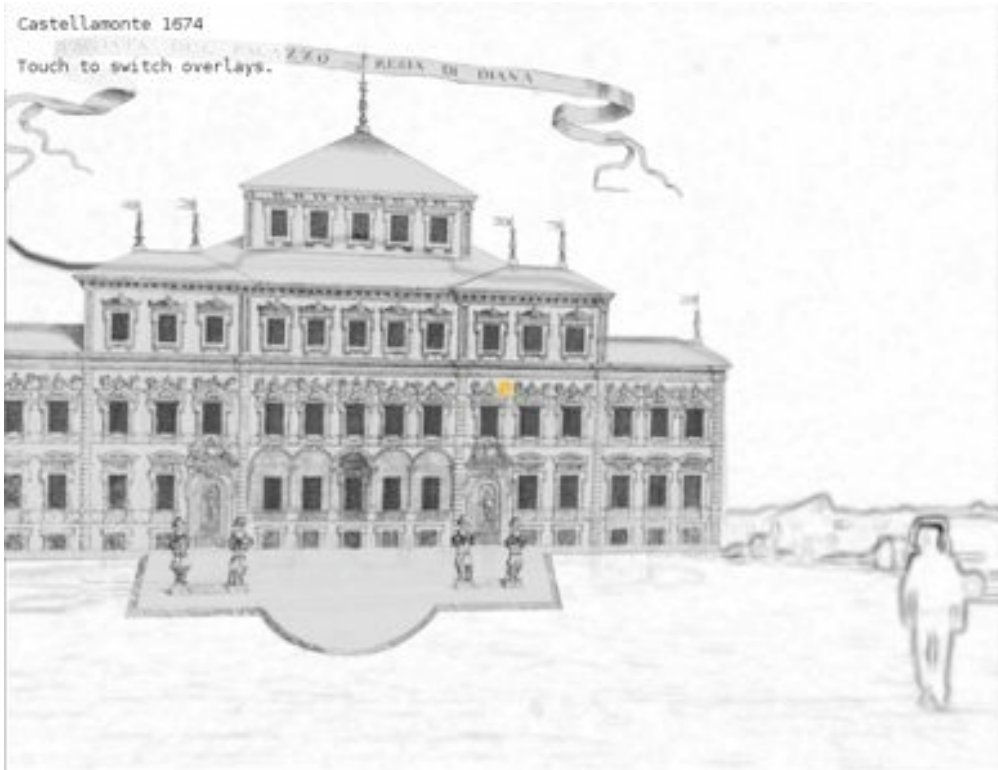
# 2005: AR Telescope

## Visualizing Fossils in the Messel Pit



# 2006 - 2009: iTACITUS

## Mobile AR at Winchester & Venaria Reale



# 2006 - 2009: iTACITUS

## Mobile AR at Winchester & Venaria Reale



# 2009: AR Sightseeing

## 20 Years Fall of the Berlin Wall



# 2009: AR Sightseeing

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# »Software Frameworks for AR«

# InstantReality

## Mixed Reality Framework



- Foundation of our research and projects
- Based on
  - X3D ISO standard (Application)
  - OpenSG (Rendering)
  - VisionLib (Computer Vision)
- 10 years of development at Fraunhofer IGD
- Enables rapid application development
- Scalable from Smartphone to clustered setups
- Cross-platform
- Free for non-commercial use

<http://www.instantreality.org>



# X3DOM

## Open Source WebGL JS Framework



- Hardware accelerated 3D in web-browsers without plugins
- HTML 5 conform X3D notation
- Based on WebGL and Javascript
- Dynamic scene manipulation via DOM & jQuery
- Works already in nightly builds of Webkit, Firefox, Chrome and on Nokia N900
- In regular browsers by 2010
- Geospatial X3d soon

<http://www.x3dom.org>



# X3DOM

## Open Source WebGL JS Framework



- Hardware accelerated desktop AR
- FLARToolkit for marker tracking
- X3DOM renders scene
- Performance boost via separate threads
- Editable in a text editor
- Seamless integration of dynamic web data via jQuery without Flash
- Available in next Mobile Webkit on iPhone OS / Android



# Open Annotation Engine

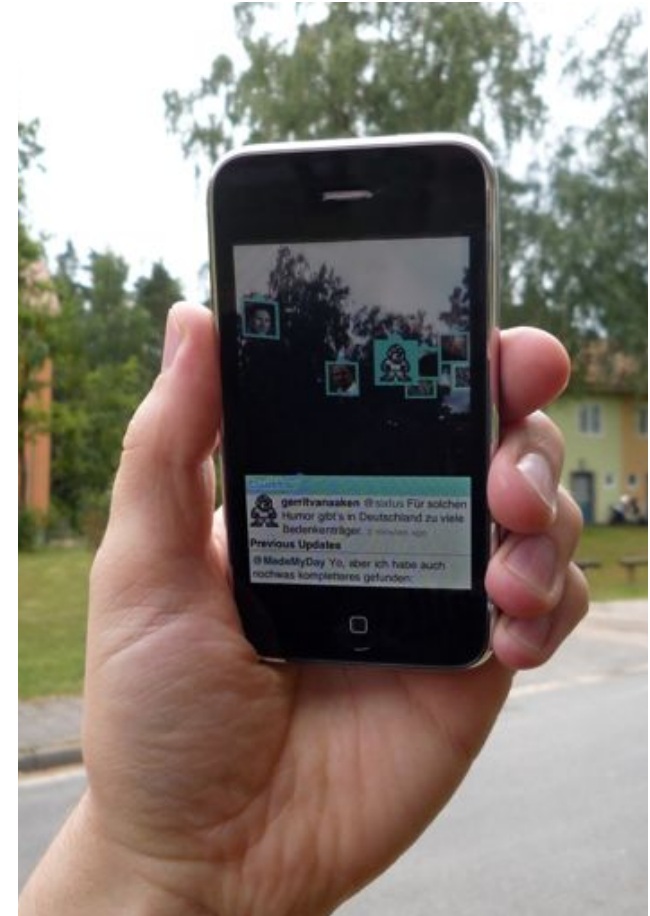
## Open Source JS AR Framework



- Foundation of **TwittARound**
- Renders AR annotations in a Webview (Webkit)
- Based on HTML 5, Javascript and (3D) CSS
- Native wrappers for iPhone & Android deliver
  - Camera background
  - Compass / accelerometer data
  - GPS already in HTML 5 available
- Seamless integration of dynamic web data via jQuery
- Styling of annotations via CSS
- Interaction via DOM Events & Javascript

**Open source release in February 2010**

**<http://code.google.com/p/openannotationengine/>**



# Open Annotation Engine

## Open Source JS AR Framework



```
<html xmlns='http://www.w3.org/1999/xhtml'>
  <head>
    <title>Open Annotation Engine</title>

    <link rel="stylesheet" type="text/css" href="world.css" />
    <link rel="stylesheet" type="text/css" href="annotation.css" />

    <script type="text/javascript" src="jquery-1.3.2.js"></script>
    <script type="text/javascript" src="oe.js"></script>
    <script type="text/javascript" src="world.js"></script>
  </head>
  <body id='body' color='#FFFFFF'>
    <div id='world' class='world' rel='position[44.20, 10.10]'>
      <div id='annotation_01' class='annotation' rel='annotation[44.10, 10.20]'>
        <img src='image_01.jpg'>
      </div>
      <div id='annotation_02' class='annotation' rel='annotation[44.10, 11.20]'>
        <img src='image_02.jpg'>
      </div>
    </div>
  </body>
</html>
```



# »Open Standards!«

# Open Standards

## Sustainability for AR Content



- All our software and applications based on open industry standards:
  - X3D (ISO/IEC 19775:2004)
  - HTML 5
  - ECMAScript (ISO/IEC 16262:2002)
  - CSS
- Benefits:
  - Sustainability (especially cultural heritage & industry)
  - Interoperability (write once ...)
  - Porting to different platforms
  - Rapid application development (interpreted code)
- Active participation in standardization groups:
  - Web3D Consortium
  - W3C

# Open Standards

## Enhancing Standard Browsers



- Browsers and the cloud are the new OS
  - HTML 5 (Video, Audio, X3D)
  - WebGL
  - Geolocation API
  - Ajax
  - Chrome OS
- Mobile SDKs are a step backwards
  - Restrictions in functionalities
  - Content gatekeepers
  - Apps are less portable
  - Non-transparent review process
  - Apple's WebApps were right but without proper business model

# Open Standards

## Enhancing Standard Browsers



- Don't reinvent browsers and standards, enhance them!
  - WebGL / X3D
  - Enhancing Geolocation API: Compass, accelerometer
  - Native camera support (video background)
  - 3D CSS: Geospatial coordinates