



Kinect Development Introduction



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About me



Stefan Stegmüller

MSc Computer Science (Uni Bern)

Software Developer/ Architect for
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Hinweis: Verwendung für eigene Präsentationen nur mit Einverständnis des Autors

Xbox?



Kinect?



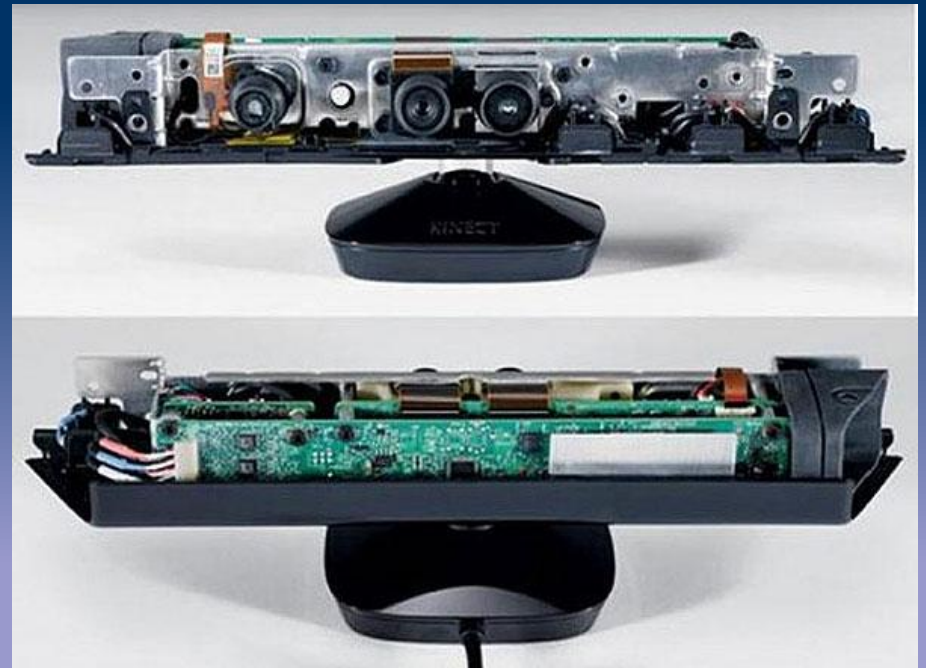
Kinect

- Controller for the Xbox 360
- Launched in November 2010
- 8 Million Units Sold in the First 60 Days
 - Guinness World Record: Fastest-selling Electronic Device in History
- Price Today: 139.- CHF
 - ASUS Xtion Pro 169.- CHF



Microsoft Kinect - Insides

- Infrared Emitter
- Depth Camera (Infrared)
- RGB Camera
- Microphone Array
- Motor



Natural User Interfaces

- A natural user interface, or NUI, [...] is a user interface that is effectively invisible, or becomes invisible with successive learned interactions, to its users.

Wikipedia



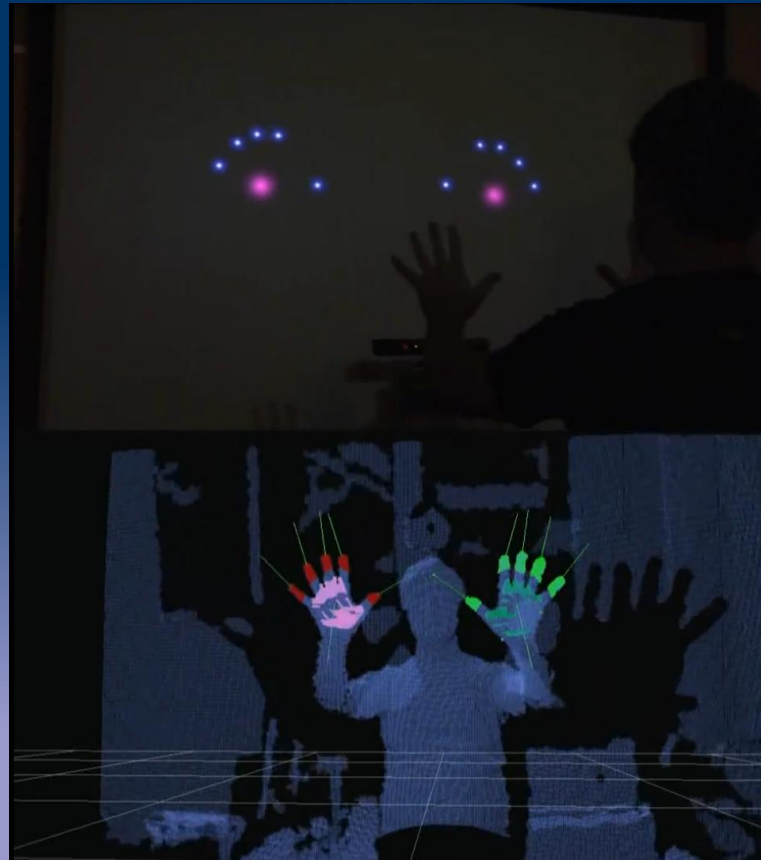
Kinect 'Hacks'

- Quest for Open Source Drivers
- 3000\$ Price Money by Adafruit Industries
- First Hacks in November 2010

Kinect 'Hacks'

Kinect Hand Detection by Garratt Gallagher

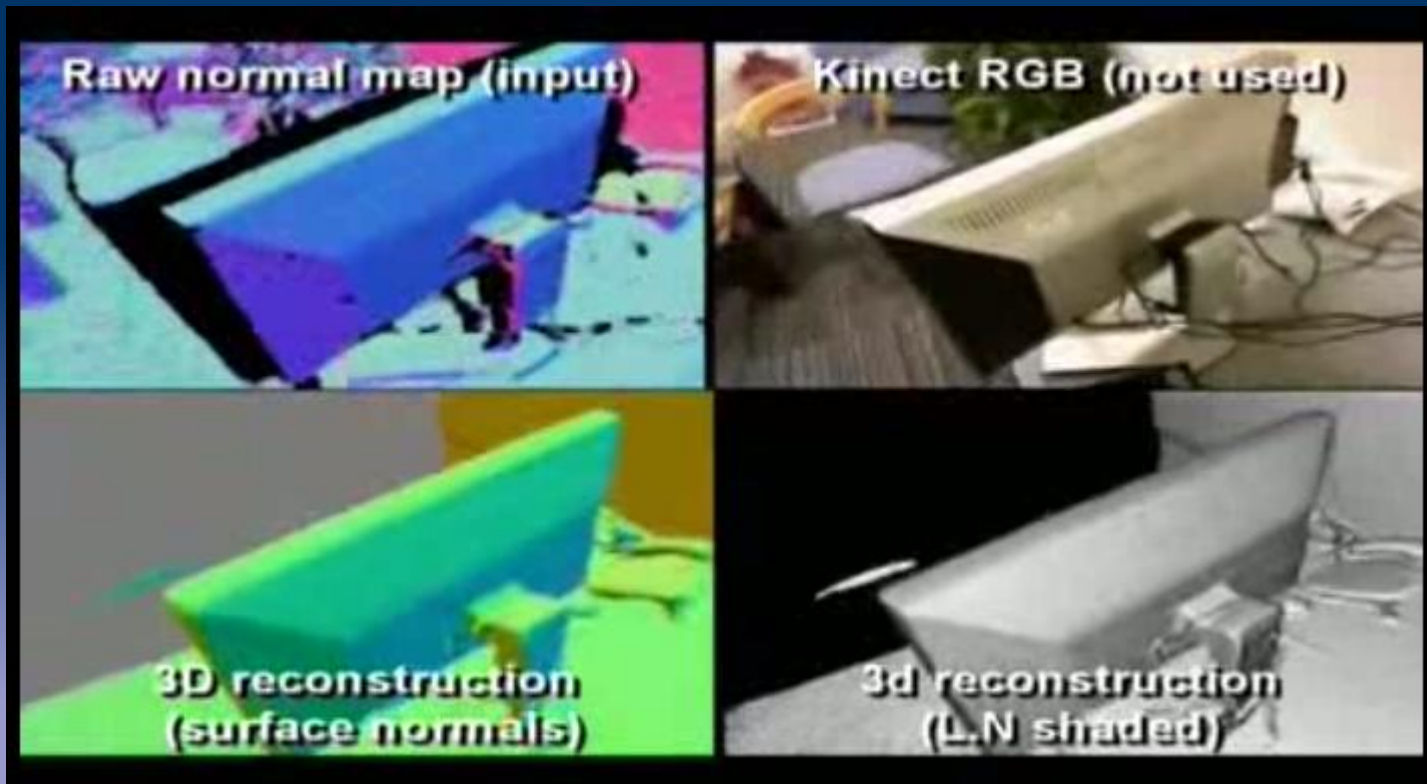
<http://www.youtube.com/watch?v=tLLschoMhuE>



Kinect 'Hacks'

Live 3D Reconstruction

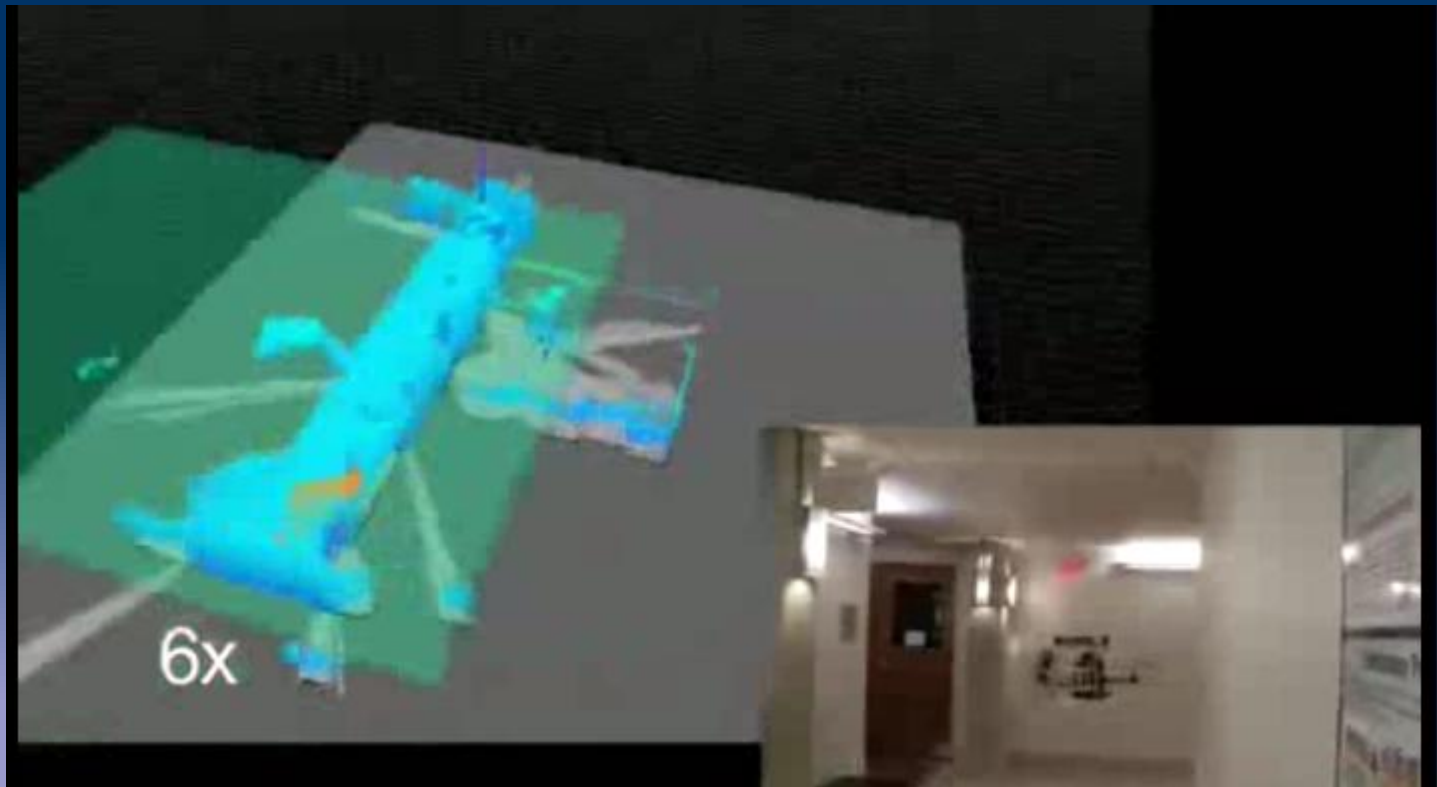
<http://www.youtube.com/watch?v=quGhaggn3cQ>



Kinect 'Hacks'

3D Indoor Exploration

<http://www.youtube.com/watch?v=cOeCZDBHrJs>



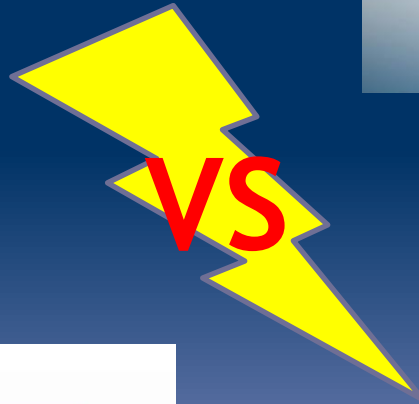
Kinect 'Hacks'

Fitting Room (www.fitnect.com)

<http://www.youtube.com/watch?v=1jbvnk1T4vQ>



Kinect Development



Kinect SDK
(June 2011)



Open Natural Interaction

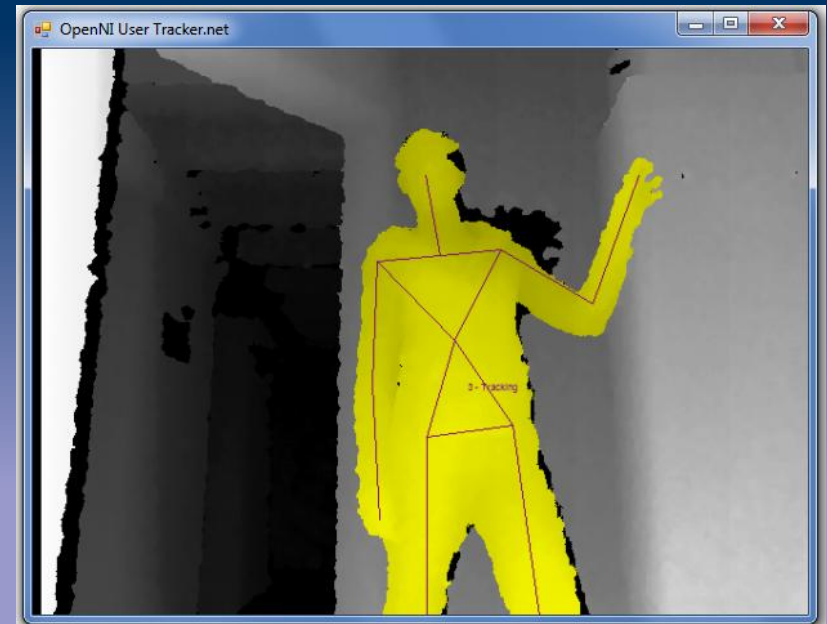
OpenNI vs Kinect SDK

- OpenNI
 - PrimeSense / ASUS
 - Open Source (LGPL)
 - Works on Windows, Linux, MacOS
 - Hand Tracking
 - Partial Skeleton Tracking
 - ...
- Kinect SDK
 - Microsoft
 - Research (Not commercial)
 - Audio
 - Motor (Tilt)
 - Easier Installation
 - ...

http://www.brekel.com/?page_id=671

Skeleton Tracking

- Enabled by Depth Image
- Core Technology behind Kinect
- Developed by PrimeSense
- Supported by OpenNI and Kinect SDK



UserTracker.net Sample

- Initialization

```
this.context = Context.CreateFromXmlFile(SAMPLE_XML_FILE, out
scriptNode);
this.depth = context.FindExistingNode(NodeType.Depth) as
DepthGenerator;
[...]
```

```
this.userGenerator = new UserGenerator(this.context);
this.skeletonCapability = this.userGenerator.SkeletonCapability;
[...]
```

```
this.userGenerator.StartGenerating();
```

UserTracker.net Sample

- Render Thread

```
while (this.shouldRun)
{
    try
    {
        this.context.WaitOneUpdateAll(this.depth);
    }
    catch (Exception)
    { }
    [...]
}
```

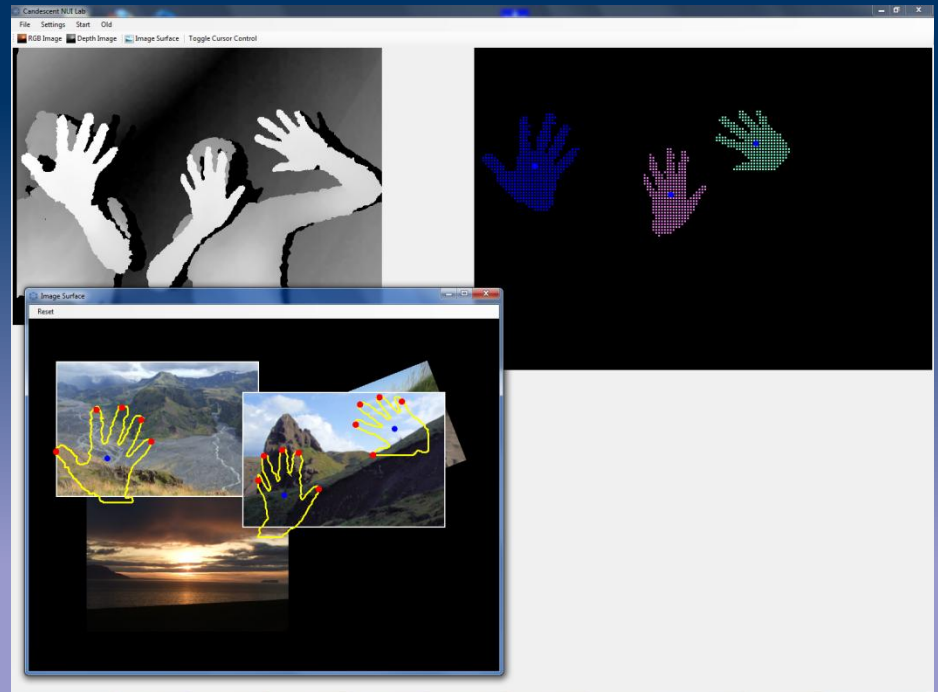
UserTracker.net Sample

- Joint Locations

```
SkeletonJointPosition pos =  
this.skeletonCapability.GetSkeletonJointPosition(user,  
SkeletonJoint.RightElbow);
```

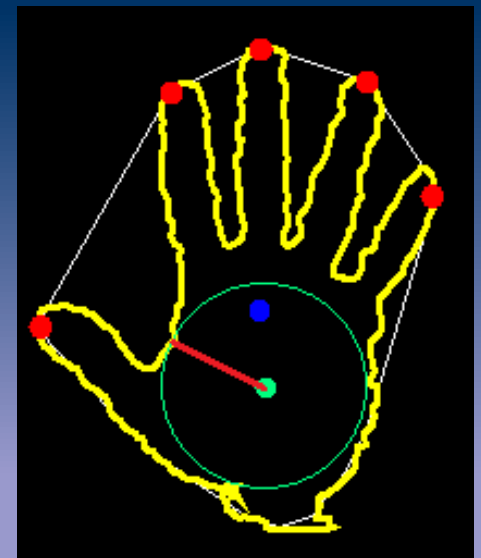
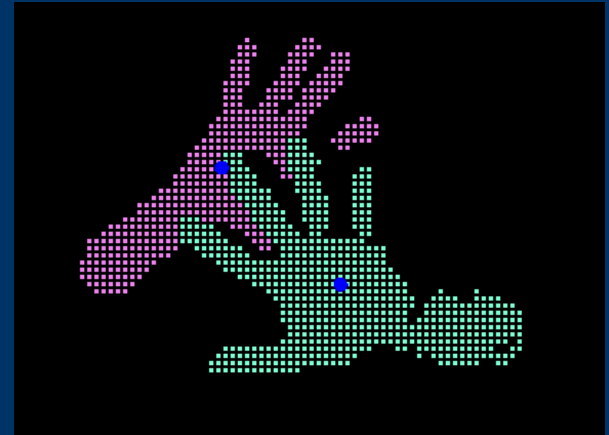
Hand & Finger Detection

- OpenNI Provides Hand Tracking
- But both OpenNI and Kinect SDK Lack Finger-Detection



Hand & Finger Detection

- K-Nearest Neighbor
- Convex Hull (Graham Scan)
- Contour Tracing
- Finger Detection
- Center of the Palm



Candescent NUI

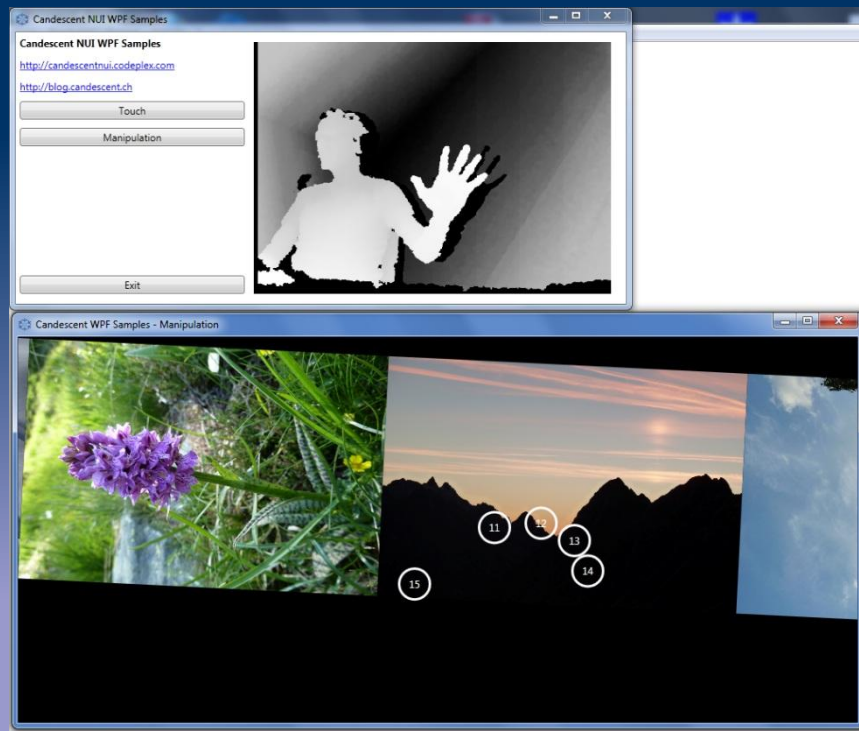
- Hand and Finger Detection
- <http://candescentnui.codeplex.com>
- Open Source (BSD License)
- Around 200 Downloads / Week (Source & Binary)

Demo: Start Menu



Demo: Image Manipulation

- First Version: WinForms
- Now: Multi-touch with WPF 4



Questions / Discussion

