Using Kinect to explore NUI

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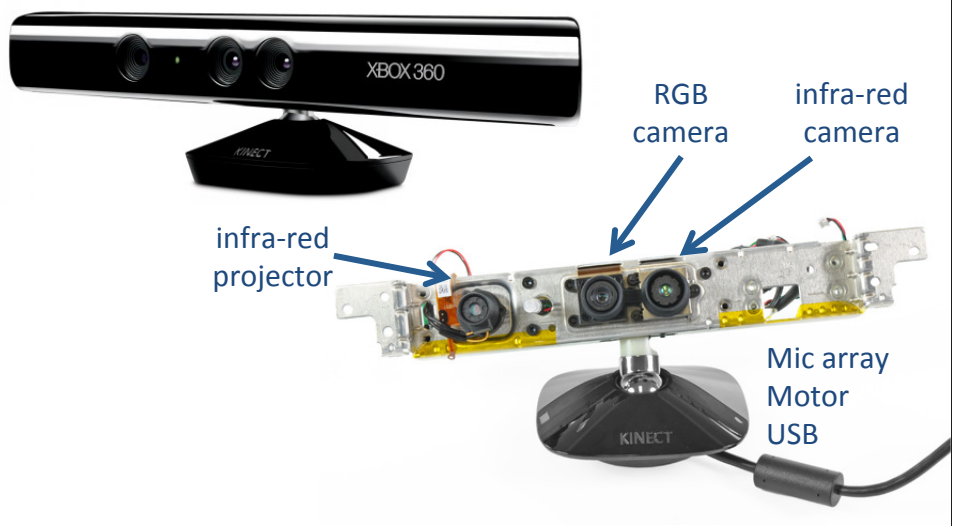
Microsoft Research

Beyond GUI

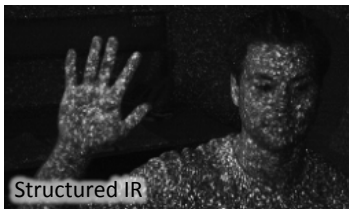
NUI--Natural User Interaction

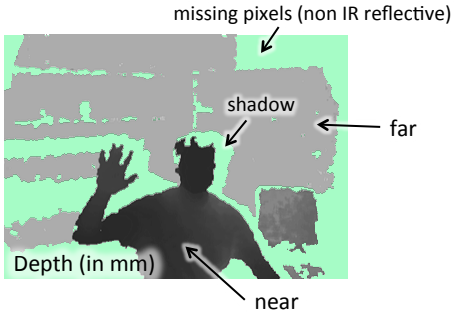
Kinect Sensor



Depth cameras

- Technology
  - structured IR light



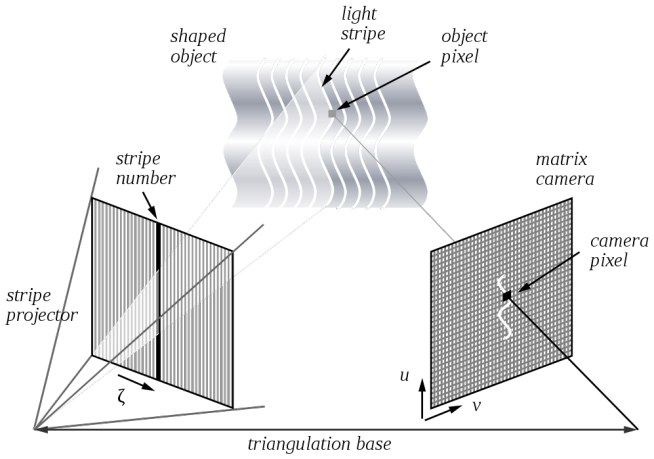


☑ cheap, fast, accurate

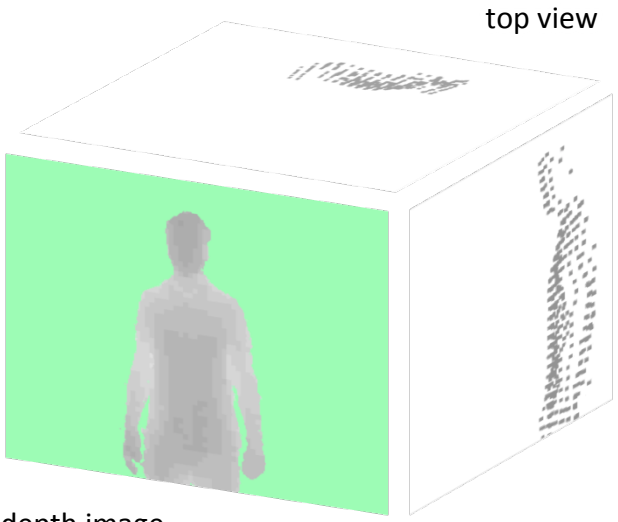
☒ missing pixels, shadows

How it works?

- **Structured light 3D scanner**



Depth cameras



RGB vs depth for pose estimation

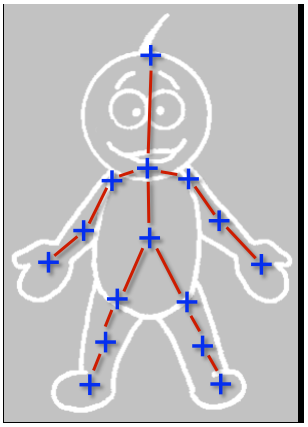
RGB	DEPTH
☒ Only works well lit	☑ Works in low light
☒ Background clutter	☑ Person 'pops' out from bg
☒ Scale unknown	☑ Scale known
☒ Clothing, skin colour	☑ Uniform texture
	☒ Shadows, missing pixels

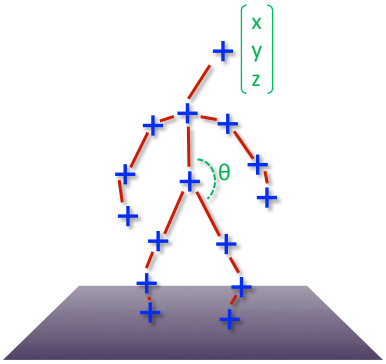
much easier with depth!

Jamie Shotton, Andrew Blake, Microsoft Research Cambridge, UK, Xbox Kinect Team

SKELETAL TRACKING

Human pose estimation



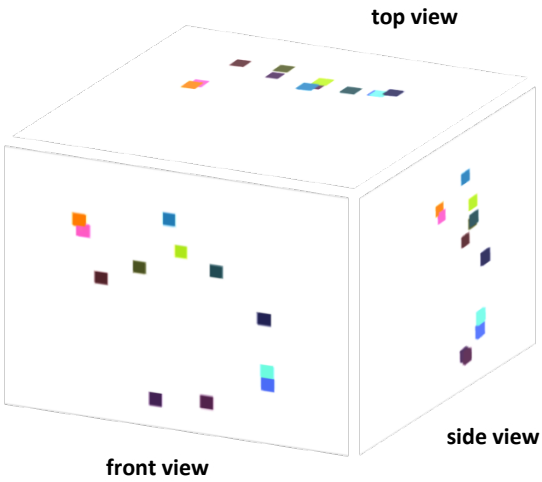


Kinect tracks 20 body joints in real time.

Skeletal Tracking

input depth image

inferred body parts & overlaid joint hypotheses



3D joint hypotheses

Kinect Games

Phil Chou, Niru Chandrasekaran, Qin Cai, Cha Zhang, Zhengyou Zhang

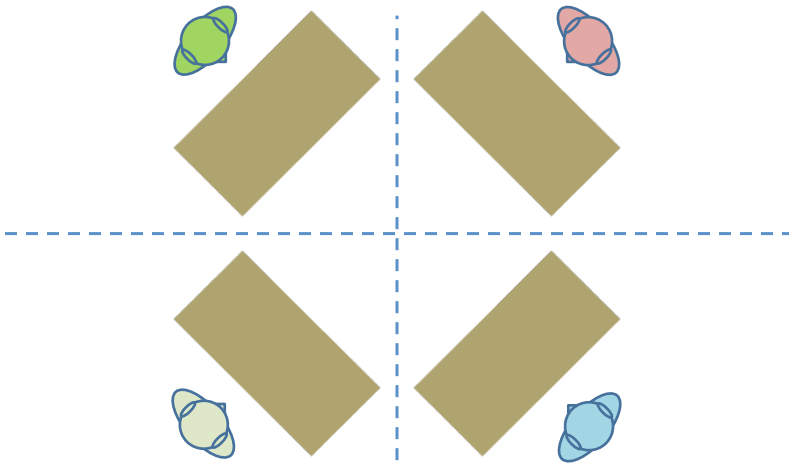
TELE-IMMERSION

Tele-immersion

- Geographically distributed participants feel like they are in the same room
- Tele-immersion experience
  - Life size
  - Mutual gaze
  - 3D
  - Motion parallax
  - Spatial audio

Virtual ("Matrix") approach

to fully distributed meetings



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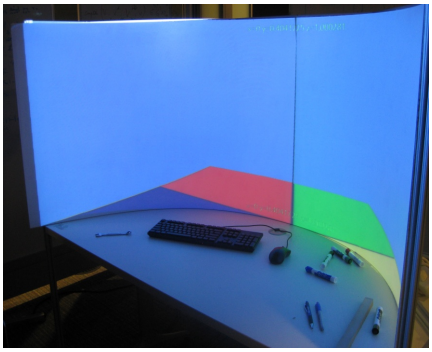
Tele-Immersion Booth



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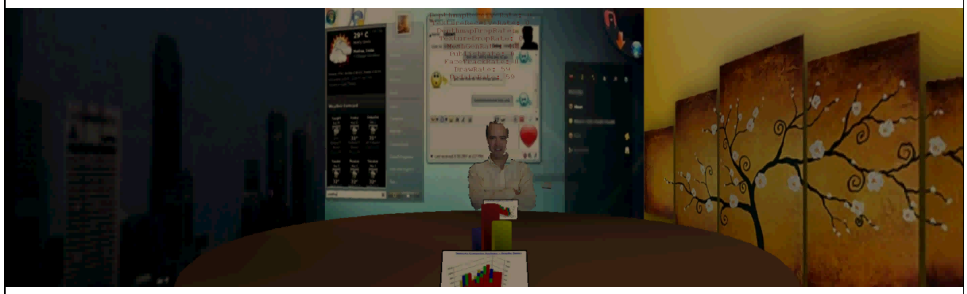
Tele-Immersion Booth video



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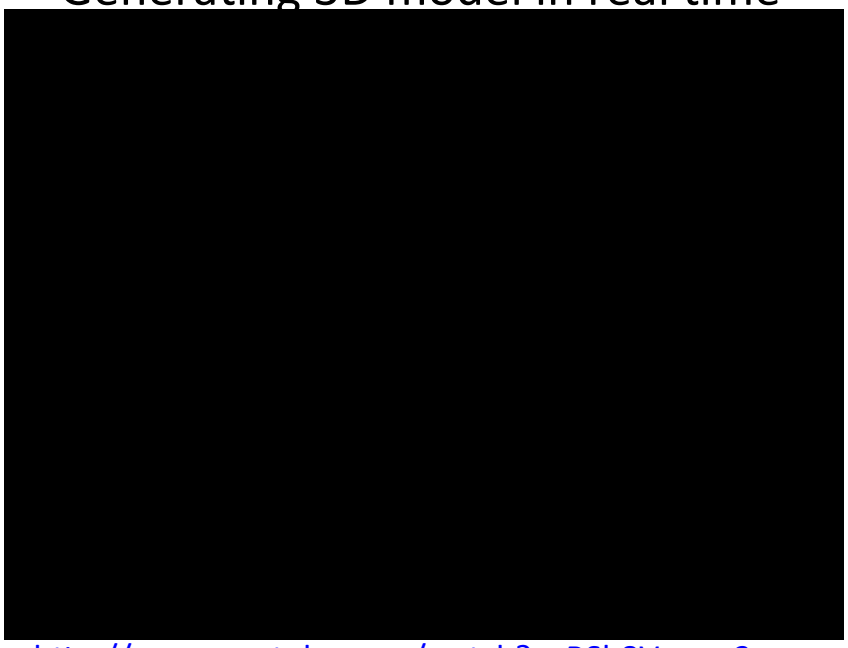
Avatar Kinect

http://www.youtube.com/watch?v=eBTredGLI4c 4:30

Shahram Izadi et al., MSR Cambridge, UK

KINECT FUSION

Generating 3D model in real time



- http://www.youtube.com/watch?v=RSh8Voanp3c 3:45

http://kinecthacks.net/ http://youtu.be/ho8KVOe_y08

Creating Shared Experiences

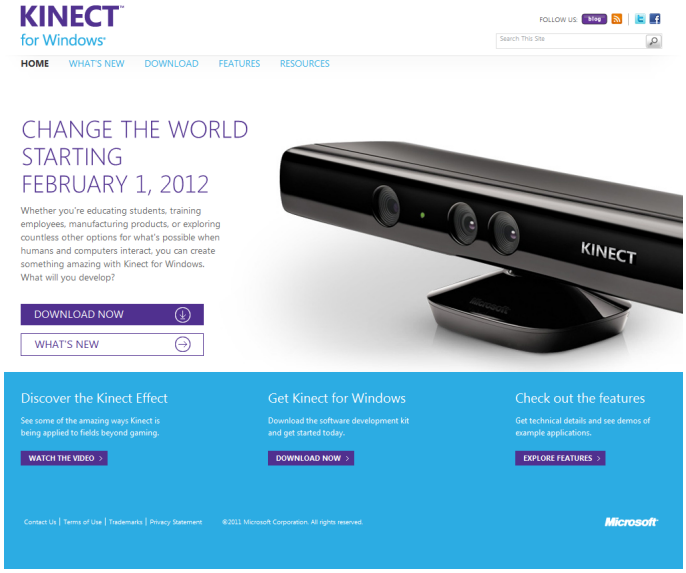
Kinect Fail

- http://youtu.be/Ux1FZpPKh20
- http://youtu.be/qafmCU4LUZ8

Kinect SDK for Windows

http://research.microsoft.com/en-us/collaboration/focus/nui/kinect-windows.aspx

Kinect for Windows



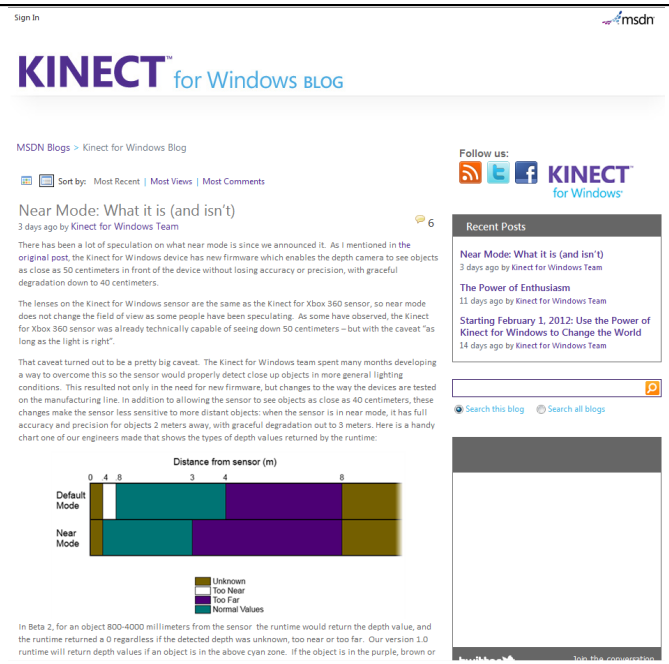
http://www.microsoft.com/en-us/kinectforwindows/

Kinect SDK

- Data streams
  - Color image
  - Depth
  - Player segmentation (up to 6)
- Skeletal tracking (up to 2)
- Audio (Microsoft Speech Platform)

Constraints

- Data analysis introduces lag
- 86cm to 4m range
- Not outdoors (too much IR noise)
- Not too close to other Kinects (interference)



http://blogs.msdn.com/b/kinectforwindows/

NUI—More than just Kinect

- Gestures
- Speech
- Environment/Context
- Mobility
- Activities (not just actions)
- Multiple devices (not just Kinect)
- People (often more than one)