

Next Generation Natural User Interface with Kinect

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The logo for GDC Next 2013. It features the text "GDC" in a large, bold, sans-serif font. The number "13" is enclosed within the letter "O". Below "GDC" is the word "NEXT" in a smaller, bold, sans-serif font. The background of the slide is a vibrant blue and cyan abstract design with glowing, perspective-oriented lines and various icons, including a computer monitor, a game controller, and a stylized eye.

GDC¹³
NEXT

NOVEMBER 5-7, 2013
EXPO DATES: NOV 5-6
LOS ANGELES, CA

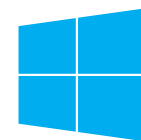
GDCNext.com



Key Takeaways

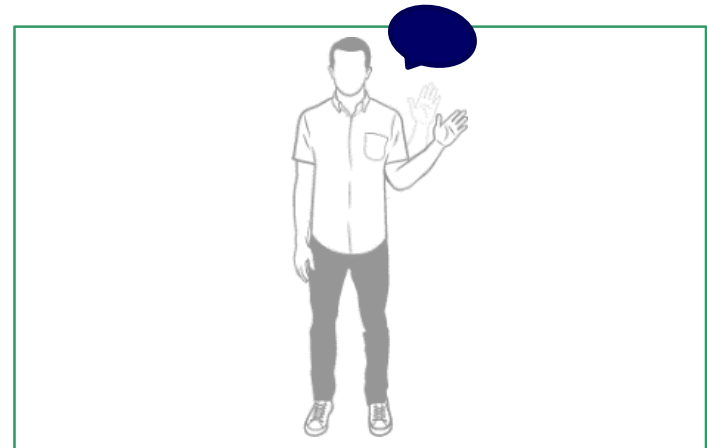
- Kinect has evolved:
 - Whether you did it -> How you did it
 - One or two people -> A room of six people
- Kinect opens up amazing opportunities for building richer and more engaging experiences
- New generation of Kinect available later this month on Xbox One and next year on Windows
- Get involved now: ID@Xbox and Kinect for Windows

Kinect is Evolving

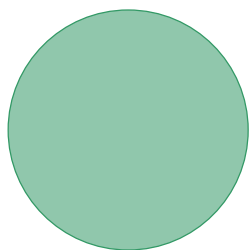


What is NUI?

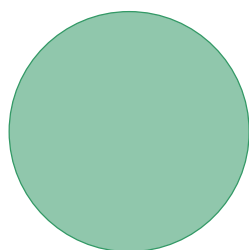
Natural User Interaction (NUI) is a completely new way to experience technology. It is a paradigm shift that allows us to go beyond only manual input to communicating with our technology in a more natural way.



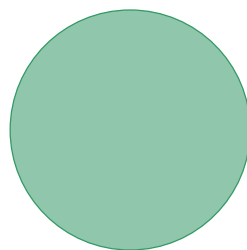
Multi-Modal



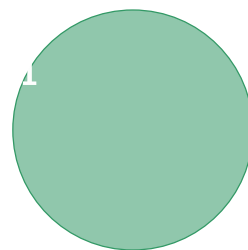
**KEYBOARD
+
MOUSE**



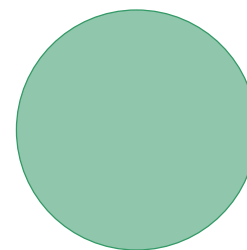
VISION



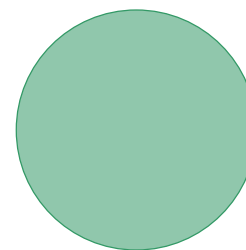
VOICE



GESTURE



TOUCH



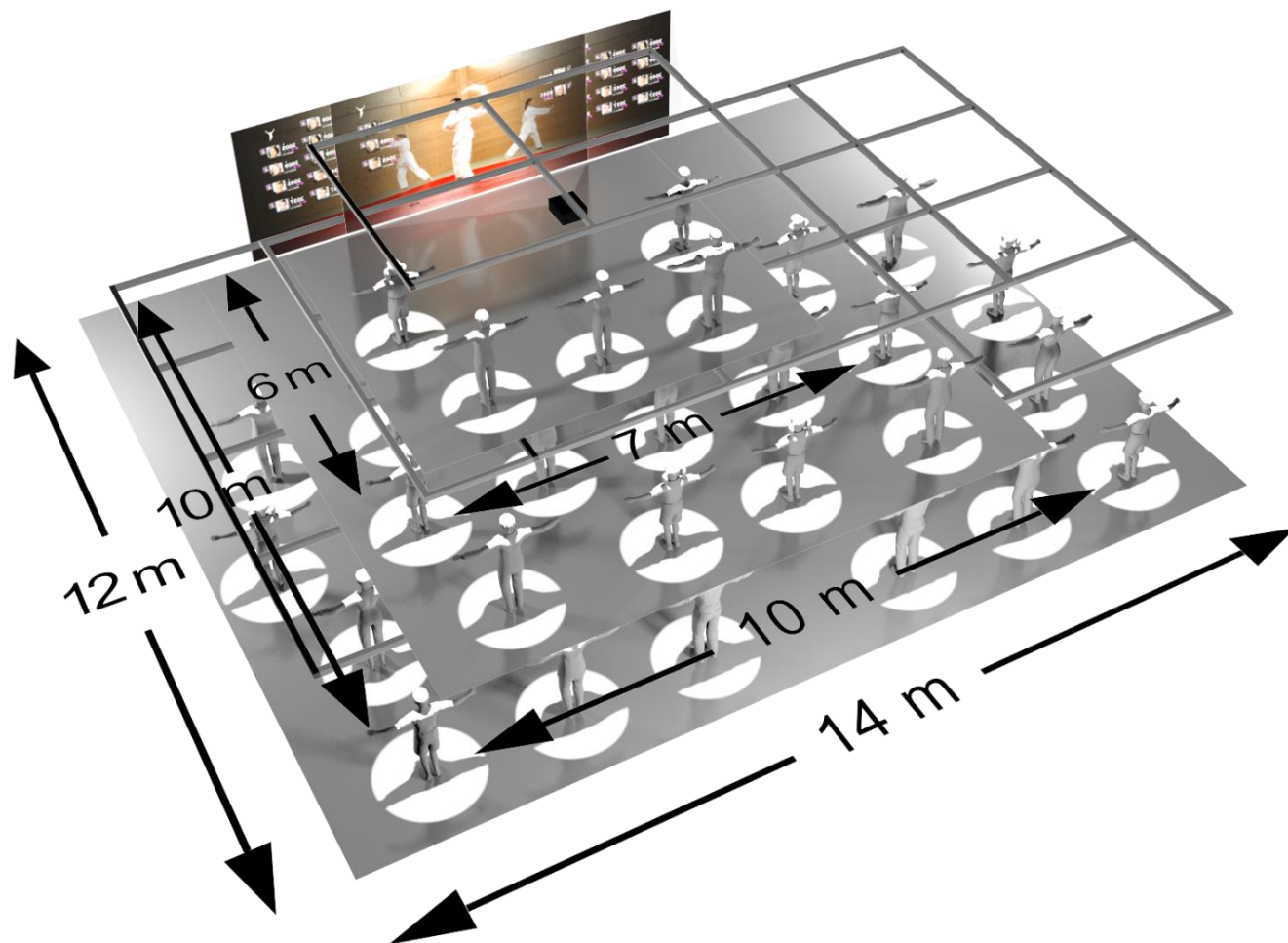
OTHER SENSORS

Playoke Dance

- Playoke is a dance game for professional fitness clubs -> players dance along to famous songs
- 4 to 36 players can be play at the same time
- The Kinect takes a picture of the player and places the image on the screen next to others
- The dance video has been “tagged” so the Kinect can see the correct dance positions
- Movements of the all the players tracked in real time, analyzed & compared with others



Playoke System Overview



Kinect for Windows 1.8 SDK

Kinect Fusion Color

Color pixels added for
new level of realism

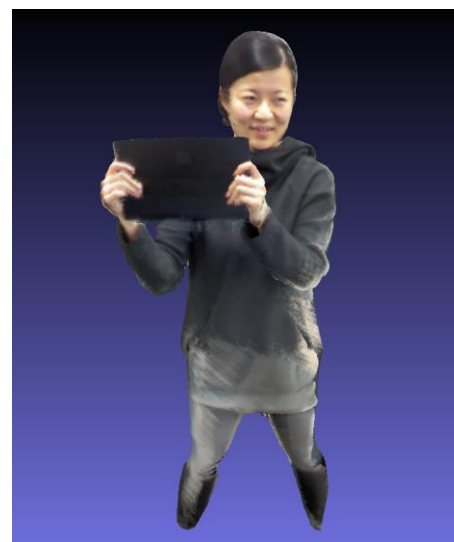
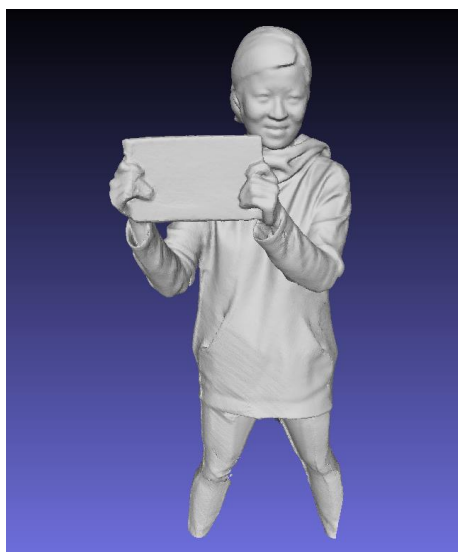
HTML5/JS App Model

Expanding access to
Kinect for web devs

Background Removal API

“Green Screen” without
the actual screen

Kinect Fusion



Demo

Kinect Fusion Color

Photobombr

Kinect Common Bridge

- Dead-simple Kinect integration into 3rd party libraries and graphics frameworks from MS Open Tech
- Collab with Cinder & openFrameworks communities: native OF add-on and Cinder block available now
- Apache 2.0 license



Microsoft
Open Technologies



<http://aka.ms/KinectCommonBridgeBlog>

Demo: Kinect Common Bridge

Fireflies (openFrameworks)

Particle Man (Cinder)

A Platform That Fully Understands the People in the Room

Who they are

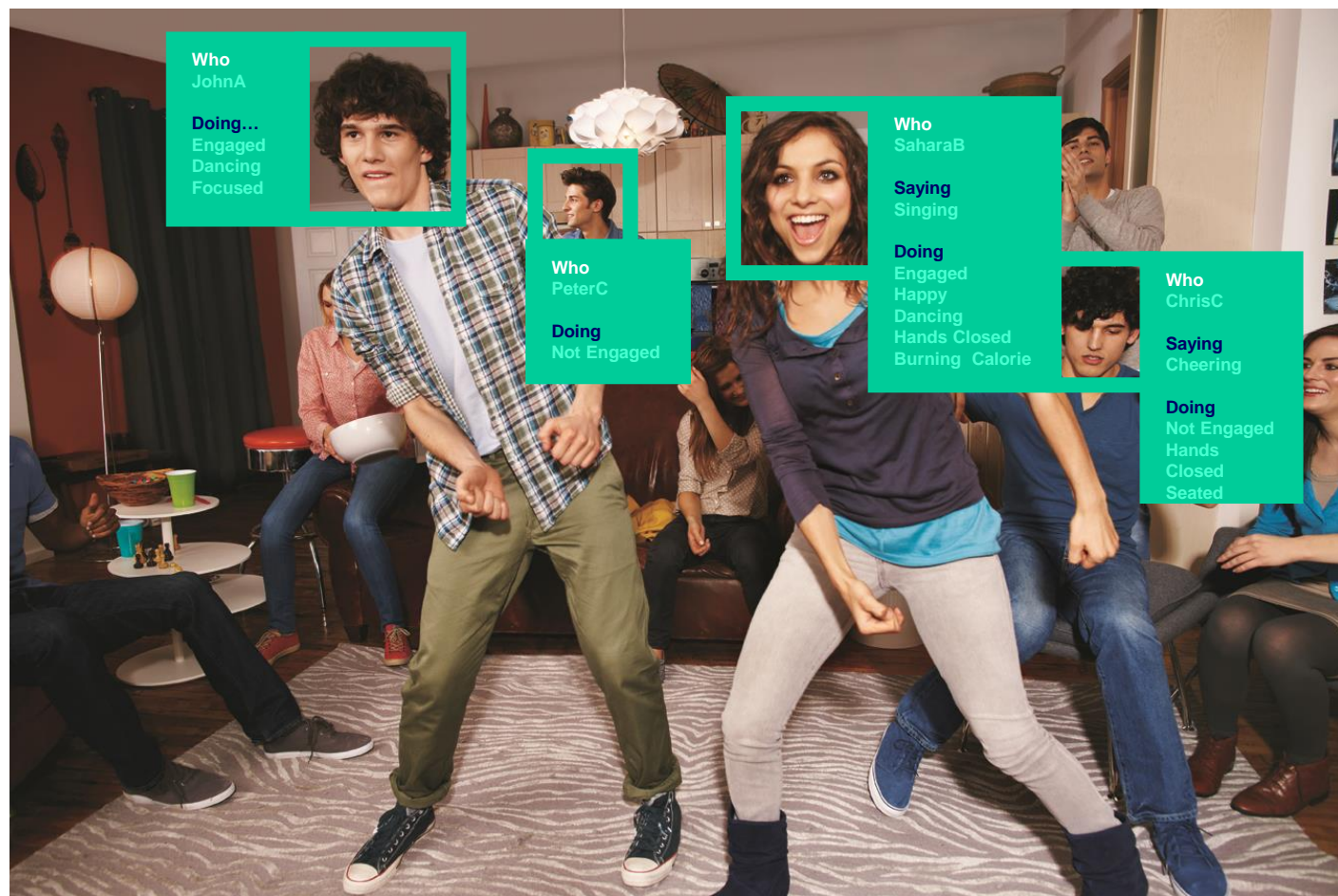
- Identity

What they are saying

- Speech

What they are doing

- Face Tracking
- Engagement
- Skeleton tracking
- Interactions
- Hands states
- Expression
- Controller Pairing
- Video



NUI Platform

Experiences



Xbox One

Windows

Software



Hand State

Expression

HD Face
Tracking

Interactions

Skeletal Tracking

Identity

Speech

Video &
Registration

Controller
Pairing

NUI Service, Runtime & APIs

Hardware

Sound

Improved Fidelity

Depth

Improved Fidelity
Improved MOS (×2)

Active IR

Improved Fidelity
Lighting Independent

Color

HD 1080p Color

Sensor Capabilities

- **Wider field of view** (horizontally and vertically) for depth and color
- **3x depth fidelity**
- **1080p, HD color** camera (30fps)
- **Lighting independent, Active IR** (30 fps)
- **Improved microphone array** (zero balanced)
- **Improved range** of high quality operation .5M near, 4.5M far



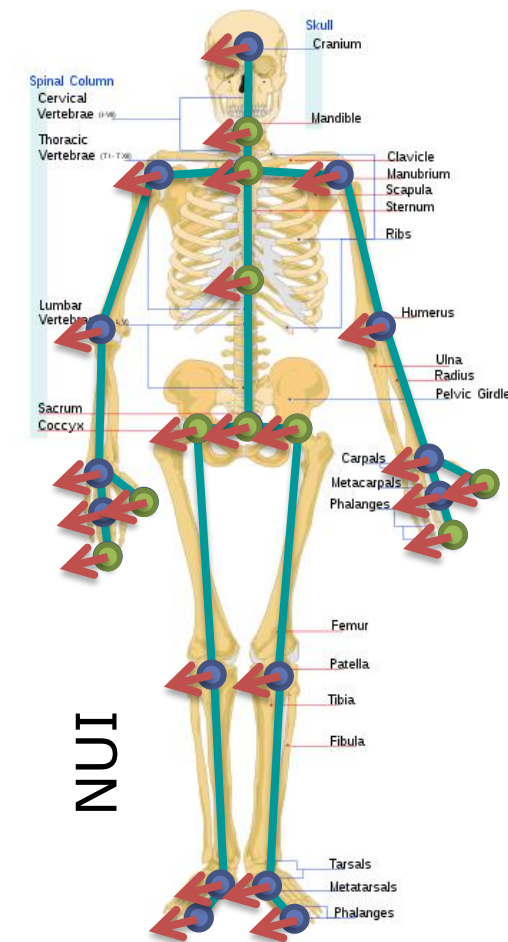
Demo

Augmented Reality

NUI Evolution

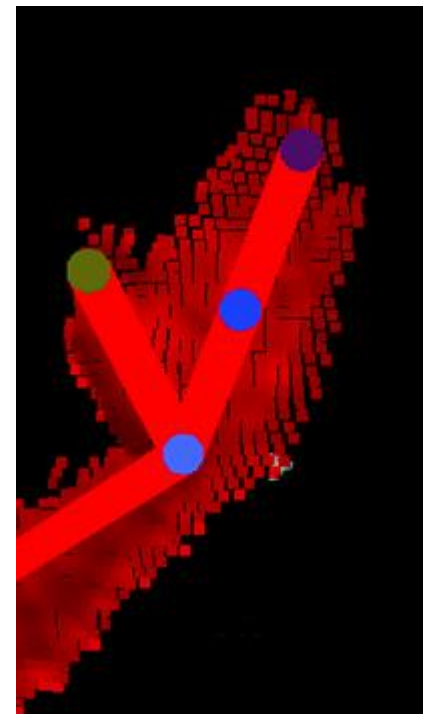
Skeletal Tracking Features

- Improved reliability and accuracy
 - More reliable lock-on and more stable joints
- More anatomically correct skeleton
 - Hips in the right place, new shoulder parent
- Six players tracked at all times
 - Simplified engagement, bystander involvement
- Hand-tip and thumb joints
 - Enables subtle and more nuanced hand gestures
- Per-joint orientation
 - Great for character retargeting



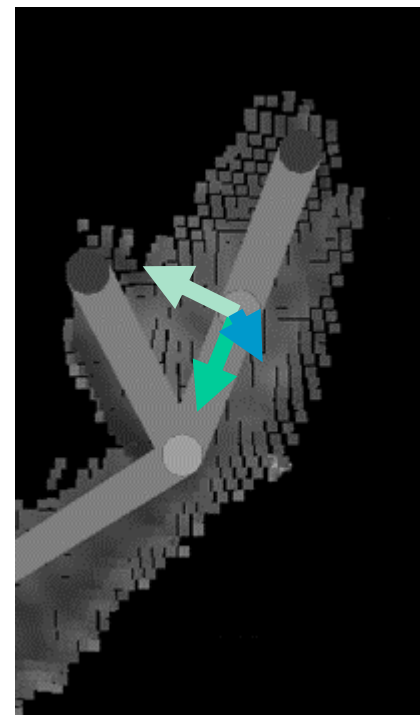
Hand Tips & Thumbs

- High-precision 3D point
 - Hand tip has high precision, good for subtle motion
- Analog open/close
 - Use hand length to get analog detail in between open/close hand states
- Wrist flick gestures
 - Swiping, shooting, whipping, slapping, throwing
- New interactions
 - Thumb in/out as button press, pinch gestures



Joint Orientation

- Yaw, pitch, and roll for each joint
 - Generated primarily from skeletal-position data
 - Roll is smartly derived when possible (for example, arms use thumbs)
- Exposed as quaternions in the body frame
 - Each is the absolute orientation of the parent bone
 - Basis for each joint is defined by:
 - Bone direction (Y) - always matches skeleton
 - Normal (Z) - joint roll, perpendicular to the bone
 - Binormal (X) - perpendicular to bone and normal



Hand-State Features

- Real-time classification of open, closed, and lasso
 - Combine with motion for brand-new interactions!
- Improved quality
 - Much less “flicker” when palms are facing the sensor
 - Better with long sleeves, arms extended, hands rotated
- Visual Gesture Builder (VGB) integration
 - Add new states and improve reliability of hard poses



Xbox One Interaction Paradigm

Common → Build Menu Navigation

- *NEW* APIs enables you to easily gesture enable your UI
- For menuing and some gameplay
- Consistent interaction with Xbox One System and other games
- Benefit from Xbox One usability tests
- Lowers your cost of developing basic interactions for your game menus
- Navigation and manipulation: targeting, selection, press & scroll

Custom → Build Unique Game experience

- Game experience and gestures : throw ball, golf swing, dance,...
- Use updated Visual Gesture Builder to build unique and fun gestures

Xbox One Interaction Language + System



Engagement

Targeting/
Pressing

Scrolling/
Zooming

Reusable Building Blocks

cheaper to build menus/navigation, even with custom look

Consistent User Experience

your game and rest of Xbox One

Engagement

Xbox 360

- Wave to engage



Xbox One

- Look towards screen
- Put hand in PhiZ
- Open palm toward screen

Improvements

- Smaller, but deliberate, barrier to interaction

Targeting & Pressing

Xbox 360

- Hold and wait to press



Xbox One

- Press arm towards button, then release
- As you progress with pressing, cursor attracts towards button center

Improvements

- More deliberate interaction

Scrolling & Zooming

Xbox 360

- Swipe left/right
- No zooming



Xbox One

- Grip hand over scrollable area to start
- Move left/right up/down
- Release hand-grip to stop

Improvements

- More user control over scrolling
- Not just page-left/page-right anymore

Demo

Interactions

Building Custom Gestures

Rinse and
repeat

VgbView

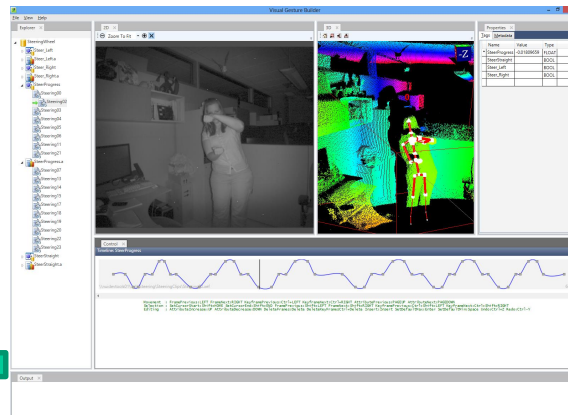
NUIView [Record]
XSConvert [Convert]

Record example gestures using
Xbox Studio and **Convert**

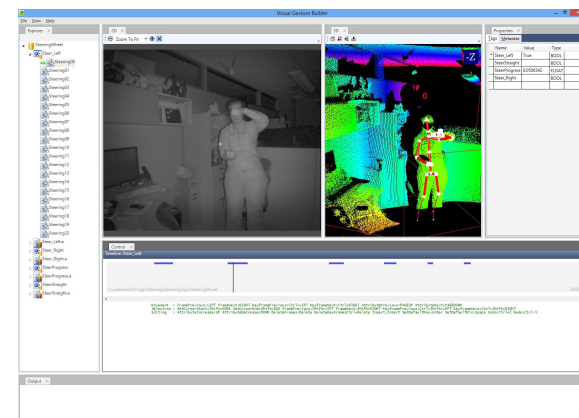
Preview gestures on Xbox
devkit

Your Game

- DiscreteGestureResults
- ContinuousGestureResults

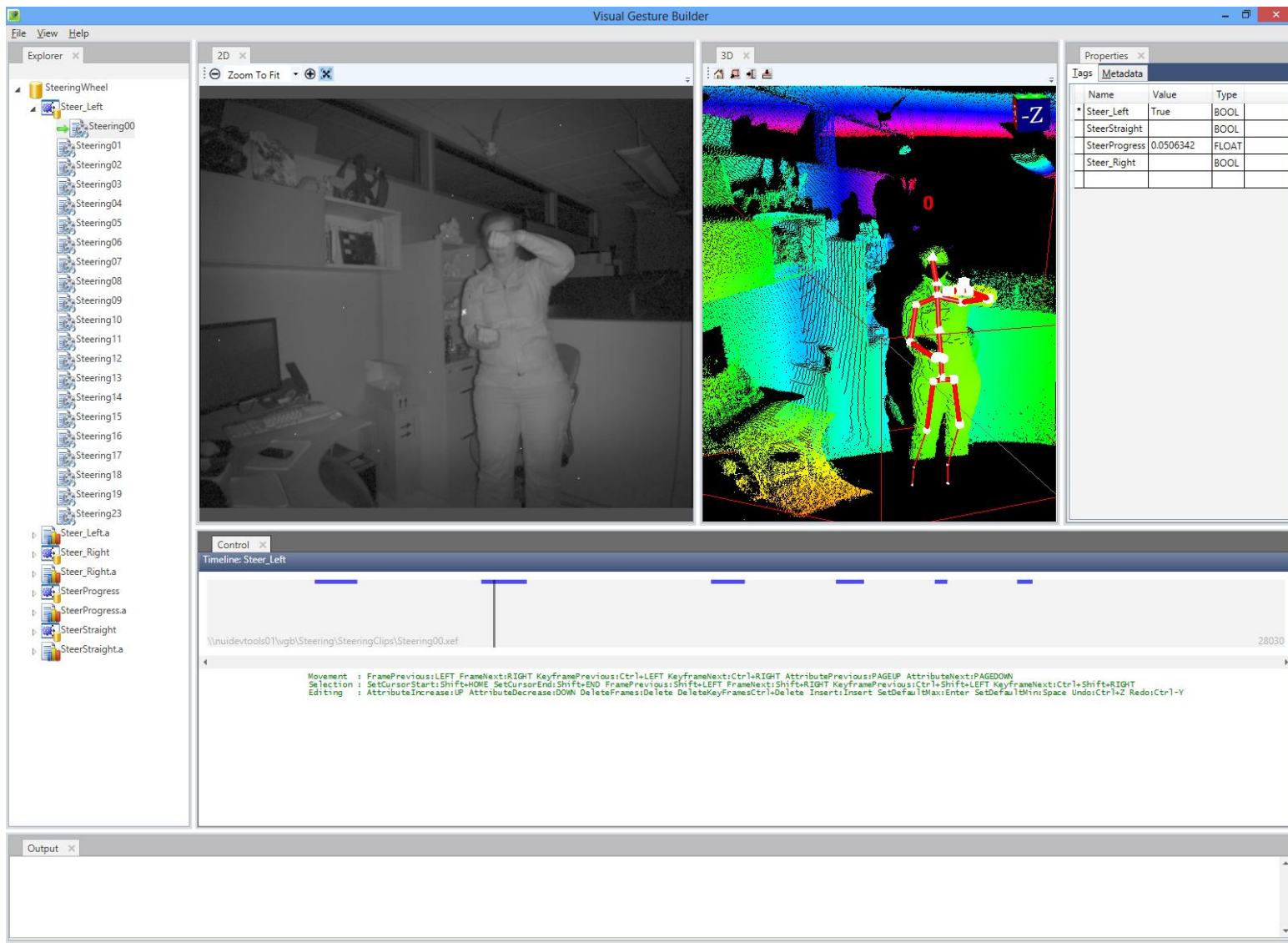


Build and analyze
gestures using VGB

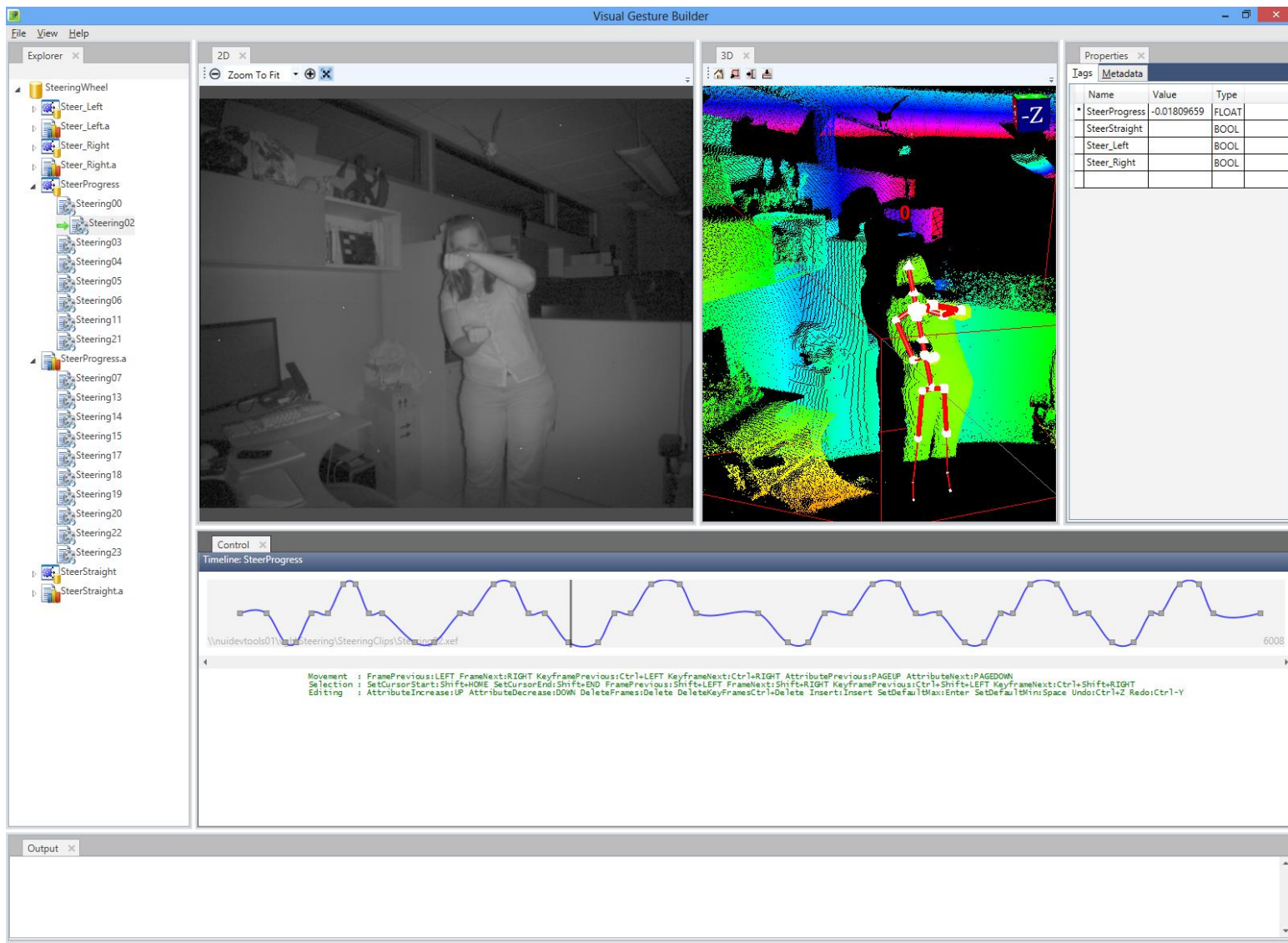


Tag gestures using VGB

Visual Gesture Builder



Visual Gesture Builder



Demo

VGB View

Steering Demo

Getting Involved

ID@Xbox
Independent Developers
Publishing Program
for Xbox One



<http://www.xbox.com/id>

KINECT for Windows | Dev Center

Resources

Community

Kinect Home



Announcing 1.8 SDK! Click here to learn more and download this release.



<http://aka.ms/k4wdev>

Introducing: ID@Xbox

- <http://www.xbox.com/id>
- ID@Xbox == Independent Developers Publishing Program on Xbox One
- Enables teams of all sizes to bring new and exciting content to Xbox One
- Initial focus on developers in Xbox One regions -> longer term any retail Xbox One will be able to be used as a developer kit

Kinect for Windows

- <http://aka.ms/k4wdev>
- Download 1.8 SDK & toolkit now
- Build apps for Windows 7/8.1 (desktop) using C++, C#/VB, HTML5/JS
- Shipping pre-release v2 sensors to select developers this month (RTM in 2014)

In Closing

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