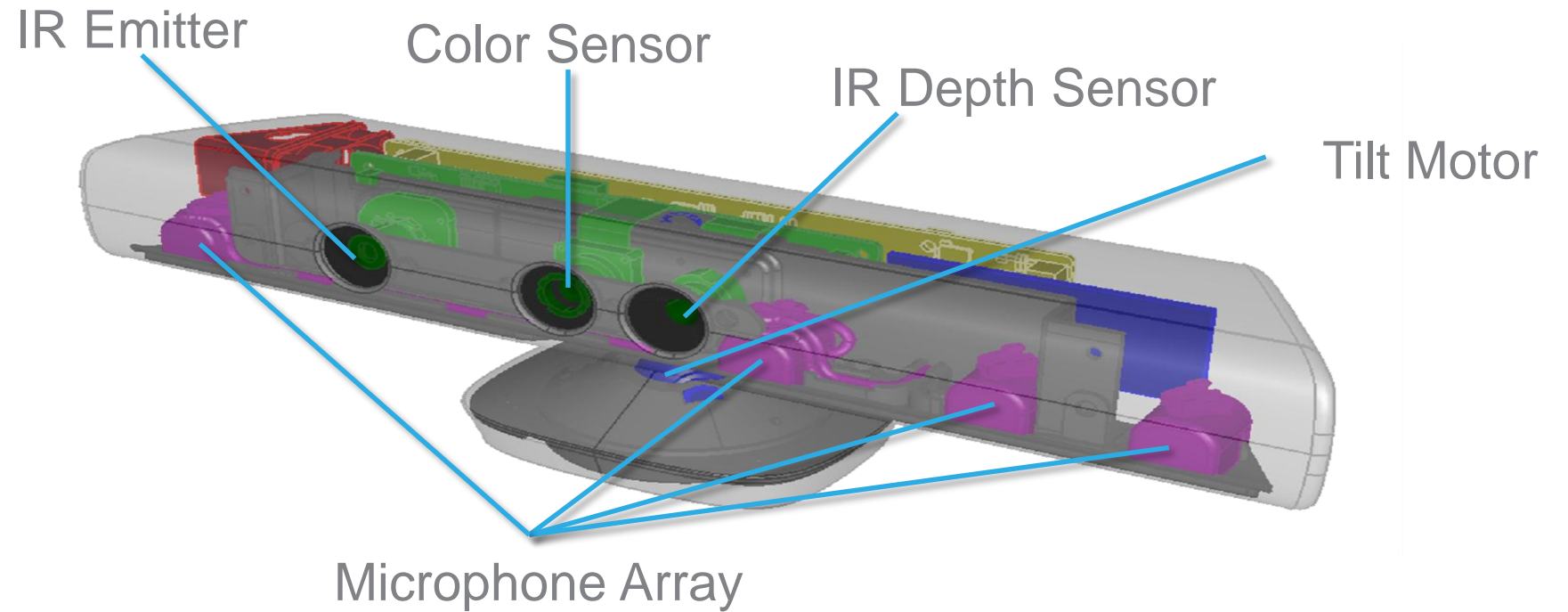


Kinect



Sensors and Components



Inside



Vision Sensors



IR Pattern



Depth Map



Camera Basics

Image Processing 101

BGR32 Format – Every Pixel (0,0 | 0,1 | 0,2) has blue, green, red, empty

B	G	R	Empty	B	G	R	Empty
255	255	255	0	255	255	255	0

Kinect Image

Sizes: 80x60, 320x240, 640x480

DPI: 96

Stride: # of bytes per single line:

Width (320 or 640) x 4 bytes (B,G,R,E)



Depth Data

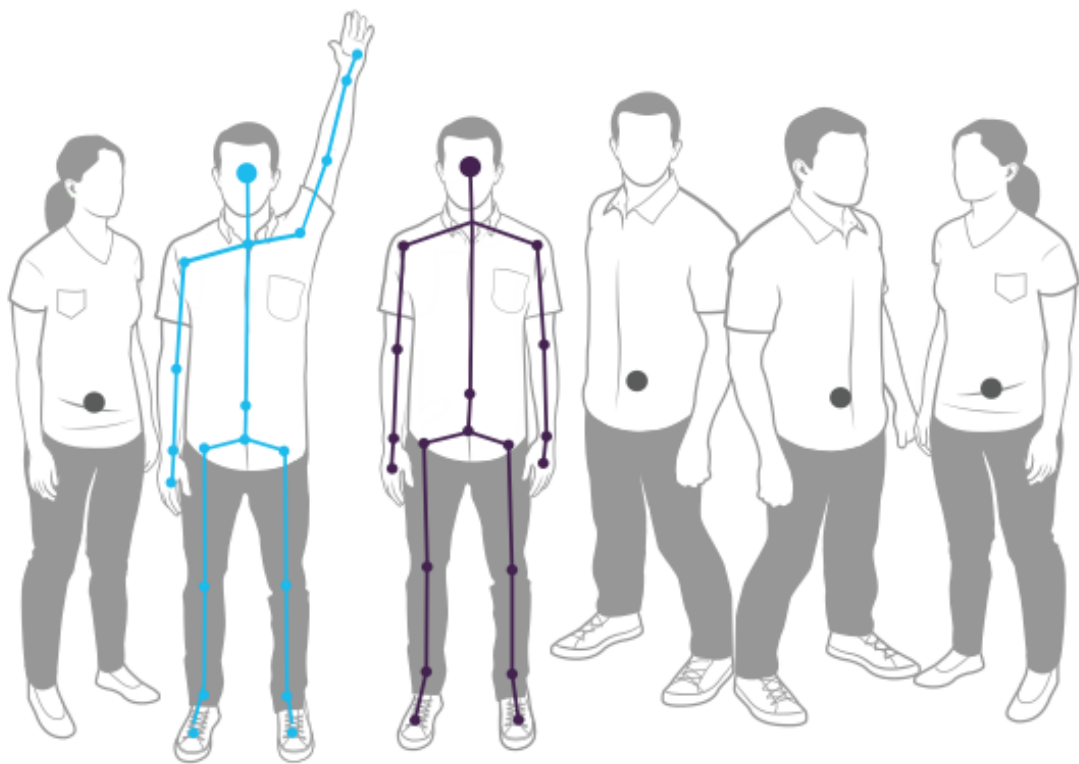
Distance and player index for every pixel

Distance is in millimeters (2,000 mm = 6.56 feet)

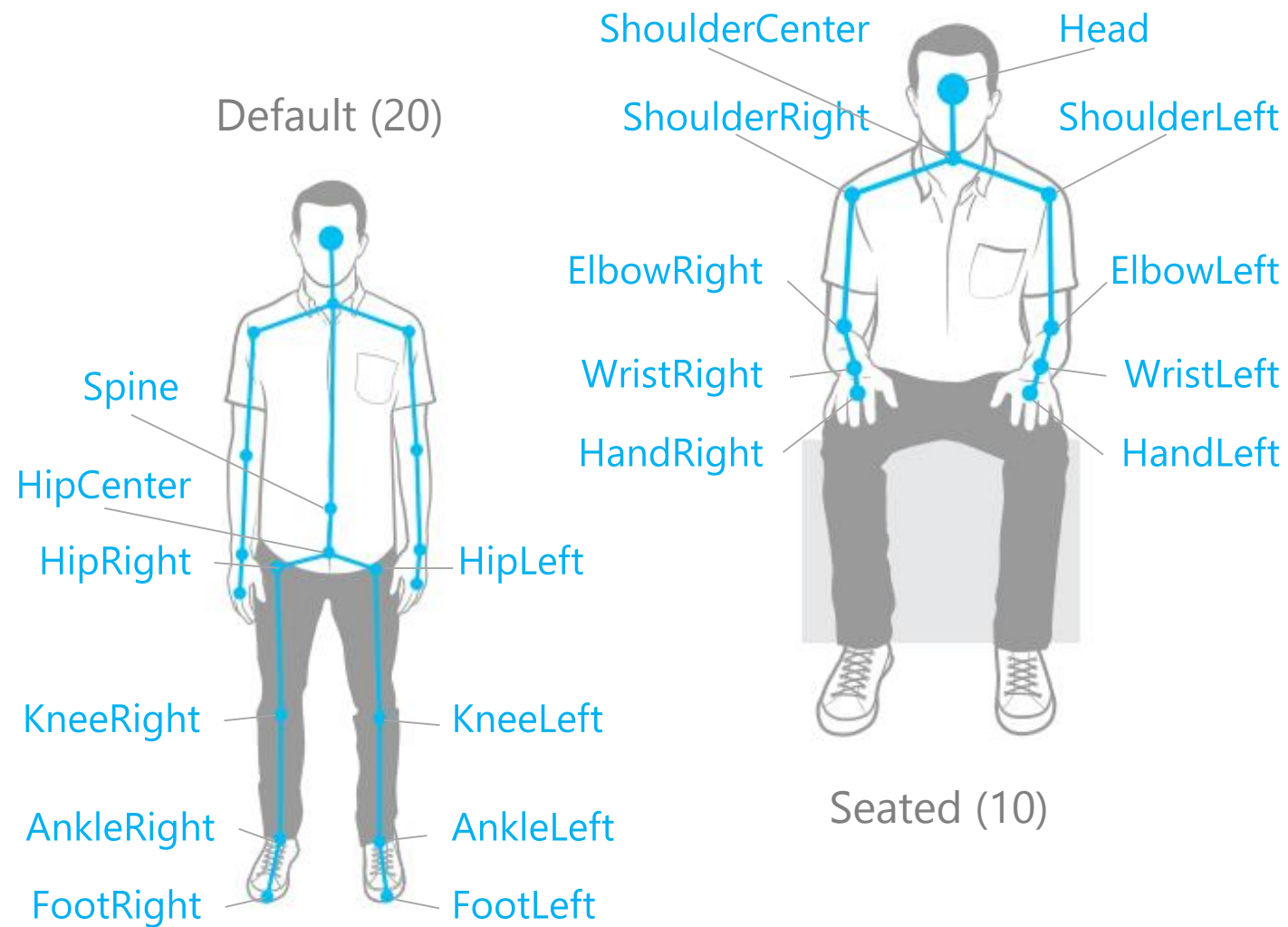
Player index 1-6 or 0 for no player

Skeletal Tracking

Skeletal Tracking

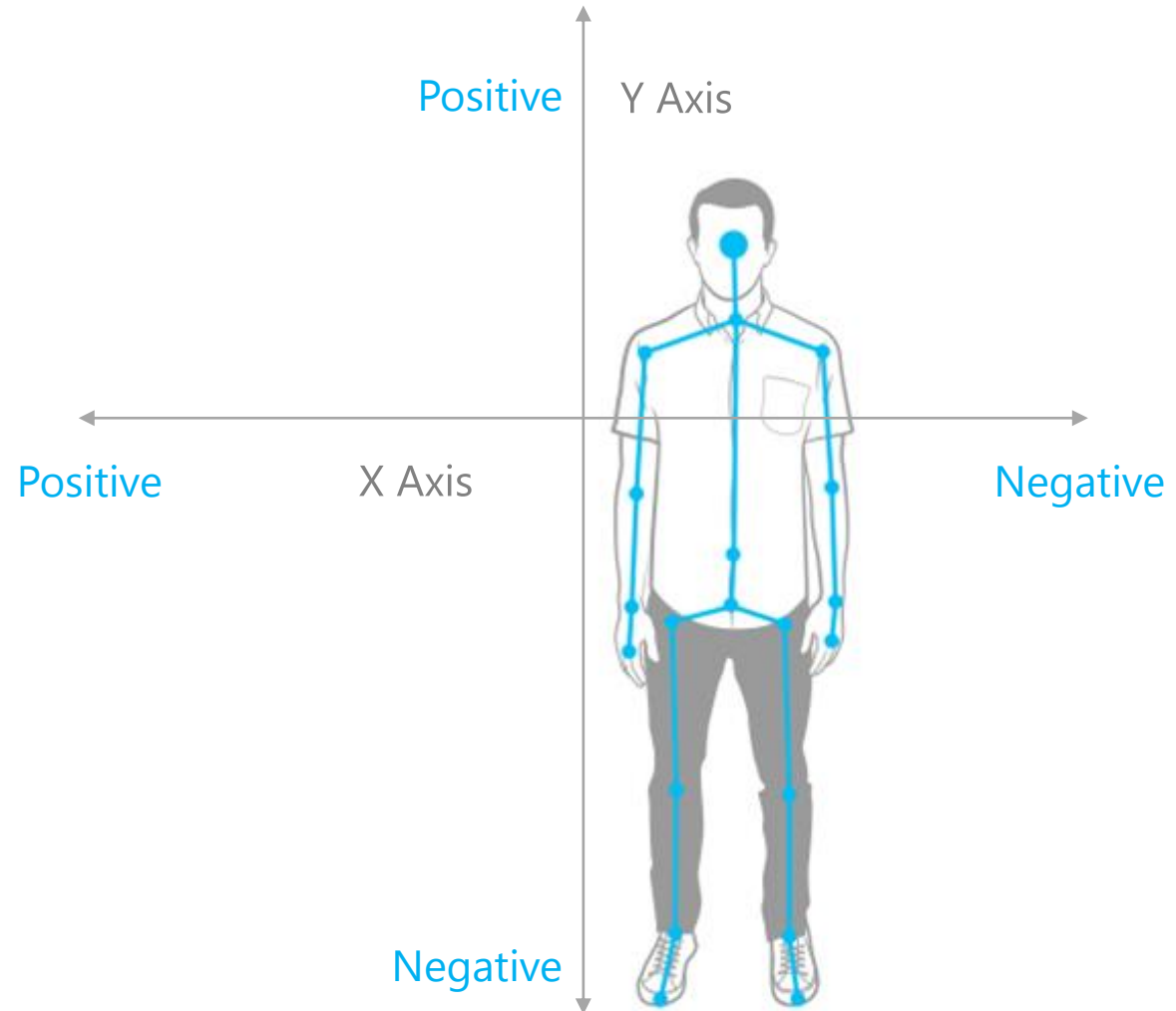
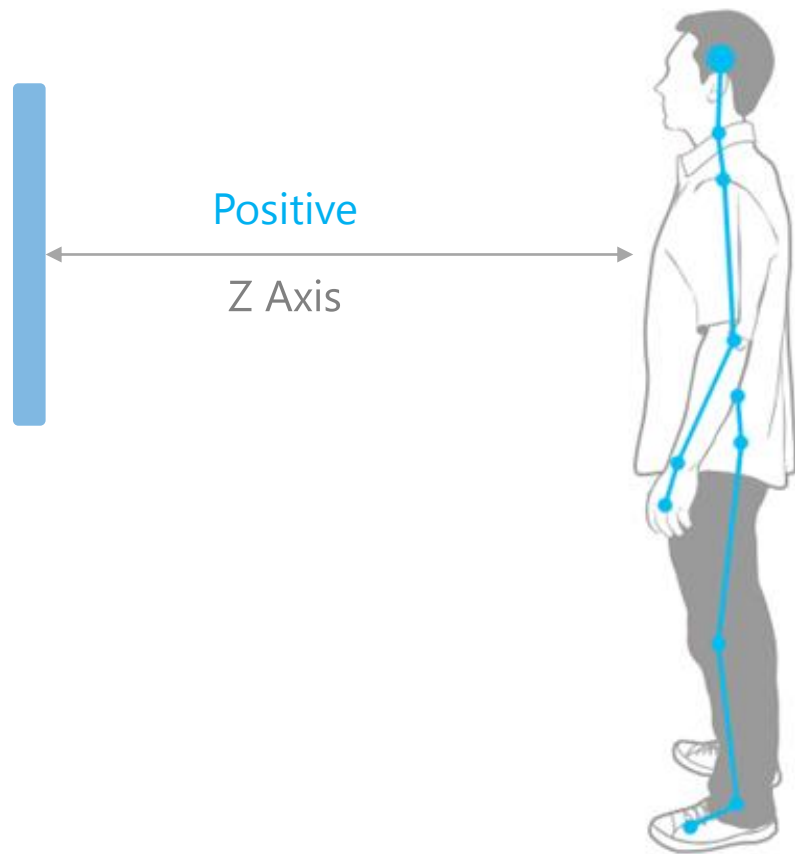


Max of two skeletons per Kinect
6 Player Proposals

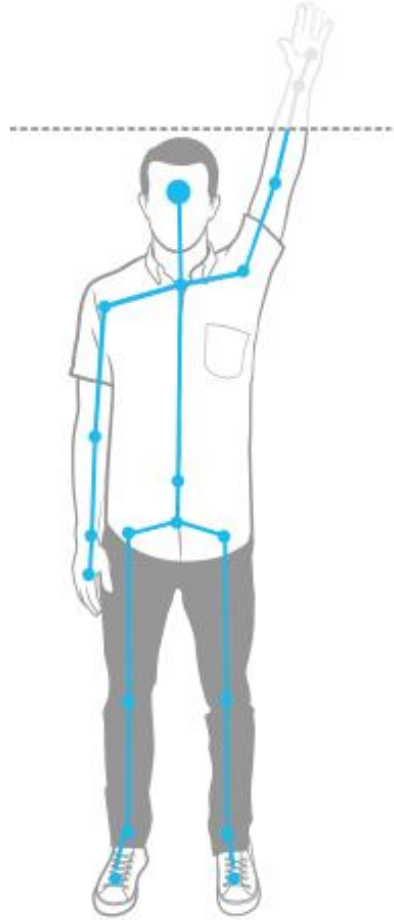


Coordinates

Joints in meters from camera



Joint Tracking & Smoothing

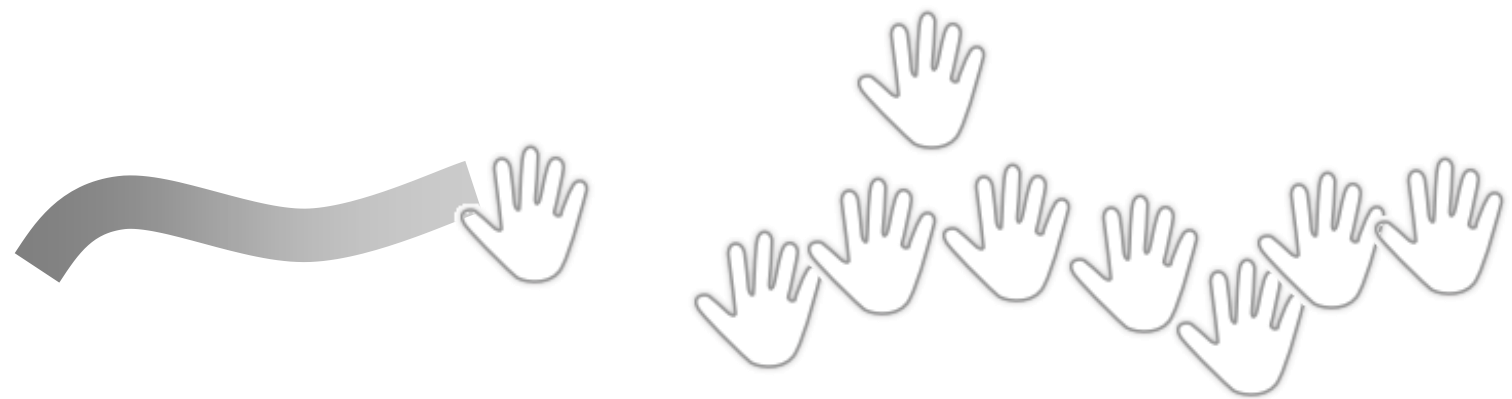


Each joint has associated tracking state

Tracked, Not tracked, or Inferred

Inferred - Occluded, clipped, or low confidence joints

Use **TransformSmoothParameters** to smooth joint data to reduce jitter



```
Skeleton.ClippedEdges = FrameEdges.Top;
```

Kinect transform smoothing uses Holt Double Exponential Smoothing - <http://en.wikipedia.org/wiki/Holt-Winters>

Kinect Explorer Demo









Gestures & Interaction

Gesture Controls

Define Kinect controls in KinectRegion

KinectItems Control, KinectTileButton, KinectCircleButton, KinectScrollViewer

Automatically get cursor, grip, and scroll support

Standard cursor and feedback graphics					
					
Default targeting state	Targeting over something that is actionable (grip or press)	Progress indication (color fills hand as the user presses further)	Fully pressed state	Gripped hand detected	Right hand vs. left hand cursors

Gestures Demo



Face Tracking

Face Tracking

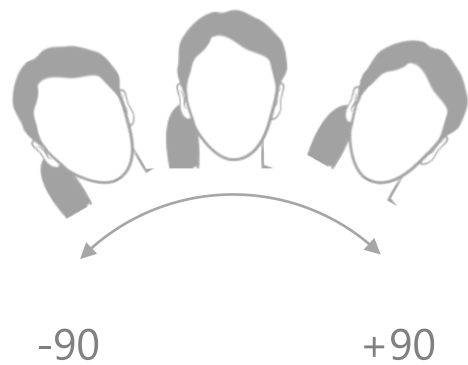
2D/3D Mesh and Points

3D Head Pose

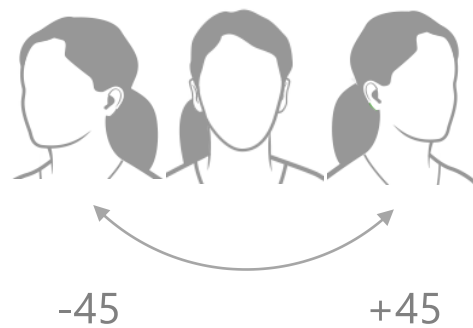
Animation Units



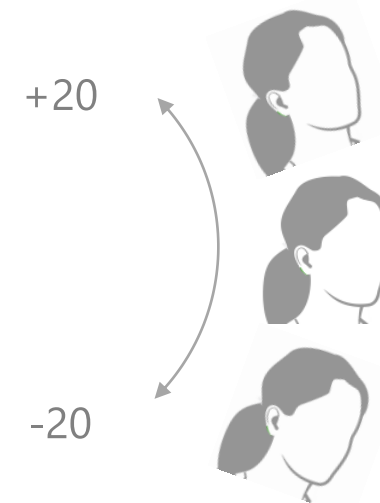
3D Head Pose



Roll



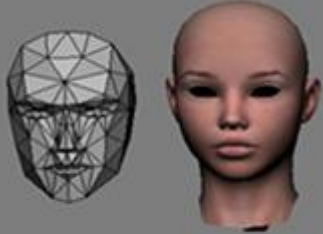
Yaw



Pitch

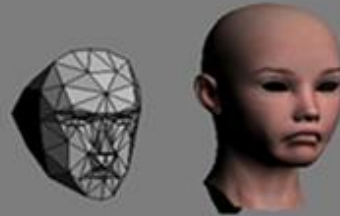
Animation Units

Upper Lip Raiser



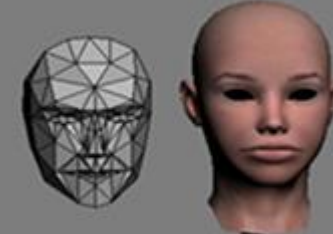
- 1 Max pushed down lip
- +1 Showing teeth fully

Lip Corner Depressor



- 1 Very happy smile
- +1 Very sad frown

Lip Stretcher



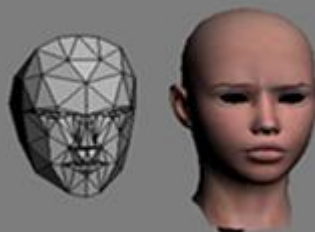
- 1 Fully rounded (kissing mouth)
- +1 Fully stretched (joker's smile)

Jaw Lowerer



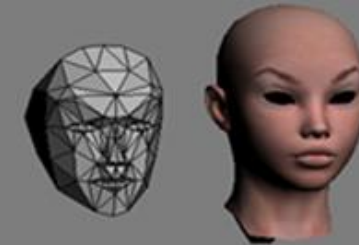
- 1 Closed
- +1 Fully open

Brow Lowerer



- 1 Raised almost all the way
- +1 Fully Lowered

Outer Brow Raiser



- 1 fully lowered, very sad face
- +1 raised in expression of deep surprise

Face Tracking Demo



New Kinect for Windows Sensor & SDK

New Active Infrared (IR)

HD 1080P Video

Wider Field Of View

Improved Skeletal Tracking

Expressions & Hand Gestures

Improved Voice Recognition

...coming next year



The Kinect Effect



Thank You 😊