Sensors and Components

- IR Emitter
- Color Sensor
- IR Depth Sensor
- Tilt Motor
- Microphone Array
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

<table>
<thead>
<tr>
<th>B</th>
<th>G</th>
<th>R</th>
<th>Empty</th>
</tr>
</thead>
<tbody>
<tr>
<td>255</td>
<td>255</td>
<td>255</td>
<td>0</td>
</tr>
</tbody>
</table>

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)

Sizes:
- 80x60
- 320x240
- 640x480
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

Default (20)

Seated (10)

ShoulderCenter
ShoulderRight
ShoulderLeft
ElbowRight
ElbowLeft
WristRight
WristLeft
HandRight
HandLeft

Spine
HipCenter
HipRight
HipLeft
KneeRight
KneeLeft
AnkleRight
AnkleLeft
FootRight
FootLeft

Head
Coordinates

Joints in meters from camera
Joint Tracking & Smoothing

Each joint has associated tracking state:
- Tracked
- Not tracked
- Inferred

Inferred - Occluded, clipped, or low confidence joints

Use `TransformSmoothParameters` to smooth joint data to reduce jitter.

Skeleton.ClippedEdges = FrameEdges.Top;

Kinect Explorer Demo
Gestures & Interaction
## Gesture Controls

Define Kinect controls in KinectRegion
- KinectItems Control, KinectTileButton, KinectCircleButton, KinectScrollViewer
- Automatically get cursor, grip, and scroll support

<table>
<thead>
<tr>
<th>Standard cursor and feedback graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="#" alt="Hand" /></td>
</tr>
<tr>
<td>Default targeting state</td>
</tr>
</tbody>
</table>
Gestures
Demo
Face Tracking
Face Tracking

2D/3D Mesh and Points
3D Head Pose
Animation Units
3D Head Pose

- Roll
  -90° to +90°

- Yaw
  -45° to +45°

- Pitch
  +20° to -20°
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 😊