Today

• Mini Quiz on Week 7
• Games in Ubicomp
  • Kinect
  • Eye Tracking
  • Pokemon Go
• HoloLens
• HoloLens Game Demo
Mini Quiz on Week 7
Ubicomp and Games
Kinect
Eye Tracking
Eye Tracking Device

- An **eye tracker** is a device for measuring eye positions and **eye movements**.

- The most popular variant uses video images from which the eye position is extracted.

- Input source: visible spectrum vs. infrared
Eyetribe Eye Tracker

- **Features**
  - Camera, multiple infrared LEDs
  - Band-pass filter
  - Operating Range: 45 - 75cm
  - USB 3.0 Superspeed
  - API/ SDK: C++, C#, Java
  - Cost: $99
Tobii EyeX + 4C

https://tobiigaming.com/
Tobii
Pokemon Go
Pokemon Go - Edward Wu
HoloLens

Thanks to Talok Mysore and Swathi Hoysala
# HoloLens Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>Windows 10.0.11802.1033 32-bit</td>
</tr>
<tr>
<td>CPU</td>
<td>Intel Atom x5-Z8100 1.04 GHz</td>
</tr>
<tr>
<td></td>
<td>Intel Airmont (14nm)</td>
</tr>
<tr>
<td></td>
<td>4 Logical Processors</td>
</tr>
<tr>
<td></td>
<td>64-bit capable</td>
</tr>
<tr>
<td>GPU/HPU</td>
<td>HoloLens Graphics</td>
</tr>
<tr>
<td>GPU Vendor ID</td>
<td>8086h (Intel)</td>
</tr>
<tr>
<td>Dedicated Video Memory</td>
<td>114 MB</td>
</tr>
<tr>
<td>Shared System Memory</td>
<td>980 MB</td>
</tr>
<tr>
<td>RAM</td>
<td>2GB</td>
</tr>
<tr>
<td>Storage</td>
<td>64GB (54.09 GB available)</td>
</tr>
<tr>
<td>App Memory Usage Limit</td>
<td>900 MB</td>
</tr>
<tr>
<td>Battery</td>
<td>16,500 mWh</td>
</tr>
<tr>
<td>Camera Photos</td>
<td>2.4 MP (2048x1152)</td>
</tr>
<tr>
<td>Camera Video</td>
<td>1.1 MP (1408x792)</td>
</tr>
<tr>
<td>Video Speed</td>
<td>30 FPS</td>
</tr>
</tbody>
</table>
HoloLens Sensors

• 18 sensors
  • Including accelerometer, gyroscope, magnetometer, microphone

• Depth cameras that are based on Kinect technology, but with a wider field of sensing (120x120 degrees)

• Two visual cameras and two depth cameras

• Visual cameras can record and share the user's visual experience from a first person perspective

• Sensor to measure the interpupillary distance
Holographic Display

- Light engine - sends out light beams towards two separate transparent lenses (one for each eye)
- Lens consist of three layers of glass of three different primary colors
- Each lens has "micro-thin" corrugated grooves
- Light hits those layers and finally enters the eye in specific angles, intensities and colors
- Producing an image on the eye's retina.
- Significantly different from most 3D systems such as the Oculus Rift – It doesn’t use lenses to refract light from a screen onto the eye.
- Image is clear, but not "4k-like"
- Buttons to control video brightness on the top of the device
Vision Field

- **Focal plane**: Best for extended flat interactions such as watching a movie.
- **Optimal zone**: Ideal hologram placement.
- **Comfort zone**: Best for shorter interactions.
TRACKING USER’S POSITION

- Cameras detect movement relative to static objects surrounding the user
- Accelerometer, gyroscope and magnetometer provide additional data to improve tracking
- Very low latency depth cameras which are intelligent enough to translate the depth information into a complete spatial map
Interacting with HoloLens

- Speakers on top of both ears and a 3.5mm headphone jack
- Buttons to control audio on the top of the device
- The device has "spatial sound" Gaze which is effectively similar to moving a mouse by moving your head
- Depth and Visual cameras recognize gestures such as “air-tap” and “bloom”
- Voice commands such as ”hey, Cortana” to bring up Cortana
- Buttons to control volume and brightness
- Additional air clicker to use instead of the gaze and air-tap
- Device portal to manage the HoloLens wirelessly
Interacting with HoloLens

• Virtual objects onto real objects (on tables, walls, …)
• Changing the texture, appearance and lighting of real objects
• Virtual holes into real objects or making real objects disappear
• Virtual screens into the real world
• Moving a cursor or virtual objects by head movement
• Initiating actions by doing hand gestures or voice commands
• Replacing the complete environment with a virtual one
• Integrating real objects into a virtual environment
• Moving a cursor from a real screen into the virtual world using a mouse
• …?
HoloLens Games
Thanks