2017

Holographic Assessment Learning Lab (HALL)

PROTOTYPE PROGRESS DOCUMENT: JULY 27, 2017

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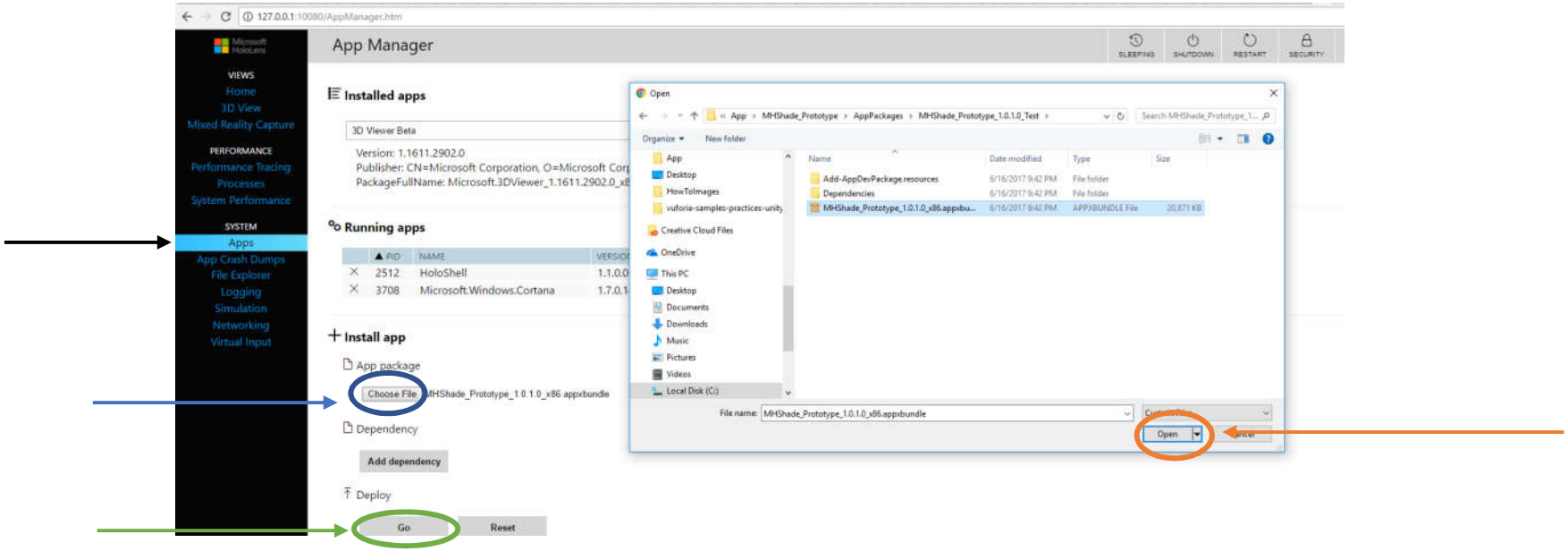
Contents

How to Install the Application on the HoloLens

- Please log into your Window Device Portal using http://127.0.0.1:10080//default.htm or remotely using the IP address of the HoloLens
- Select **Apps** from the left navigation area
- In **Install app**, select the `<file_name>.appxbundle` from the `<file_name_Test>` folder (*may also need x86 dependency files*)



- In **Deploy**, click **Go** to deploy the app package to the connected HoloLens

Overview of the MHShade_Prototype Application

There are four main areas in the Holographic Assessment Learning Lab (HALL):

1. Introduction Area: *Far Left* – Please “gaze” at the area to activate the text-to-speech introduction.

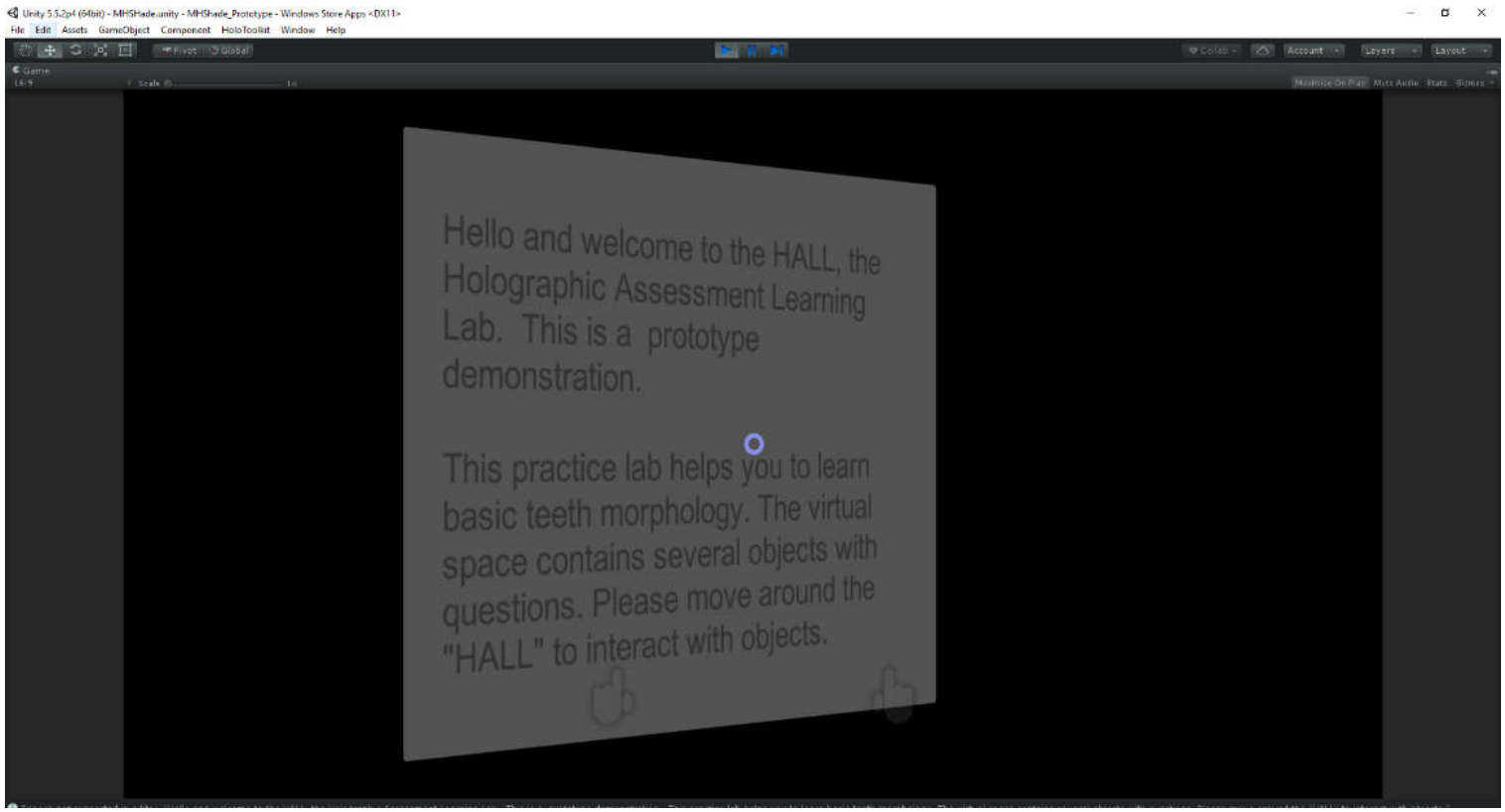


Figure 1. Introduction Area

2. Question/Answer Area**:** *Middle* – This area uses text-to-speech, voice recognition and gestures. Additional questions are placed at various areas in the HALL virtual space. Assessment objects (e.g., tooth, face, bones) can be manipulated (enlarged, moved, rotated, etc.). The prototype will demonstrate several questions types including basic assessments (e.g., *true/false*), *speech-to-text* and *text-to-speech* assessments and *simulations*.

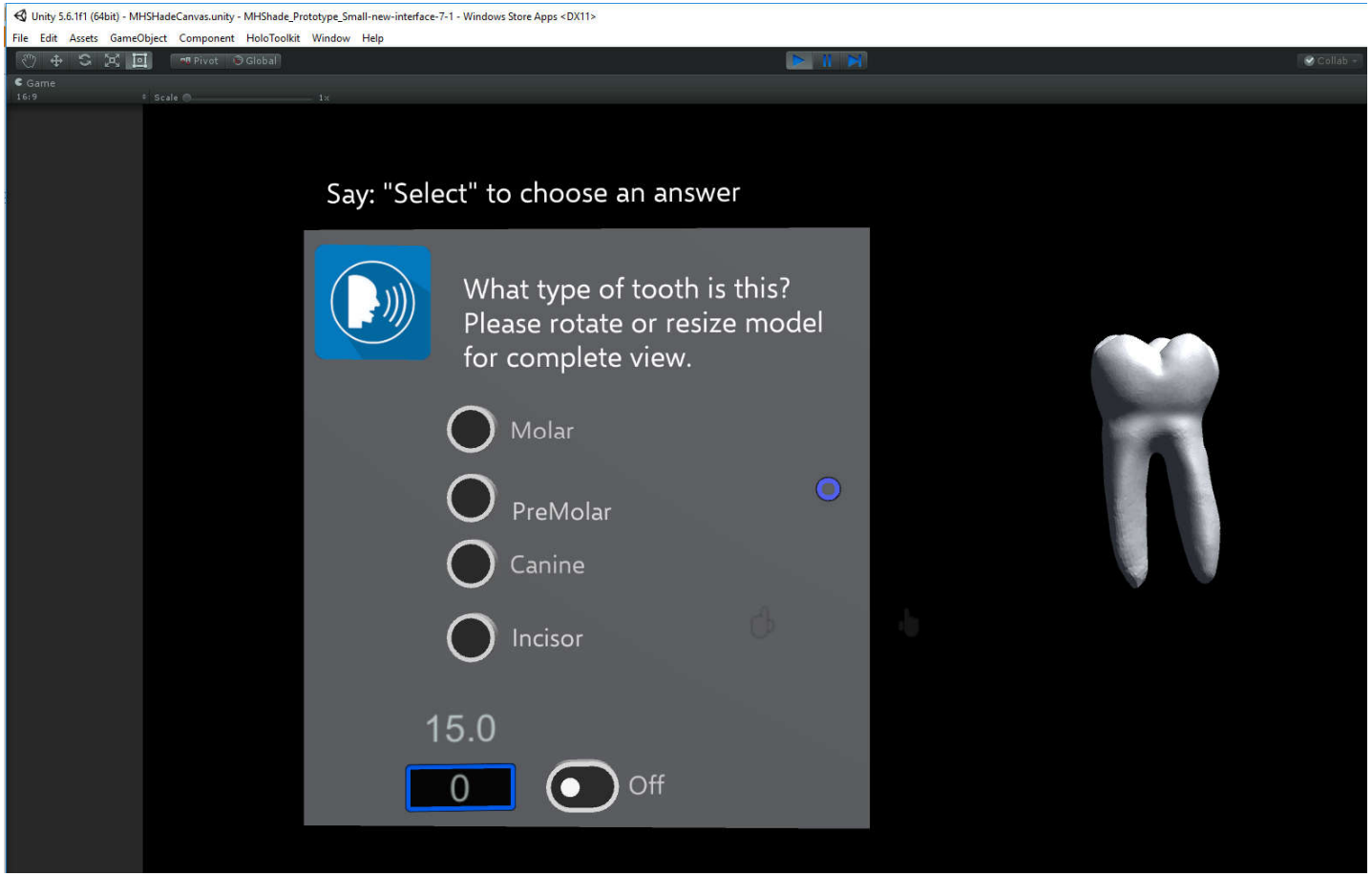


Figure 2. Question/Answer Area

3. Floating Radial Menu Area**:** *Right Side* - Place your hand in the “Ready” gesture and “select” by closing your index finger and thumb on the middle icon, then drag the menu to any position in the virtual space (prototype has two options working). The menu is “context aware” and is configured according to the question.

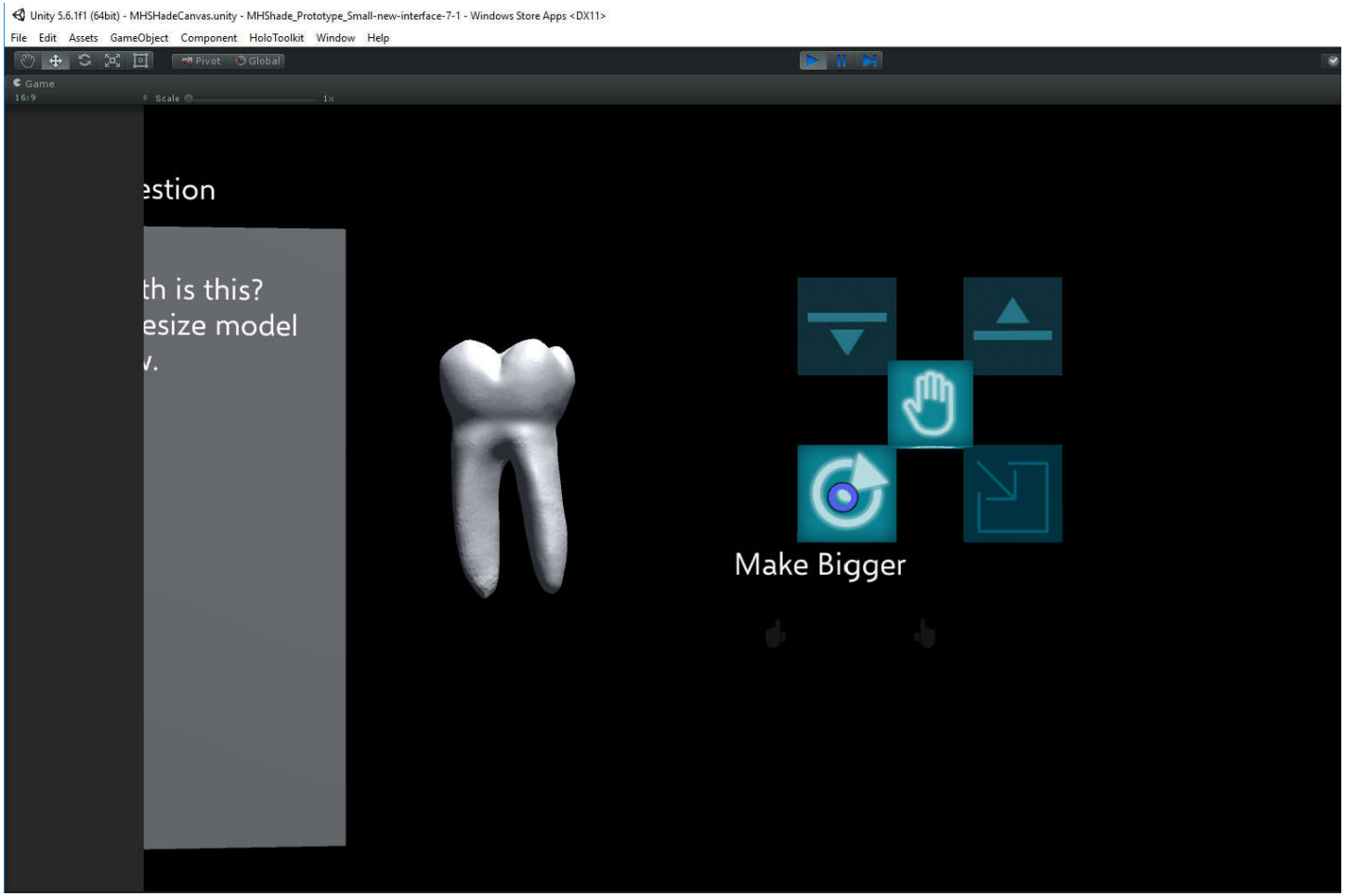


Figure 3. Radial Menu

4. Optional Scoring/Timer Area**:** *Bottom* – You can practice against the clock (or the best score or another user). This is an optional feature. Scoring and timing are enabled/disabled using the toggle button. The time (in seconds) to complete the question is indicated above the score window. X points are awarded for a correct answer. X points are subtracted for an incorrect answer.

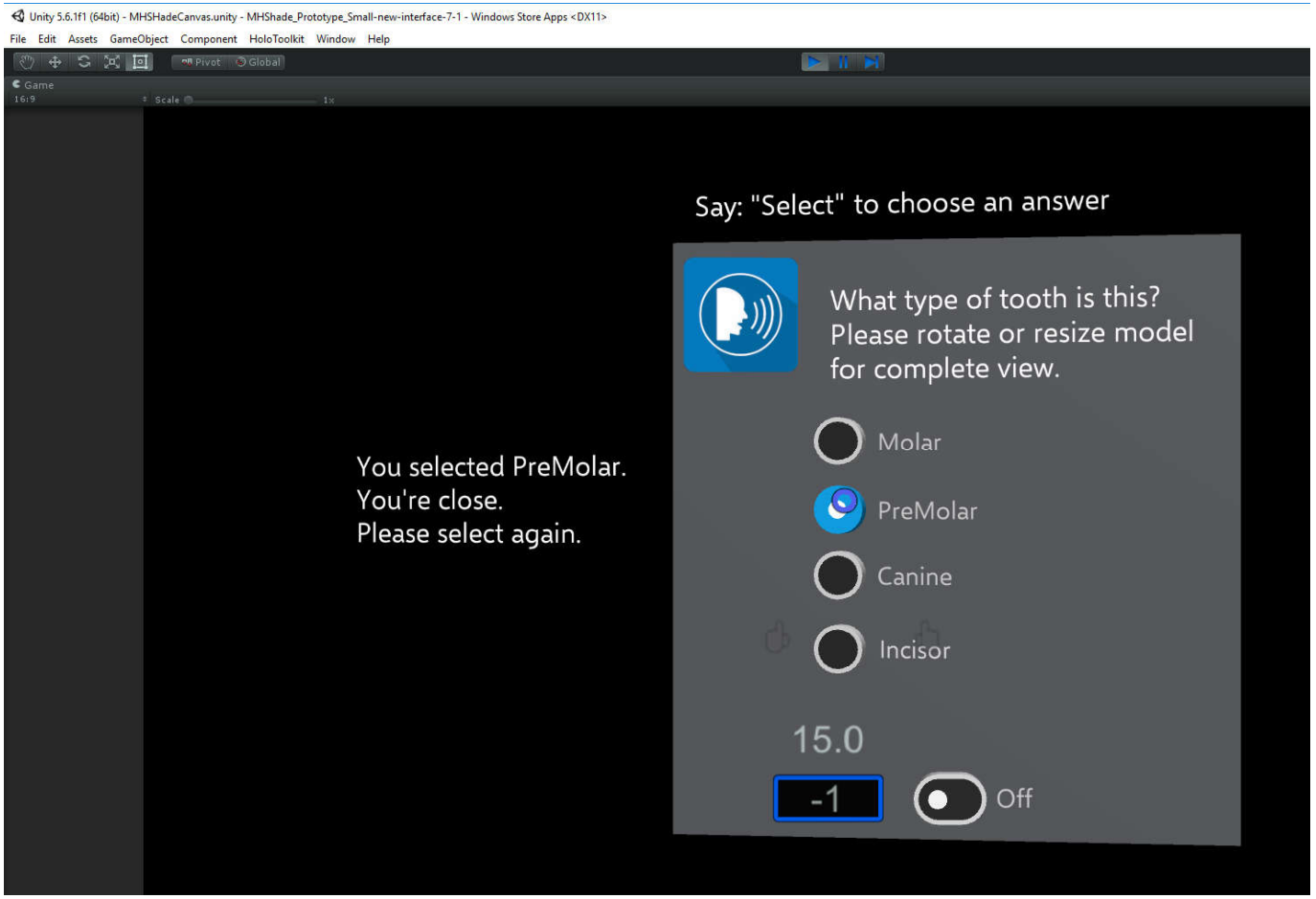


Figure 4. Optional Scoring and Timer

How to Run the Prototype Application

The prototype currently contains one sample question.

Getting Started Sample Question:

From the **Start Menu** locate the **MHShade_Prototype** entry and launch the application.

1. First, look to your left to launch the “text-to-speech” introduction (Figure 1). The “Mark” voice speaks the text.

2. Next, look in the center to interact with the sample tooth:
    a. The **tooth enlarges** when you **Say**: “Make Bigger” or **air tap** the “Make Bigger” icon on the Radial menu (Figure 3). You may also **gaze at the “Make Bigger**” icon and **Say**: “Select**”**
    b. The **tooth gets smaller** when you **Say**: “Make Smaller” or **air tap** the “Make Smaller” icon on the Radial menu (Figure 3). You may also **gaze at the “Make Smaller**” icon and **Say**: “Select**”**
    c. The **tooth rotates** by gazing at the tooth and placing your hand in the “ready” gesture. The cursor will change. Close your index finger and thumb and move your hand. (Figure 3). This movement is “free rotation.”
    d. To return the tooth to the original orientation, **Say:** “Reset Tooth”
    e. To **view the top** of the tooth, **Say:** “Show Top”
    f. **Say:** “Face Me” to turn the tooth toward you
    g. To move the tooth **forward or backward, Say:** “Move Forward” or “Move Backward”

    Additional behaviors can be implemented depending on the question.

3. Try the sample question:
    a. To hear the question, “gaze” and then “**air tap” the blue speaker icon** (Figure 2)
    b. or gaze at the icon and **Say**: “Select”

    *The speaker icon can also be **dragged** to any area in the space (like the radial menu - Figure 3)*.

Select an answer:

You can select an answer in three ways (Figure 3):

a. **Selection:** “**Air Tap” a radio button** (Note: enabled for all answers).

The “Selection” method should be used when several users are in the same space.

b. **Voice recognition**: Please “Speak” an answer (Note: enabled for Molar, Pre-Molar and Canine).

The “Zira” voice “speaks” the answer. *This should be a configurable option when several users are in the same space*.

c. **Gaze at an answer** and **Say**: “Select”

4. Practice **Against the Clock** or **Another User(s) in Sharing Mode**:

Air Tap the **Off/On Radio** button to sharpen your skills! (Figure 4).

How to Run the Sharing Service

- Please download the sharing service software from https://github.com/Microsoft/HoloToolkit-Unity/blob/master/External/HoloToolkit/Sharing/Server/SharingService.exe
- To **run** the server from a command prompt, run:

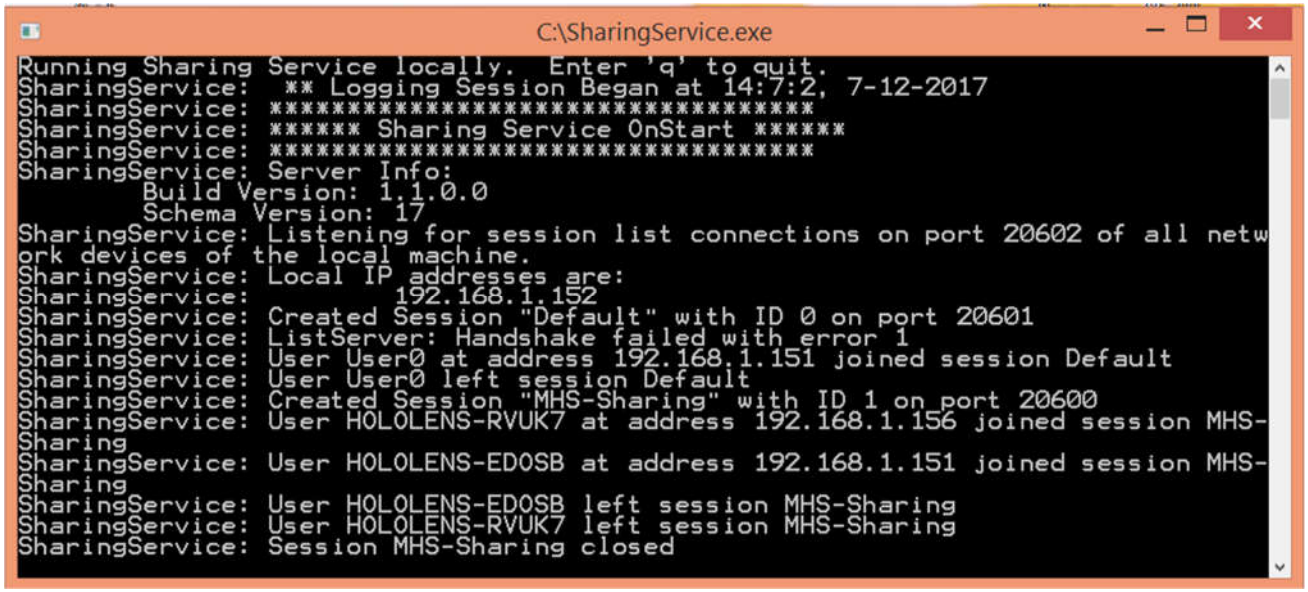
```
C:\<filelocation>SharingService.exe -local
```

- To **install** as a service, open an administrator command prompt and run:

```
C:\<filelocation>SharingService.exe -install
```

- To **uninstall** as a service, open an administrator command prompt and run:

```
C:\<filelocation>SharingService.exe -remove
```



Shared Holographic Environment

1. "Custom Messages" Sharing Demo**:**

   This first Sharing app demonstrates sending "custom messages. *This feature can be used for polling instructor/student questions or responses.*

   Getting Started:

   Note: Please wait until both devices are synchronized.

   - Download and install the appx bundle on both HoloLens devices (version 1.0.x.0)
   - Download and start the sharing service (https://github.com/Microsoft/HoloToolkit-Unity/blob/master/External/HoloToolkit/Sharing/Server/SharingService.exe)
   - Start the sharing application on the *first HoloLens device* and wait for it to connect to the server (cube will turn green). The connection status for the first device is displayed in the SharingService.exe window.

     (Example) SharingService: User HOLOLENS-RVUK7 at address 192.168.1.156 joined session Meharry Hall01

   - Start the sharing application on the *second HoloLens device* and wait for it to connect to the server (cube will turn green). The connection status for the second device is displayed in the SharingService.exe window.

     At this point, both devices should see a tooth, cube, button and starting diagnostic messages.

   Running the Test:

   - Click the "Change Color" button on the "first" HoloLens device -- the "second" device displays the "HelloWorld...HelloWorld" text and the cube turns "yellow."
   - Click the "Change Color" button on the "second" HoloLens device -- the "first" device displays the "HelloWorld...HelloWorld" text and the cube turns "yellow."

Emulator Custom Message Demo Results

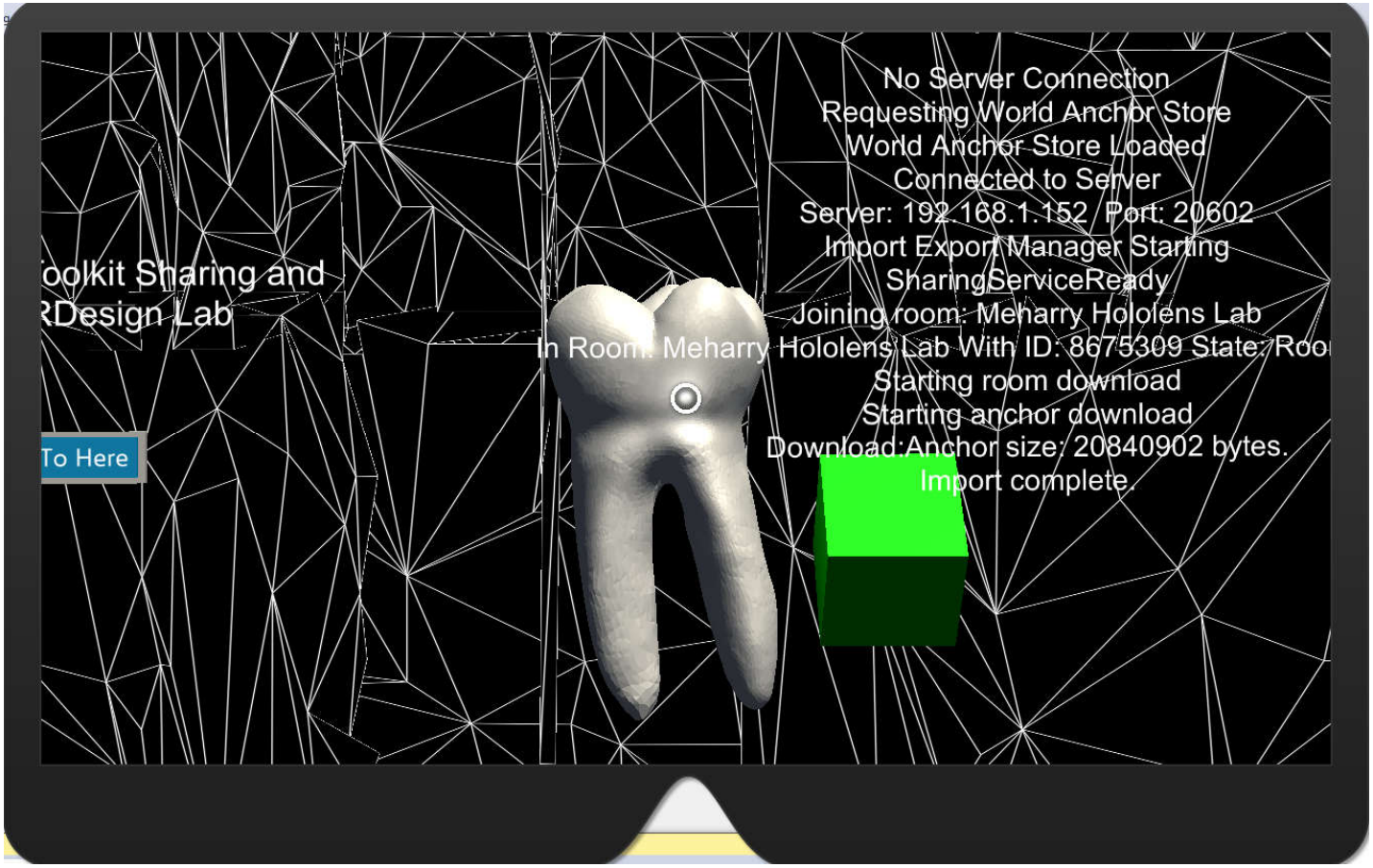


Figure 5. HoloLens Emulator: *Diagnostic Messages from Importing Anchor*

Emulator Custom Message Demo Results

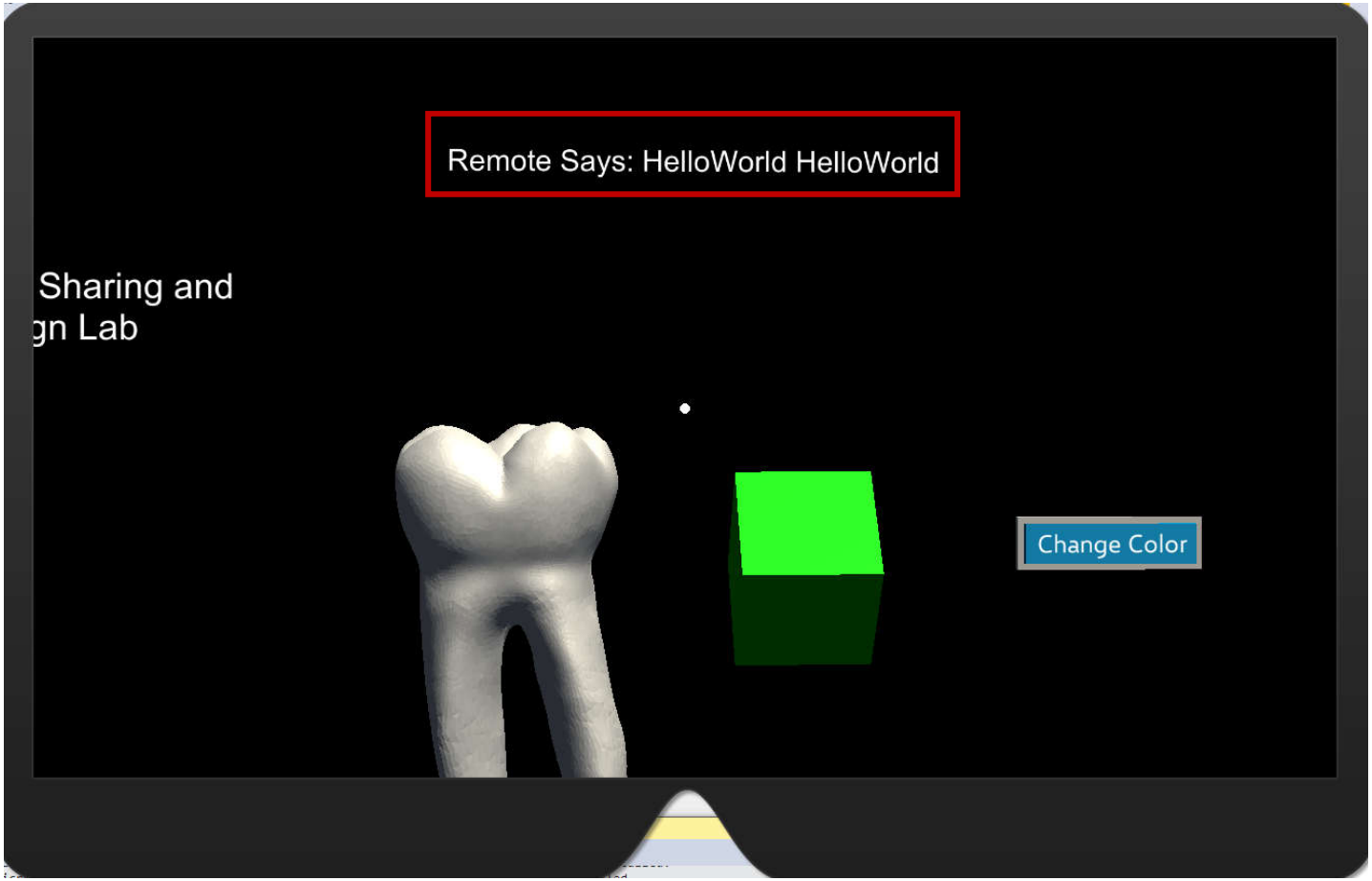


Figure 6. Custom Messages Demo from HoloLens Emulator: *"Hello World"*

2. "Gesture, Voice and Manipulation" Sharing Demo:

The second Sharing app closely demonstrates the capabilities in the current MHS_Prototype. For example, when the radial menu is moved or if the tooth is rotated or moved, the results are displayed on *both* devices. It shows a "shared" environment where both devices interact in the "same" scene. *This feature can be used for sharing instructional, practice or simulation sessions. The Sharing Menu gives control to the user for when sharing should start.*

Getting Started:

Note: Please wait until all devices are synchronized.

- Download and install the appx bundle on both HoloLens devices (version 1.0.5.0)
- Download and start the sharing service (https://github.com/Microsoft/HoloToolkit-Unity/blob/master/External/HoloToolkit/Sharing/Server/SharingService.exe)

Sharing Menu: (*New*)

- **Start Sharing Session** button: Start the sharing application on the *first HoloLens device* by **air-tapping or gazing and Say: "Select". Please wait for the message**: "Export Complete"
  The connection status for the first device is displayed in the SharingService.exe window.

- **Join Sharing Session** button: Start the sharing application on the *next HoloLens device* by **air-tapping or gazing and Say: "Select". Please wait for the message**: "Import Complete"
  The connection status for the next device is displayed in the SharingService.exe window.

At this point, all devices should see "starting diagnostic messages", the tooth, the moveable radial menu and an avatar (that indicates the "head position" of the other user). Please note: The moveable menu "moves" to indicate that it is can be dragged.

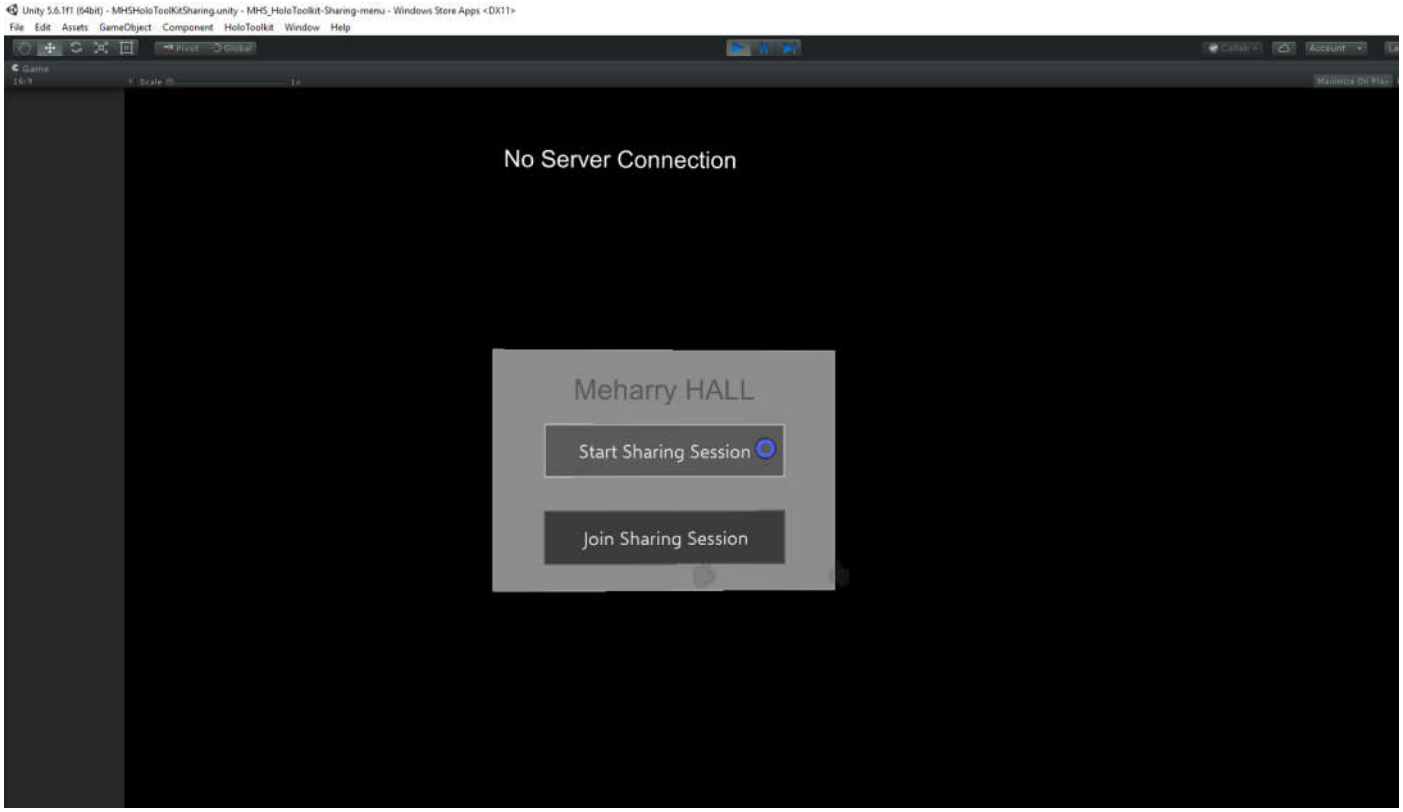


Figure 7. Sharing Menu with Option to *Start* or *Join* a **Sharing Session**

Running the Test:

- Run this test as you would the MHS_Prototype application (e.g., Show Top, Move Forward, etc.)
- First, use the **air-tap gestures** on the **radial menu** (make bigger, make smaller).
- Next, **rotate** the tooth.
- Then try the voice commands. Cortana *may* “hear” the commands and execute them on the other device as well. 😊
- You may also move the radial menu so that it is not in view

Note: If the application fails to obtain or export/import an anchor, please restart the server and the application.

First Implementation: Emulator Sharing Gesture and Voice Demo Results

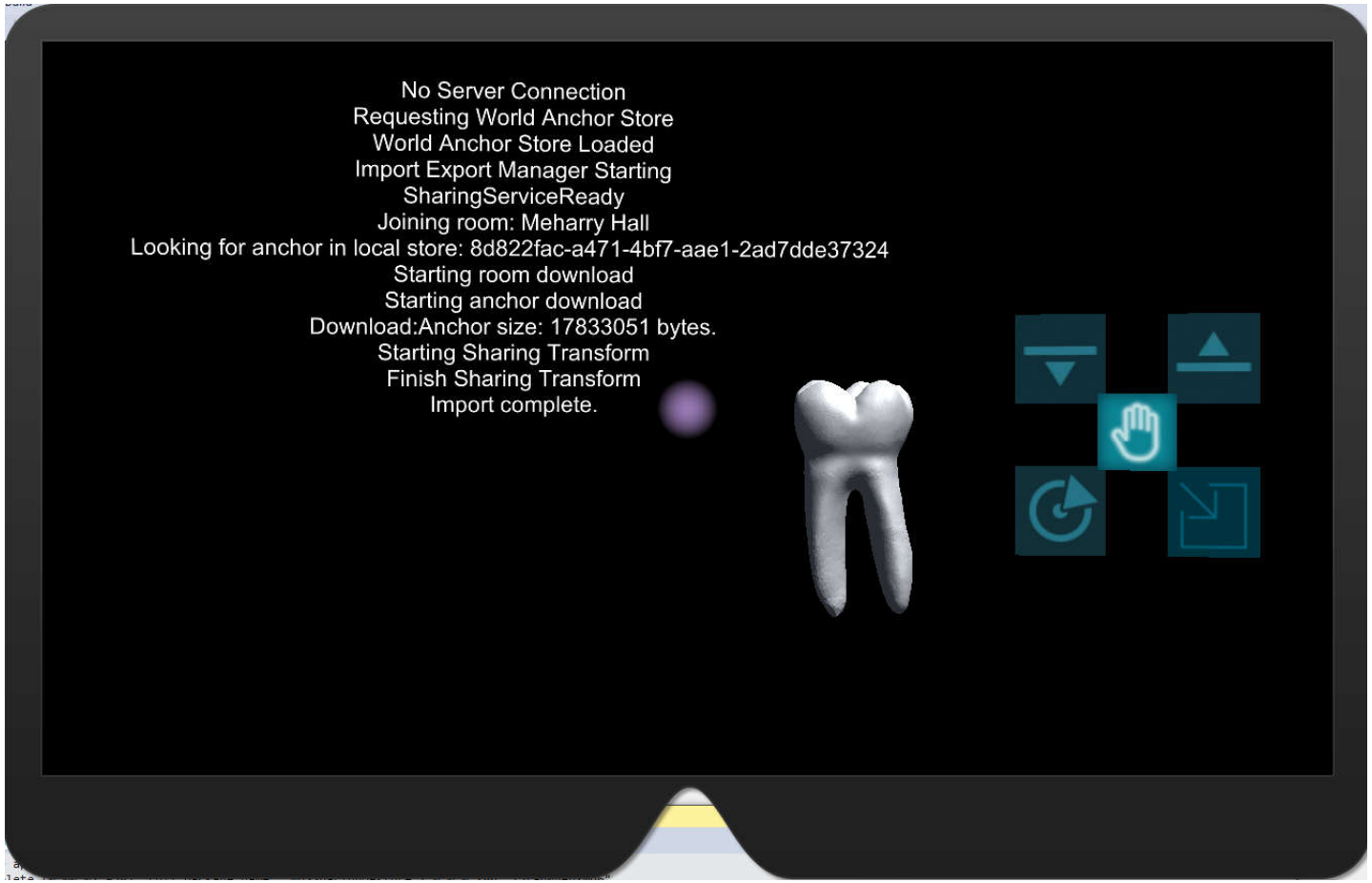


Figure 8. Sharing Gesture Demo from HoloLens Emulator: *Anchor Import Complete*

First Implementation: Emulator Sharing Gesture and Voice Demo Results

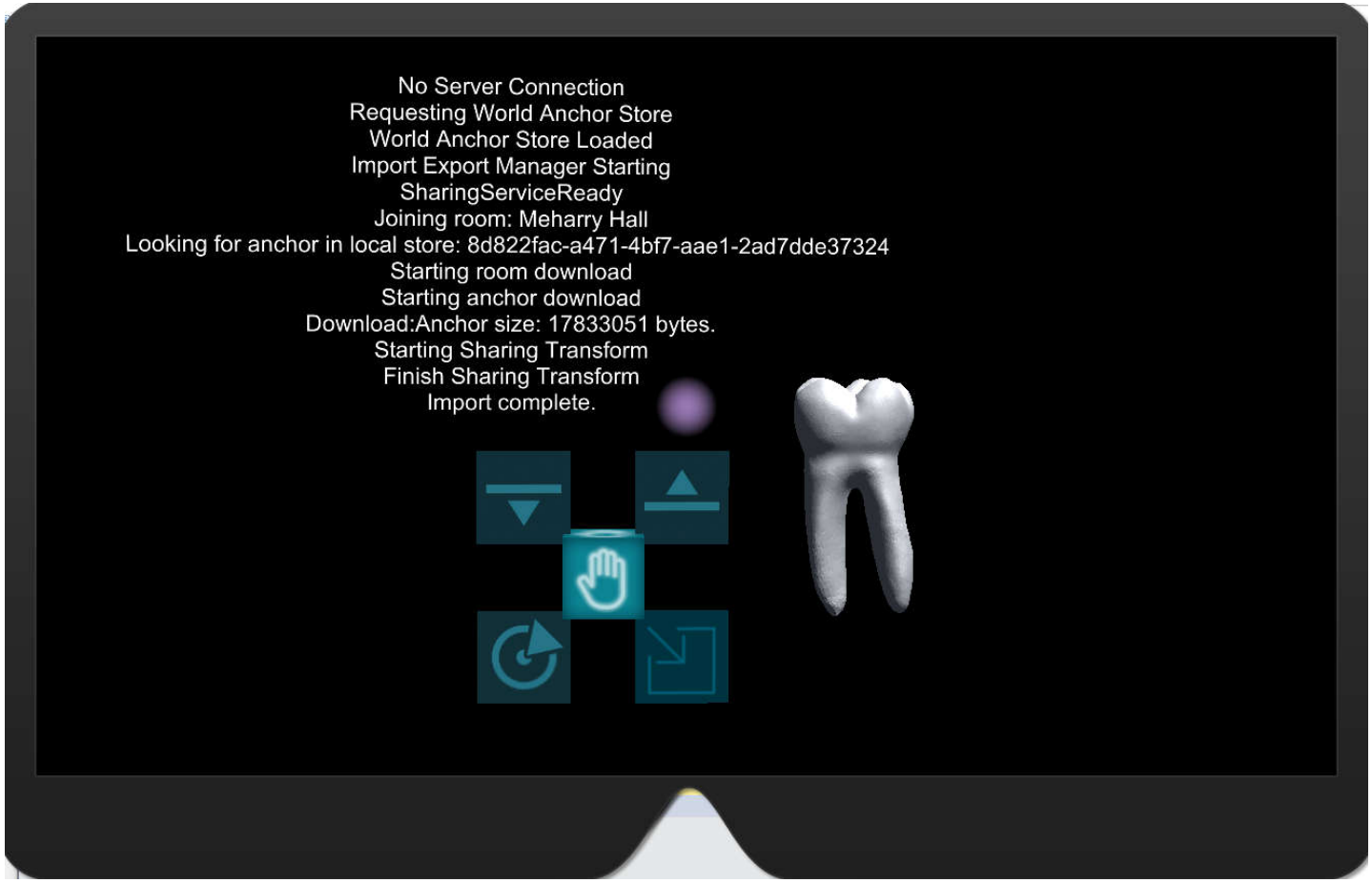


Figure 9. Sharing Gesture Demo from HoloLens Emulator: *Moving Menu placed by HoloLens Device*

First Implementation: Emulator Sharing Gesture and Voice Demo Results

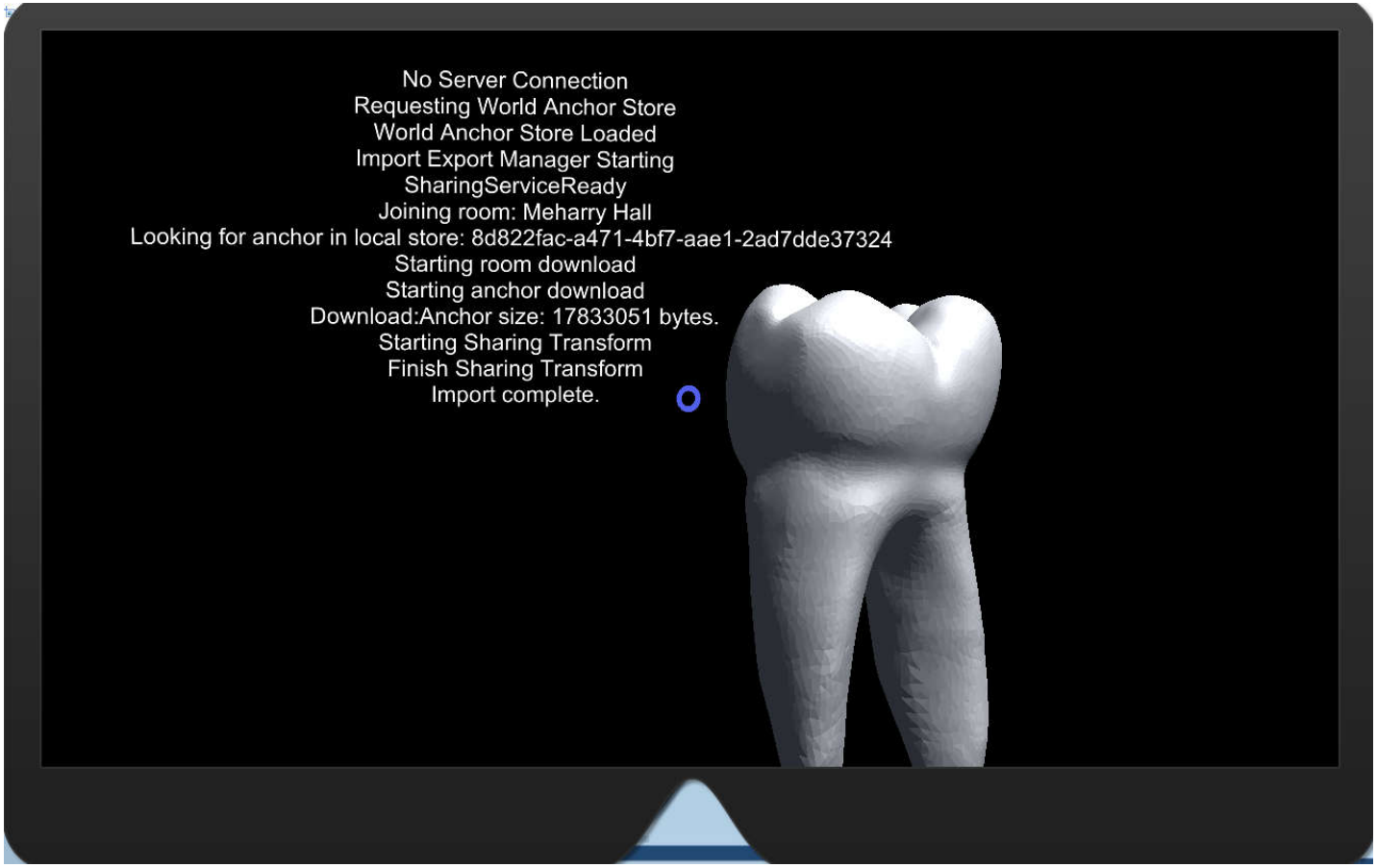


Figure 10. Sharing Gesture Demo from HoloLens Emulator: *"Make Bigger" Command Issued on HoloLens Device*

First Implementation: HoloLens Sharing Gesture and Voice Demo Results: 7-21-2017

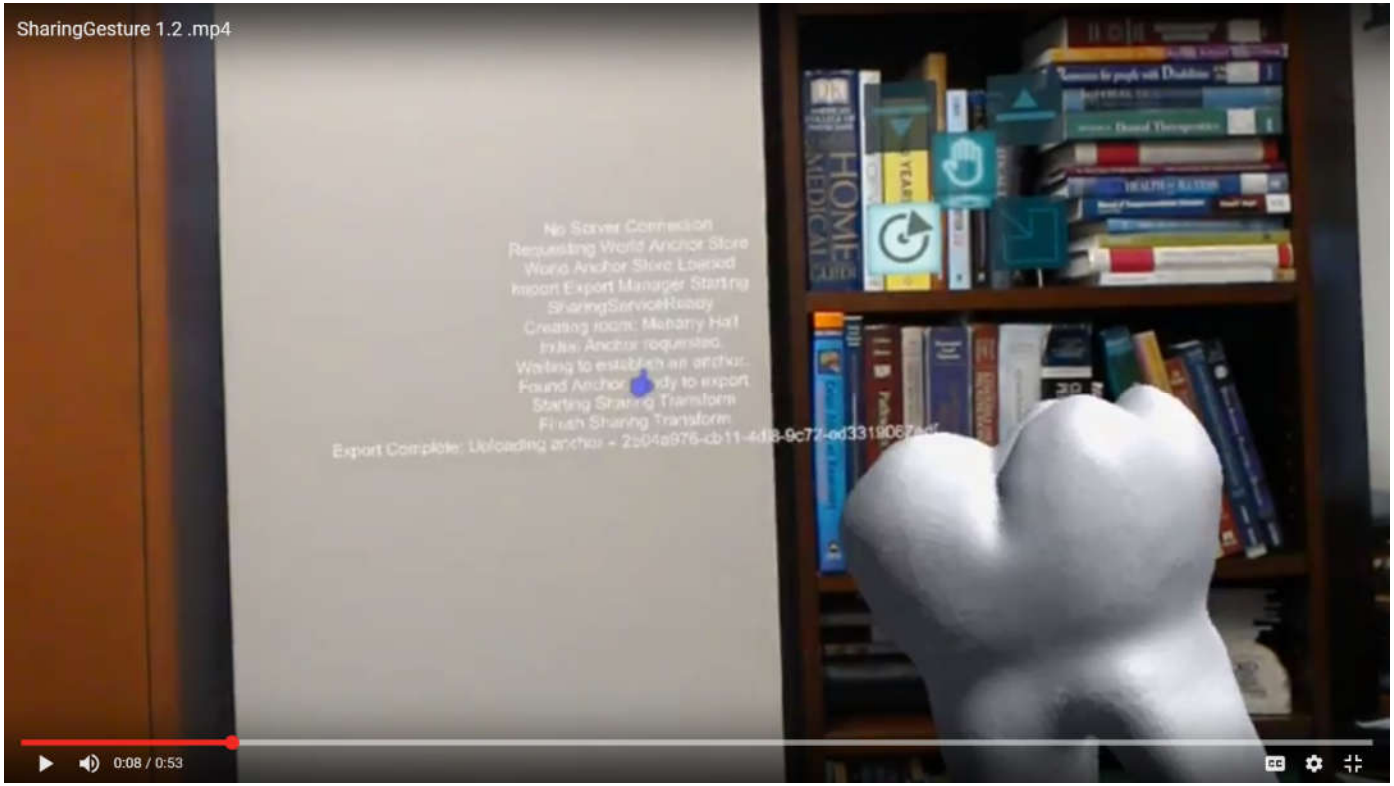


Figure 11. Sharing Gesture Demo from First HoloLens: *Tooth and Application Diagnostics*

First Implementation: HoloLens Sharing Gesture and Voice Demo Results: 7-21-2017

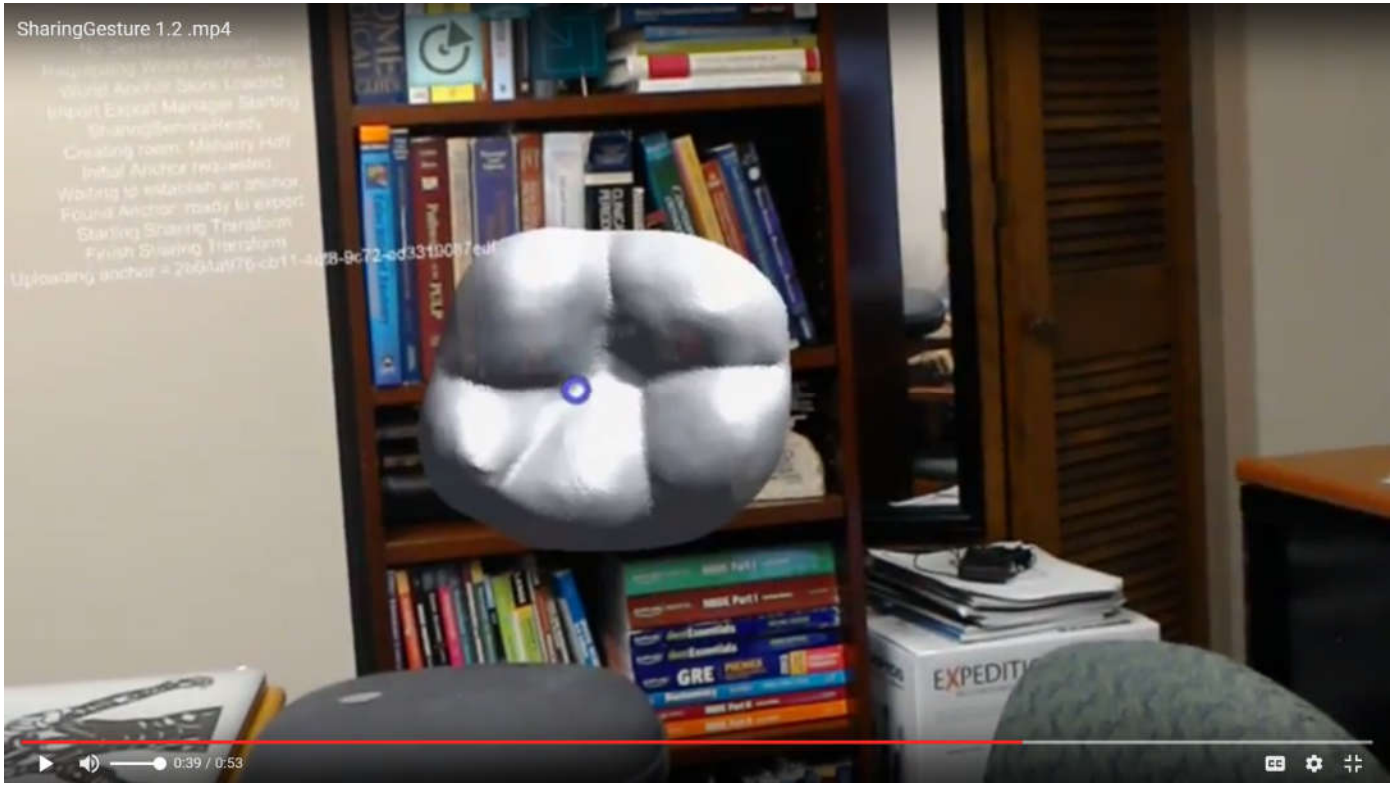


Figure 12. Sharing Gesture Demo from First HoloLens: *"Show Top" Command Issued from Second HoloLens*

Final Implementation: HoloLens Sharing Gesture and Voice Demo Results: 7-27-2017

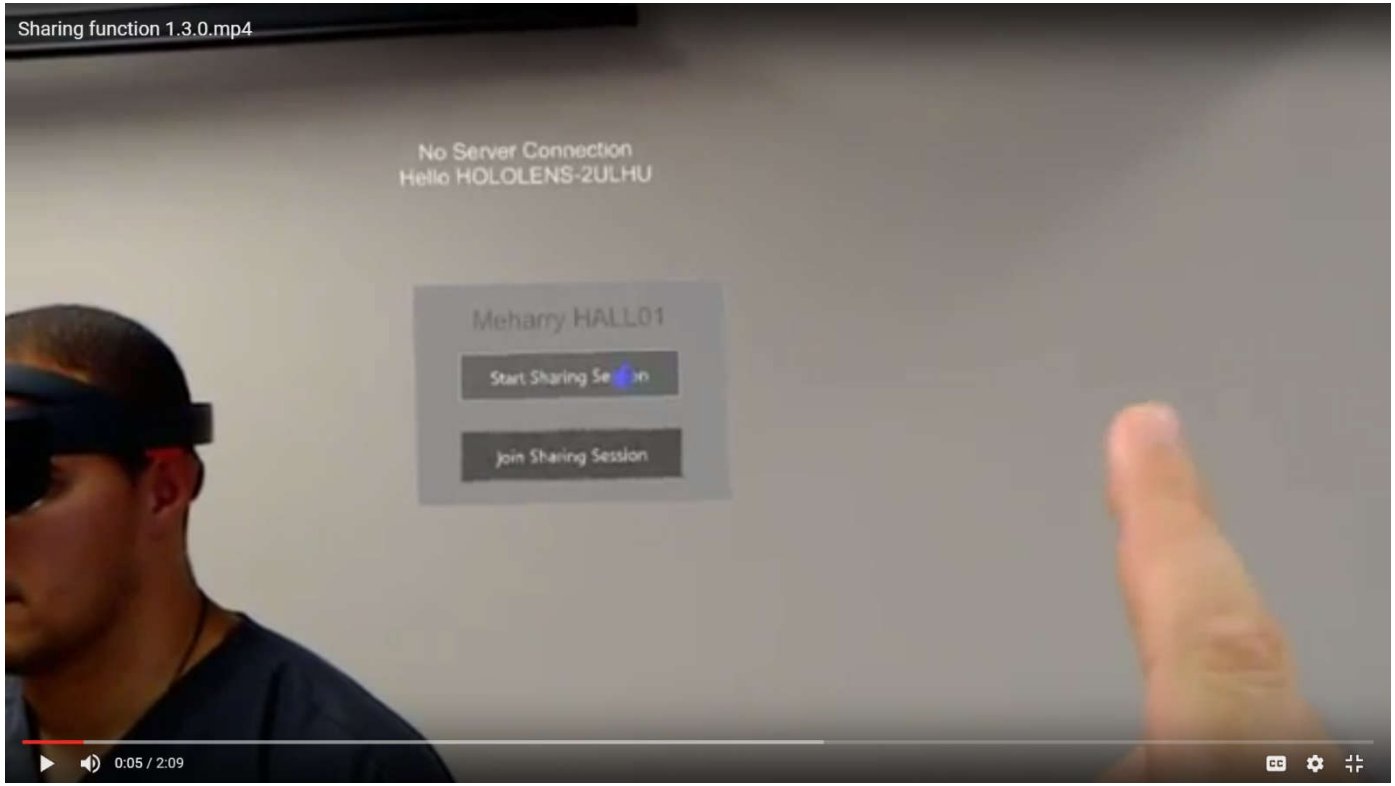


Figure 13. Sharing Gesture Menu from First HoloLens: *Sharing Menu Interface*

Final Implementation: HoloLens Sharing Gesture and Voice Demo Results: 7-27-2017

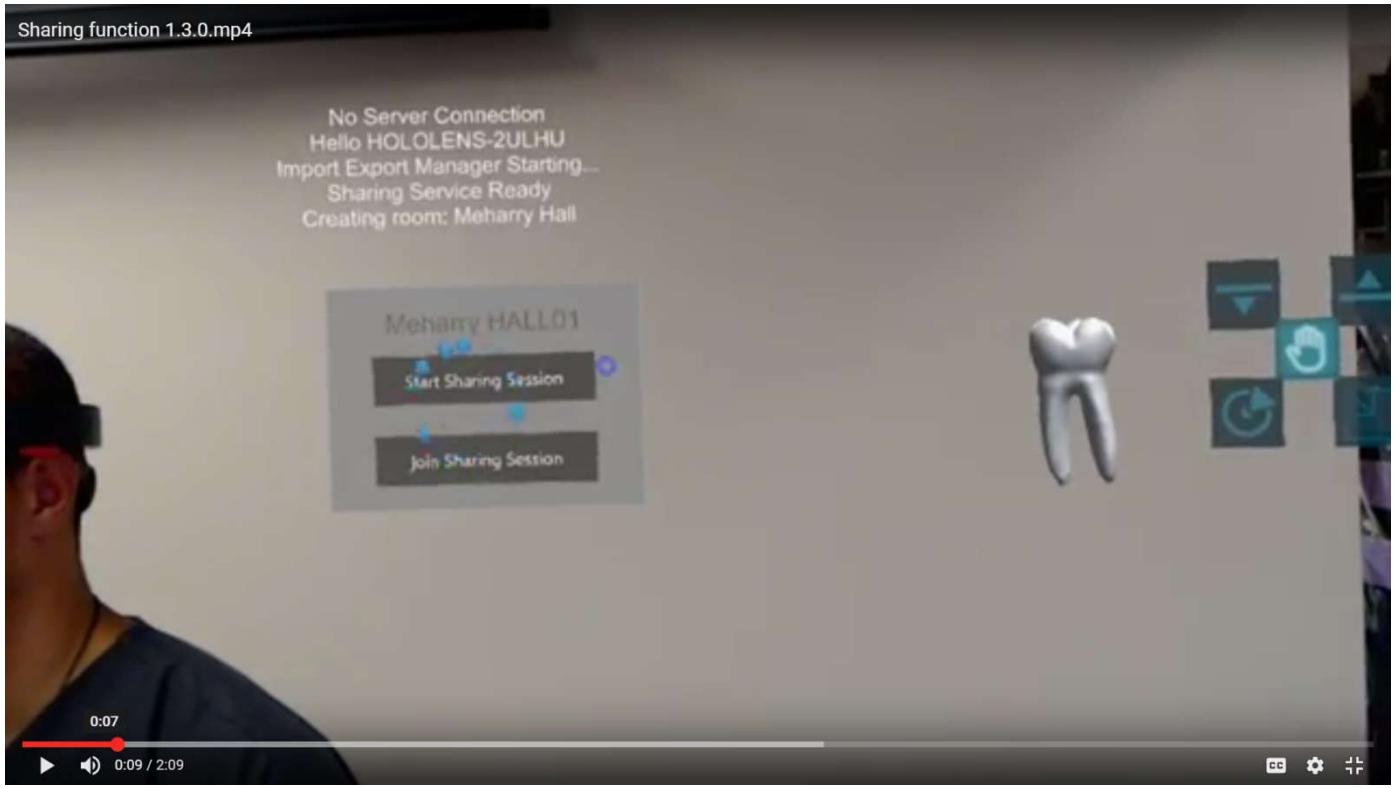


Figure 14. Sharing Gesture Menu from First HoloLens: *Progress Indicator*

Final Implementation: HoloLens Sharing Gesture and Voice Demo Results: 7-27-2017

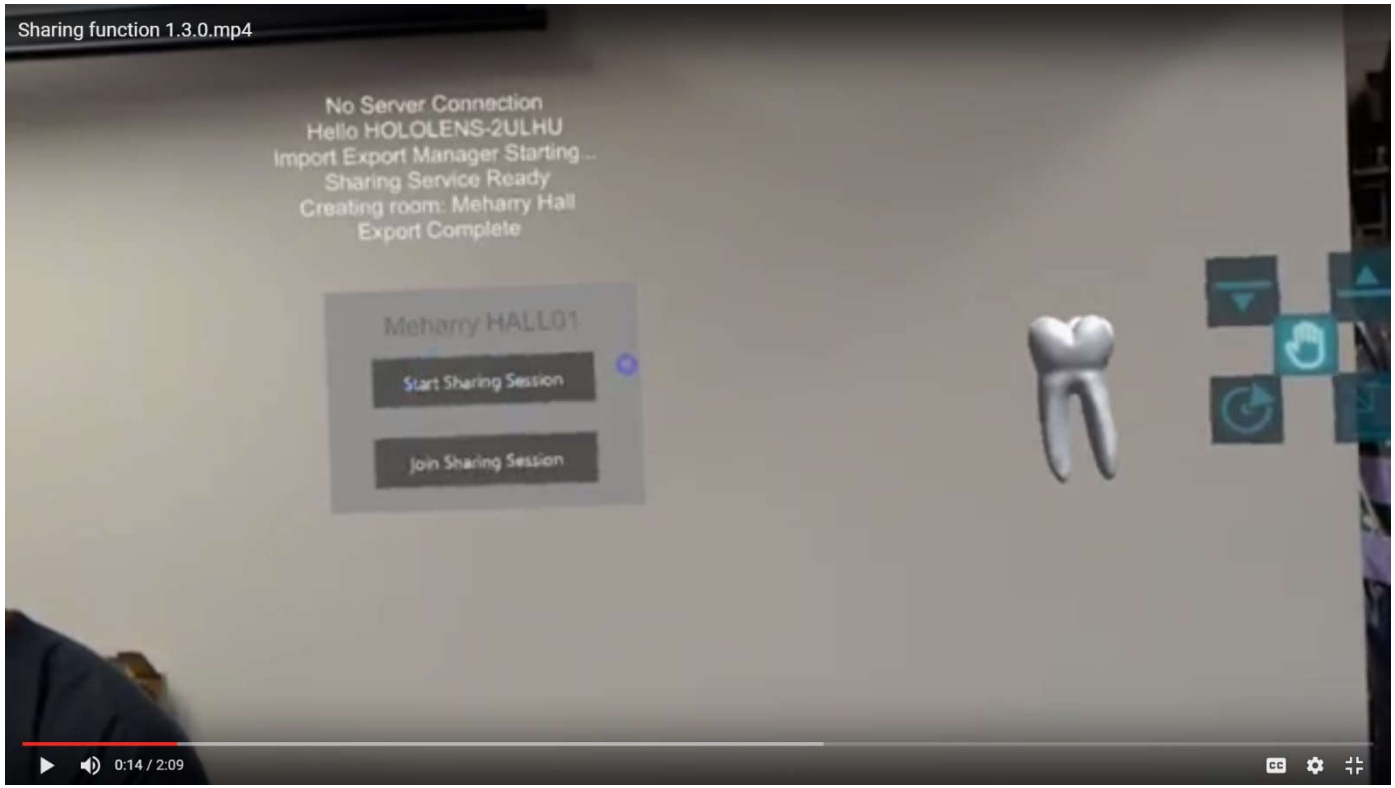


Figure 15. Sharing Gesture Menu from First HoloLens: *Export Complete*

Current Features (7-24-2017)

1. **Voice Commands**:

*** NOTE:** This command does not require "gazing" at the object

Command	**Description**
Face Me *	Moves an object to face you (walk around area and then Say: Face Me)
Move Forward *	Moves an object forward in the space (walk around the object)
*Move Back**	Moves an object backward in the space (walk around the object)
Make Bigger *	Makes an object larger (also on radial moving menu)
Make Smaller *	Makes an object smaller (also on radial moving menu)
Reset Tooth *	Resets an object to original transform values
Say: <answer name> *	Selects an answer (For example: Say: "Molar")
Show Top *	Shows the top of an object
*Start Session**	Starts a sharing session (***NEW***)
*Join Session**	Join a sharing session (***NEW***)
Say: "*SELECT*"	**While gazing** at an icon to activate a feature (e.g., speaker icon or question item)
Say: *"SELECT"*	**While gazing** at a button in the **Sharing Menu** to *start* or *join* a sharing session (***NEW***)

2. **Air Tap Gestures**- Multiple Choice Question:

Object	**Action**
"Speaker" icon	Hear text-to-speech of question (Voice Zira)
Radial Menu Icon	Make bigger and smaller
OFF/ON toggle	Start question start timer
Sharing Menu	Start or Join a sharing session (***NEW***)

3. **Manipulation (drag) Gesture**:

Object	**Description**
Radial Menu	Make bigger and smaller (up to 6 context sensitive items)
“Speaker” Icon	Speaks question

4. **Manipulation (Rotate) Gesture**:

Manipulation	**Object**
Free rotation	Tooth, face, jaw, bones, etc.
X/Y rotation	Tooth, face, jaw, bones, etc.
Bounding Box	Tooth, face, jaw, bones, etc.

5. **Gaze Gesture**:

Object	**Action**
HALL Introduction	Air tap to stop text-to-speech
Radial Menu	Shows tooltips on Radial Menu
Question Answers	Selects a question

6. **Text-to-Speech:**

Object	Voice
HALL Panel	Mark
Question Answers	Zira
Question Text	Zira

7. **HoloLens Sharing:**

Type	Description
Custom Messages	Polling of student/instructor questions, real-time display of course material
Object Transforms	Share objects for instruction, practice or simulations

8. **Video:**

Controls	Description
Play, Pause, Stop	Regular video controls

9. **Speech-to-Text**: (**Not Implemented in this version**)

10. **QR Codes** for connecting to sharing service (**Not Implemented in this version**)

Change History

Date	Owner(s)	Description
7/27/2017	Mitchell, Malcolm, TDL	• **Milestone: Complete Sharing Menu Interface Testing** • Created new appx bundle for IP 10.254.52.8
7/25/2017	TDL	• **Milestone: Complete Sharing Menu Interface** • Shortened diagnostic messages • Added Progress Indicator • Zira voice provides information on sharing process
7/24/2017	TDL	• Added check for joining a session only if a room is created • Added check for starting a session only if the sharing service is running • Updated change log • Created new appx bundle (1.0.4.0) • Uploaded to Google Drive and Github
7/22/2017	TDL	• Added **Sharing Menu** to *start* and *join* a sharing session • **Added new avatar** (This asset is from the web. We should create our own “unique” avatar(s)) • Created appx bundle • Updated change log and document • Uploaded document and change log to Google Drive and Github
7/21/2017	Malcom, Mitchell	• **Milestone: MHS_Sharing_Gesture_1.0.2.0_Test:** Successful test of Version 1.0.2.0 at Meharry (please see video on Google Drive). The challenge was running on different IP Addresses. The test used the IP address **10.254.52.221**. • Issue: MHS_Sharing_Tooth_1.0.2.0_Test: *Sharing Box Avatar* **visible** but **not positioned properly** over participates’ head (under investigation).
7/21/2017	TDL	• Updated change log and added images for video to document
7/19/2017	TDL	• New appx bundles created for IP addresses: **10.254.52.221** and **10.254.53.144** • Uploaded to Google Drive

Change History (continued)

Date	Owner(s)	Description
7/15/2017	Mitchell, Malcom	• **MHS_Sharing_Tooth_1.0.2.0_Test:** Successful test of Version 1.0.2.0 outside of Meharry • Issue: MHS_Sharing_Tooth_1.0.2.0_Test: *Sharing Box Avatar* **not visible** over participates' head (under investigation)
7/15/2017	TDL	• **Milestone: Updated documentation to V1.2 (Sharing Architecture)** • Complete development of sharing demo with **gesture**, **manipulation** and **voice** (tooth and moving radial menu) • **MHS_SharingGesture:** Version 1.0: Successful test with voice, gesture and manipulation features • **MHS_SharingGesture: Sharing Box cube (indicates where the other user is located): RESOLVED** • Create and upload **appx bundle** to Google Drive (for 3 IP addresses: *10.5.50.49*, *192.168.0.14*, *192.136.67.2*) • Updated documentation with directions and images for the **MHS_Sharing_Tooth** demo • Updated documentation with directions and images for the **MHS_SharingGesture** demo • Updated feature list
7/14/2017	Mitchell, Malcom, Dr. Davis, TDL	• **MHShade_Prototype_1.0.5.0_Test**: Successful test of Version 1.0.5.0 • **MHS_Bounding_Box_1.0.0.0_Test**: Successful test of Bounding Box • **MHS_Sharing_Tooth_1.0.2.0_Test**: Could not test sharing "custom messages" demo at Meharry because we could not connect to 10.x.x.x network
7/11/2017	TDL	• Complete development of Bounding Box demo with "custom messages" using MRDL Unity Toolkit. This app demonstrates "peer-to-peer" communication. • Successful test of Bounding Box app from MRDL Unity Toolkit

Change History (continued)

Date	Owner(s)	Description
7/3/2017	TDL	• **Updated documentation to V1.1 (New Interface and Voice commands)** • Voice commands have changed in HoloLens – users **Say:** "Select" to activate an item (please see documentation below). This eliminates the need to air-tap an icon to select it. For example, **gaze at the Speaker Icon** and **Say: Select** to hear Zira speak the question. • Add voice command to "view the top" of the tooth (or any object) • Add voice command to "face tooth" (or any object) to the user • Document current features
6/29/2017	TDL	• Reformat question area for better placement and readability • Updated all images in document • Add "free rotate" of tooth (not just the "x/y" axis) • Add *voice command* to move tooth "forward" (away from question area) for better viewing/manipulation • Add *voice command* to move tooth "backward" (back to the question area or the HALL) • Add *voice command* to reset tooth model to original rotation • Document all voice commands, gaze, gesture (e.g., air tap, navigation and manipulation gestures) • Download, install and test *sharing* server software for HoloLens • Test for "shared application" (up to 4 users) – *In Progress – requires using one computer for server, HoloLens and/or HoloLens emulators*

Change History (continued)

Date	Owner(s)	Description
6/27/2017	Mitchell, TDL	• Mitchell: Received error while side loading app version: `MHShade_Prototype_1.0.4.0_x86.appxbundle` to HoloLens: Failure reason: Failed to start deployment. Failure text: Package failed updates, dependency or conflict validation. (0x80073cf3) • Solution: Mitchell loaded "x86 Dependencies" files • Mitchell: Tested first question (Tooth #30); will continue testing and create video
6/26/2017	TDL	• Changed icons for radial menu (we need to create our own, these are from a Microsoft HoloLens project) • Added canvas image background (grey) for better visibility of objects • Development of Multiple Choice Holographic Assessment Learning Object (HALO) prototype prefab completed
6/21/2017	TDL	• Add optional timer/scoring feature
6/19/2017	TDL	• Add ability to drag "speaker question icon" • Add billboards so that all question areas are always facing user (when walking around the HALL) • Moved areas in space to enhance 3D
6/8/2017	TDL	• **Start documentation- V1.0 (Develop Multiple Choice Prefab)** • Development of *Multiple Choice* Holographic Assessment Learning Object (HALOP) prototype Prefab started • One question – Tooth #30

Change History (continued)

Date	Owner(s)	Description
6/7/2017	TDL	• **Create Private GitHub Repository - https://github.com/cookiedancer/ MeharryShade**
6/7/2017	Dr. Davis	• Joined repository • GD: Create branch for creating 3D objects for prototype • GD: Upload Tooth #30 to repository