Screenshot Summary

Manuscript JoVE60618

- 60618_screenshot_1
    - 2.1 (Load patient data ("/Data/PatientData/Patient000_CT.nrrd") by dragging the medical image file into the 3D slicer software window. Click **OK**) 00:00 – 00:10
    - 2.2 (go to the **Segment Editor** module in 3D slicer) 00:10 – 00:15
    - 2.2.1 (Select the desired volume (a medical image of the patient) in the **Master Volume** section. Then, right-click below on the **Add** button to create a segment) 00:15 – 00:24
    - 2.2.2 (Using different tools from the **Effects** panel to segment the medical image of the patient. Tools used: **Threshold**, **Scissors**) 00:24 – 02:18

- 60618_screenshot_2
    - 2.3 (Export the segmentation in a 3D model file format by going to the **Segmentations** module in 3D Slicer) 00:00 – 00:07
    - 2.3.1 (Go to **Export/import models and labelmaps**. Select **Export** in the operation section and **Models** in the output type section. Click **Export** to create the 3D model) 00:07 – 00:18
    - 2.3.2 (Select **SAVE** (upper left) to save the model. Choose the elements to be saved. Then, change the file format of the 3D Model to "OBJ" within the **File format** column) 00:18 – 00:49

- 60618_screenshot_3
    - 2.4. (Final result of adding a second 3D Model repeating steps 2.2 and 2.3) 00:00 – 00:12

- 60618_screenshot_4
    - 3.1.1 (Go to the **ARHealth: Model Position** module, and (in the initialization section) select **Visualization** mode. Click on **Load Marker Model** to load the marker for this option) 00:00 – 00:10
    - 3.1.2 (Load the 3D models created in section 2 by clicking on the **…** button to select the path of the saved models from section 2. Then, click on the **Load Model** button to load it in 3D Slicer) 00:10 – 00:18
    - 3.1.3 (Click the **Finish and Center** button) 00:28 – 00:32
    - 3.1.4 (Use different slider bars to move the 3D models with respect the marker) 00:32 – 01:07
    - 3.1.5 (Save the models at this position by choosing the path to store the files and clicking the **Save Models** button) 01:07 – 01:26

- 60618_screenshot_5

- 3.2.1 (Go to the **ARHealth: Model Position** module, and (in the initialization section) select **Registration** mode. Click on **Load Marker Model** to load the marker for this option) 00:00 – 00:12
- 3.2.2 (Load the models as done in step 3.1.2) 00:12 – 00:32
- 3.2.3 (Move the 3D models and ensure their intersection with the supporting structure of the cube marker, since these models will be combined and 3D-printed later. The height of the marker base can be modified) 00:32 – 01:35
- 3.2.4 (Save the models at this position by choosing the path to store the files and clicking the **Save Models** button) 01:35 – 01:50
- 3.2.6(Open **Meshmixer** software and load models from 3.2.4. Combine these models by selecting both models in the **Object Browser** window and clicking **Combine**) 01:50 – 02:06
- 3.2.7 (use the **Plane Cut** tool under the **Edit** menu to remove unwanted sections of the model that will not be 3D-printed) 02:06 – 02:43
- 3.2.8 (To save the model to be 3D-printed, go to **File** > **Export** and select the desired format) 02:43 – 02:57

- 60618_screenshot_6
  - 4.1. (In the 3D printing software, select a white color material for the file "TwoColorCubeMarker_WHITE.obj" and black color material for "TwoColorCubeMarker_BLACK.obj") 00:00 – 00:51

- 60618_screenshot_7
  - 5.1 (Create a Vuforia Developer account to obtain a license key to use their libraries in Unity) 00:00 – 00:12
  - 5.1.2 (In the **License Manager** menu, create a **Development Key** and copy the provided key) 00:12 – 00:42

- 60618_screenshot_8
  - 5.3 (Open Unity v.2019 and cerate a new 3D project. under **Build Settings** in the **File** menu, switch the platform to either an Android or iOS device.) 00:00 – 00:19
  - 5.3.1 (Enable Vuforia into the project by selecting **Edit** > **Project Setting** > **Player Settings** > **XR Settings** and checking the box labeled **Vuforia Augmented Reality Support**) 00:19 – 00:40
  - 5.3.2 (Create an "ARCamera" under **Menubar** > **GameObject** > **Vuforia** > **ARCamera**) 00:40 – 00:49
  - 5.3.3 (Add the Vuforia License Key into Vuforia Configuration settings by selecting the **Resources** folder and clicking on **Vuforia Configuration.** Paste Development Key previously created) 00:49 – 01:03
  - 5.3.4 (Import the Vuforia Target file provided in "/Data/Vuforia/ AR_Cube_3x3x3.unitypackage" into Unity) 01:03 – 01:19

- 5.3.5 (Create a Vuforia MultiTarget under **Menubar** > **GameObject** > **Vuforia** > **MultiTarget**) 01:19 – 01:24
- 5.3.6 (Select the marker type that will be used for detection by clicking on the MultiTarget created in the previous step. In the **Database** option under **Multi Target Behaviour**, select **ARHealth_3DPrintedCube_30x30x30**. In the **Multi Target** option under **Multi Target Behaviour**, select either **TwoColorCubeMarker** or **StickerCubeMarker**, depending on the marker created in section 4) 01:24 – 01:39
- 5.3.7 (Load the 3D models created in section 3 into Unity Scene under **MultiTarget** dragging the 3D models into "**Models"** folder under "**Resources".** Once loaded in Unity, drag them under the "MultiTarget" item created in step 5.3.5) 01:39 – 02:05
- 5.3.8 (Change the colors of the 3D models by creating a new material and assigning the new materials to the models) 02:05 – 02:24

- 60618_screenshot_9
  - 5.3.9 (Optional: if there is a webcam available, click on the play button located in the upper-middle portion to test its application on the computer. If the marker is visible to the webcam, it should be detected, and the 3D models should appear in the scene) 00:00 – 00:37
  - 5.3.10 (If an Android smartphone is used for app deployment, go to **File** > **Build Settings** in Unity, and select the plugged phone from the list. Select **Deploy and Run**. Save the file with extension .apk on the computer and allow the process to finish) 00:37 – 01:17
  - 5.3.11 (If the app will be deployed in an iOS device, go to **File** > **Build Settings** in Unity and select **Run.** Go to the saved folder and open the file with the extension ".projectxcode") 01:17 – 01:50
  - 5.3.11.1 (In Xcode, follow the instructions from step 5.2.2 to complete deployment) 01:50 – 01:57