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## 1 Local Anesthesia VR Simulation with Haptics Setup Procedure

Welcome to the demonstration of the Local Anesthesia VR Simulation with Haptics, developed by the Applied Interactive Multimedia Laboratory. This guide will walk you through the initial setup and use of the simulation.

### 1.1 Initial Calibration

Before using the simulation, it is essential to calibrate the Haply Inverse 3 device: 1. Navigate to the **Demo-bundle** folder and open the launcher application. 2. Select the **Device Dashboard** app to begin the calibration process for the Haply Inverse 3. 3. Choose your device port from the device list. 4. Select “**Shaded**” to view the device in the dashboard. 5. Manipulate the device arm to ensure it is aligned properly. 6. If the Haply Inverse 3 is not calibrated, refer to the Haply Inverse 3 manual to place the device arm in the calibration position by attaching the magnet to the top of the device and then press the **Calibrate** buttons.

### 1.2 Serial Manager Setup

Next, set up the serial manager to detect syringe modules: 1. Ensure Python and `pyserial` are installed on your system. If not, install `pyserial` using `pip`:

```
pip install pyserial
```

2. Launch the serial manager script through the command prompt:

```
python serialmanager.py
```

3. Leave this command prompt window open as it will continue to detect the syringe modules automatically.

### 1.3 Running the Simulation

- Put on the VR headset.
- Click the **Play** button in Unity to launch the simulation.
- Click **Scan** in the Python Serial Manager window to automatically connect the syringe module to Unity.

### 1.4 Using the VR Controls

Below are all the controls for the simulation.

- **Y**: Calibrate syringe.
- **X**: Enable/Disable haptics.
- **A and B**: Adjust chair height.
- **Left Joystick**: Move (forward, backward, left, right).
- **Right Joystick**: Rotate (left and right).
- **Left Grip Trigger**: Enable Passthrough.
- **Touch the Syringe**: Disable Passthrough.

#### 1.4.1 Control Overview

Pick up the VR controllers. Use the following controls: - **Left Joystick**: Move (forward, backward, left, right). - **Right Joystick**: Rotate (left and right). - **A and B buttons**: Adjust chair height.

#### 1.4.2 Calibration and Interaction

- Press the **Left Grip Trigger** to enable passthrough for calibration of the virtual syringe with the real-world syringe, adjusting both its position and rotation.

- Use the **Y**, **A**, **B** buttons and the joysticks to approximately align the virtual syringe with the real-world syringe.
- Rotate the syringe to any orientation and use the plunger. Ensure the **Scan** button on the Python Serial Manager has been clicked to sync the syringe rotation data.
- Once aligned to your satisfaction, drop the controllers and manually handle the syringe, which will revert to the VR simulation with the correct alignment.

## 1.5 Enabling Haptic Feedback

### 1.5.1 Haptic Control

- To enable haptic feedback, pick up the left controller with your free hand and press the **X** button. This will toggle the haptic feedback allowing you to feel different textures such as skin and teeth.
- If the syringe goes out of alignment, press the **Y** button to recalibrate.

**Note:** All buttons to press are on hand controllers, not on keyboard.