meshARment – AR Measure Tape

Introduction and purpose:

The purpose of our AR measure tape app is to allow users to quickly and accurately measure distances in the real world using augmented reality. With the app, users can spawn tape points and a line with the corresponding length is drawn on the screen. The distance between the two points is then displayed in real-time. On user input the app can also switch to another measuring mode to measure the incline between the two points in degrees. In addition to measuring distances, the app also includes a feature that generates a colored-coded mesh based on LIDAR sensor data. This mesh provides an incline-dependent representation of the surrounding environment, which can be particularly useful for construction sites or other applications where understanding the terrain is important. Overall, the AR measure tape app provides a fast and convenient way to gather spatial information in the real world using augmented reality technology.

Description of AR-Features:

1. Image tracking: Image tracking is a technique that allows the app to anchor the measure tape to a specific surface in the real world. This is achieved by analyzing the camera feed from the device and identifying distinct features in the scene. Once these features have been identified, the app can use them as reference points to maintain the position and orientation of the measure tape relative to the surface.

2. 3D object rendering: In the case of your AR measure tape app, this was used to display the tape points and line that are used for measuring distances. The app was able to accurately position and orient these 3D models in the scene based on the image tracking data.

3. User input: In the case of your AR measure tape app, touch input was used to allow users to spawn tape points by pressing buttons. Based on the user inputs the scene was reset, the tape points placed or a switch between measurement modes in distance or degree could be made.

4. LIDAR-generated mesh: This data is collected by the device's LIDAR sensor and used to construct a mesh representation of the environment. The app then overlays this mesh on top of the camera feed and renders it with an overlay to visualize the incline and orientation of the surface.

Description of technical implementation:

The basic function of the app relies on a C# script that executes a few methods in the update function.

UpdatePlacementPose: Uses the ARRaycast Manager to get information of where and in which orientation the camera is facing. In addition it gathers spatial information in regards of distance of the camera to the next object like a detected plane.

UpdatePlacementIndicator: If the raycast hits a plane, the Placement Indicator is placed on it and updated correspondingly. Only works if the Raycastmanager detects an object.

UpdateMeasurement: When two points are placed this method is responsible for getting the right measurement in meters or degree.

PlaceFloatingText: Places a text with the taken measurement in the Virtual Reality just next to the line between the two points.

DrawLine: Draws a line between the two tape points. If only one point is placed it draws the line between the first point and were the Placement Indicator is currently.

PlacePoint: Activates the tape point where the Placement Indicator is currently.

Conclusion:

Overall, the AR measure tape app achieved its basic goal of providing a fast and convenient way to measure distances and inclinations in the real world using augmented reality technology. The image tracking and 3D object rendering features don´t work flawless but as intended, allowing users to accurately measure distances and visualize the terrain using the LIDAR-generated mesh.

However, there were some challenges during the development process. One of the main challenges was the hardware restrictions when developing for iOS on a Windows machine, which slowed down project progress significantly and added complexity to the development process as live testing current changes was not an option. Another challenge was theimplementation of raycasting against the LIDAR-generated mesh which has not been accomplished.

Despite these challenges, the result is functional AR measure tape app that serves the purpose of measuring real world objects. A lot was learned during the process of creating the app.