Shoe AR Reconstruction

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Have you needed a second opinion before buying
Shoe AR Reconstruction is the solution
The App

• Shoe AR Reconstruction allows user to create 3D models from images clicked via the app
• It allows users to view and interact with the shoe in real world environment hence helping the user make better decisions
Existing Solutions

- Amazon allowing virtual try on
- Ikea app allows users to place furniture in their home
- Snap’s AR try on
- Meshroom and Blender to build 3D models
Initial Solution

• Build the world map of everything around you and crop the model out

• Autonomous cars like Waymo map the world around using lidar sensor

• Same sensor available on the iPhone.
Issues

- Difficult to crop 3D model requires special software like Blender
- Not a great solution for visual details
- Device limitations
Final Solution

- Photogrammetry is collecting 2D photos and generating 3D models.
- Drones used for surveying construction site use photogrammetry to build 3D models.
- Same idea can be used for our purpose.
Technology Stack

• Swift, SwiftUI (App development)
• Python (Server)
• S3 bucket (Store models and upload images)
TIMELINE
PRELIMINARY WORK
Teapot AR App
Intro to AR App Development

• Understanding how AR apps are built
• Research about existing AR technologies
• Built a demo app to just place tea pots on the horizontal plane
• Used this as the base for the app and experimented with different interactions to make the experience better
Building Mesh

• Building mesh from images
• Photogrammetry technique used for building the mesh
• Overlap of roughly 70% needed for the mesh
Model Sharing

• Explored different methods of sharing 3D model
• iMessage for sharing models is limited by iCloud space
• Implemented sharing using an object store and sharing object links
• Integrated deep linking which makes the user experience better
DESIGN
PHONE APP
Image Capture

- Image clicking part of the app
- Captures depth data along with the images
AR View

- Module responsible for viewing the 3D model in real world
- Camera is opened a horizontal plane is recognised
- User taps and the model is placed at that location
- Model can be rotated, zoomed, and moved around on the plane
Photos and Model Handler

- Uploading images to S3 bucket
- Pinging the server that upload is complete
- Querying the server regarding the model building status update
- Downloading the model from the server
SERVER
Server

- Download images from server
- Delete images from server
- Build 3D model from images
- Upload model to S3
S3 Bucket

- Store images for being consumed by the server
- Store models to be downloaded by the app
- Provide unique URL which can be used in sharing of models
RESULTS
## User Testing

**P1. Gaps present**

**P2. Well formed**

**P3. Only object**

**P4. Time to build**

**P5. Ease of interaction**

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<tr>
<th>User Number</th>
<th>Number of images</th>
<th>Depth data</th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>P4</th>
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<td>No</td>
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</table>
Results

• Difficult to interact if gaps in the model
• Time to build increases with increase in images
• Depth data improves model building capability
• Clean background improves model quality
Conclusion

- The app creates models of the shoes from images and allows users to view and interact with them in the real world
- Allows users to zoom into models and view them better
- Details in the model improved with more images
Demo
5. ARCritique: Supporting Remote Design Critique of Physical Artifacts through Collaborative Augmented Reality. Y. Li, D. Hicks, W. S. Lages, S. Won Lee, A. Sharma and D. A. Bowman. 2021 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW). 2021
Thank You!