

# 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

*Shoe AR*





# 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.



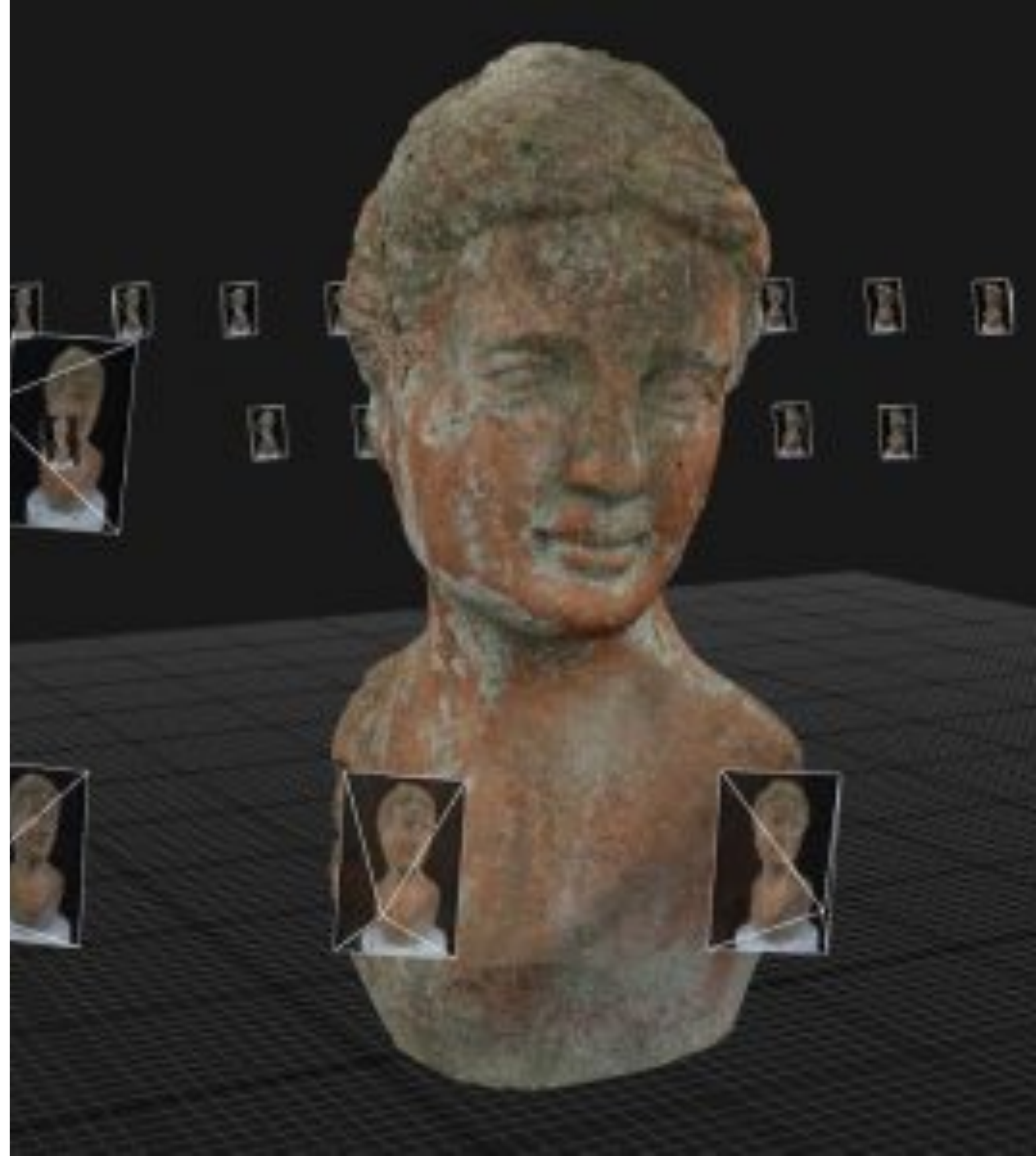
# Issues

- 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

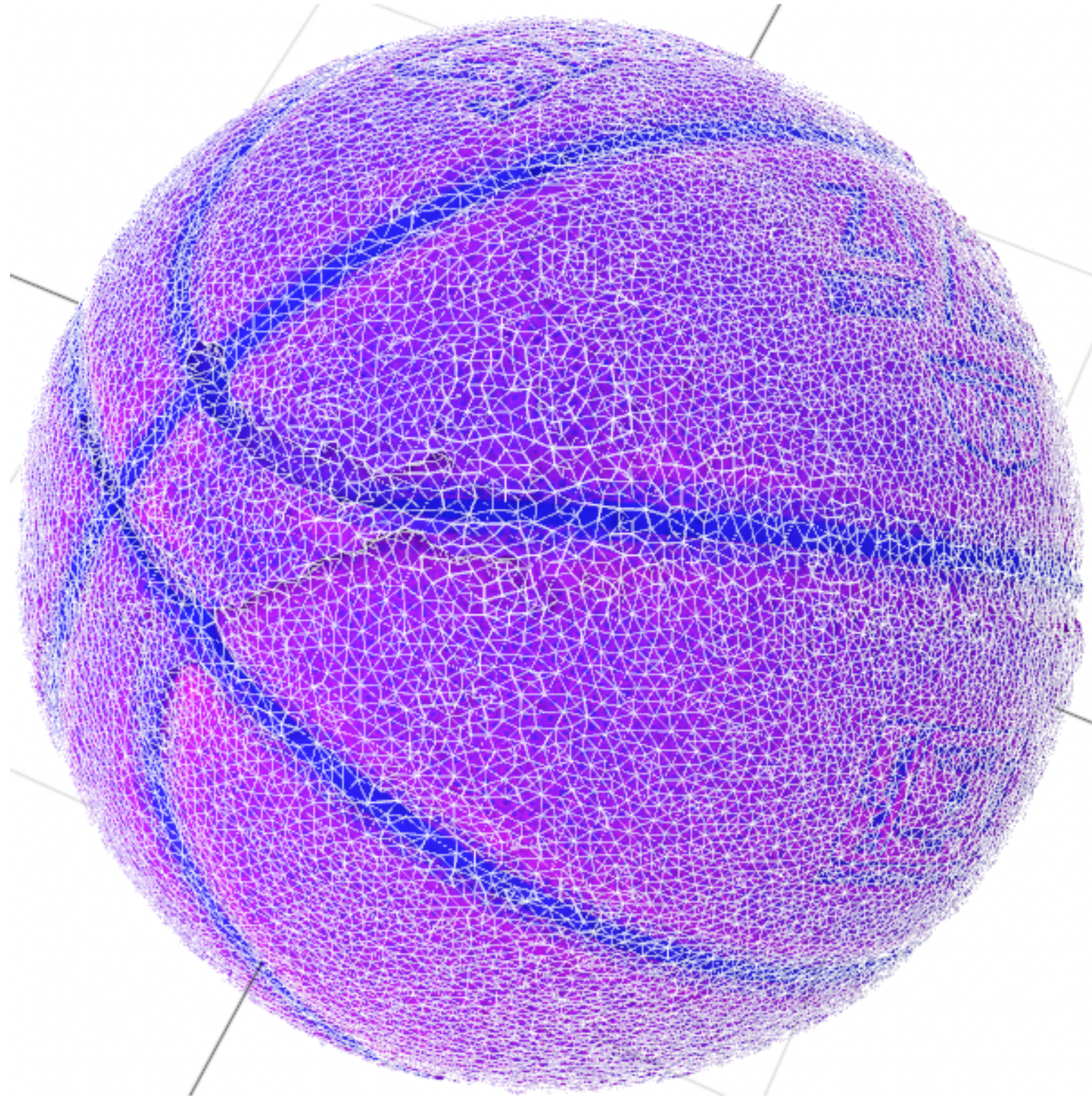
- Understanding how AR apps are built
- Research about existing AR technologies
- Built a demo app to just place tea pots on the horizontal plane
- Used this as the base for the app and experimented with different interactions to make the experience better





# Building Mesh

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



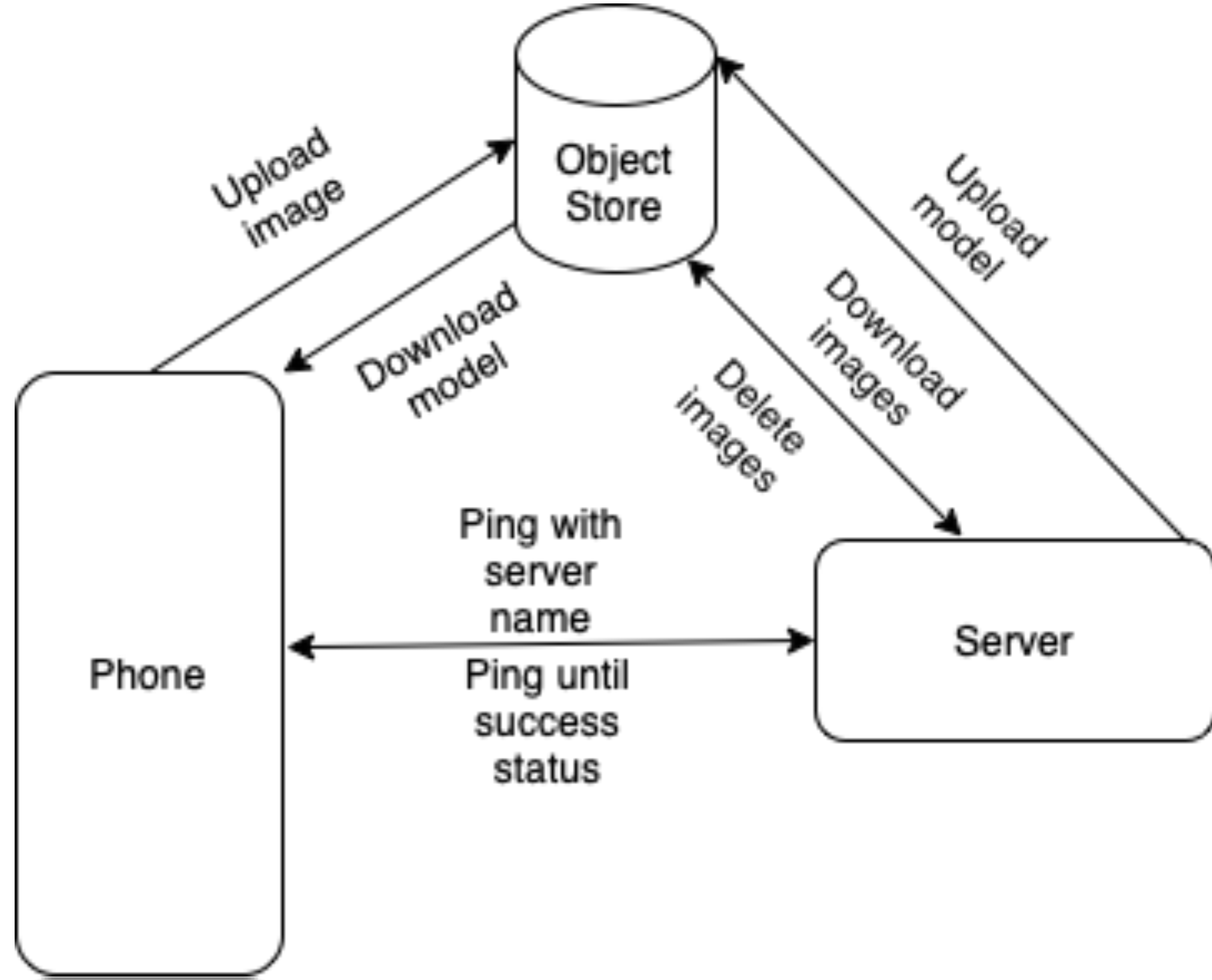


# Model Sharing

- 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
- Intergrated 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

# Object Store



# 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

User Number	Number of images	Depth data	P1	P2	P3	P4	P5
1	5	Yes	Yes	No	Yes	90 sec	Tough
2	15	Yes	No	No	No	100 sec	Easy
3	60	No	Yes	Yes	No	130 sec	Tough
4	102	Yes	No	Yes	No	200 sec	Easy
5	20	Yes	No	Yes	No	100 sec	Easy

# 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



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**Thank You!**