

The Shop

AR Assignment

Done By: Team 1



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Creativity**

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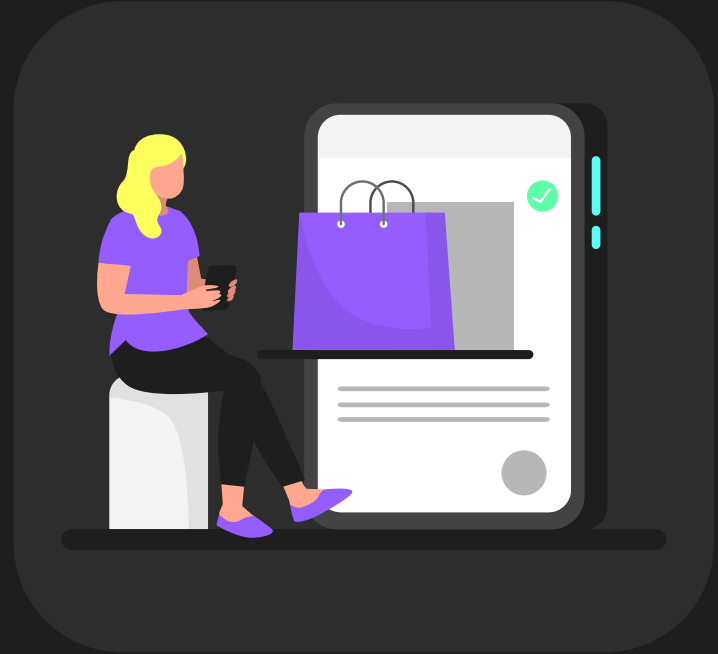
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Contributions

Theme

Contactless Shopping

- Increased adoption of AR and VR during the Covid-19 pandemic
- Global AR market expected to reach \$50 billion in 2024
- Provide in-store experiences to consumers on the go





"I'm excited about augmented reality because unlike virtual reality, which closes the world out, AR allows individuals to be present in the world but hopefully allows an improvement on what's happening presently."

- **Tim Cook**

Objectives



Realistic



Personalized



**Convenient &
Easy-to-use**

Features



Login/Sign Up

User needs to be authenticated to use the app



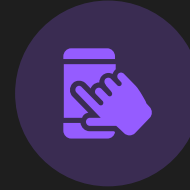
Face Scanning

Face is scanned for measurements



View Item in AR

Item viewed in AR can be customised by color and lighting

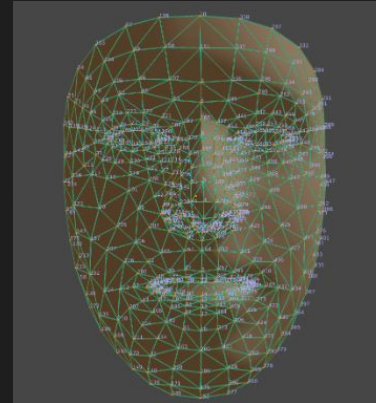
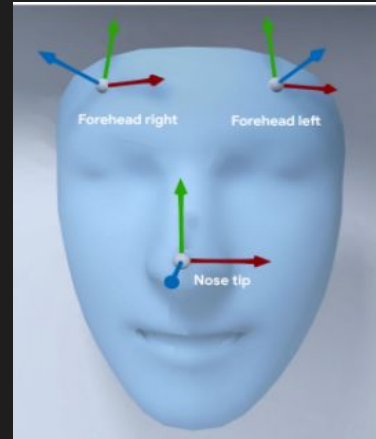


Checkout

Items added to cart can be purchased via Stripe

Augmented Faces

- Three Regions Pose (Left & Right Forehead, Nose)
 - Used by Accessories
- 468-point face Face Mesh
 - Used by glasses and face masks



3D Models

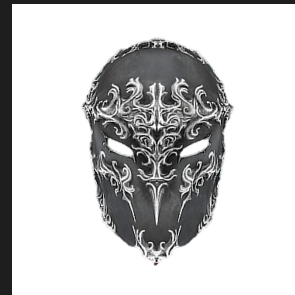
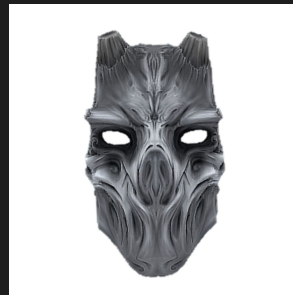
Glasses

- Plastic frames (Metallic workflow)
 - Metallic: 0 & Smoothness: 0.5
- Metallic frames (Metallic workflow)
 - Metallic: 0.5 & Smoothness: 0.5



Masks

- Plastic (Metallic workflow)
 - Metallic: 0 & Smoothness: 0.5
- Metallic (Metallic workflow)
 - Metallic: 0.5 & Smoothness: 0.5

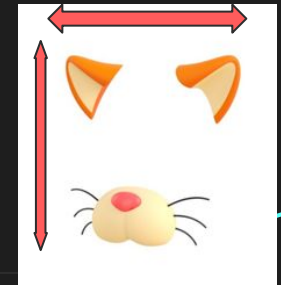
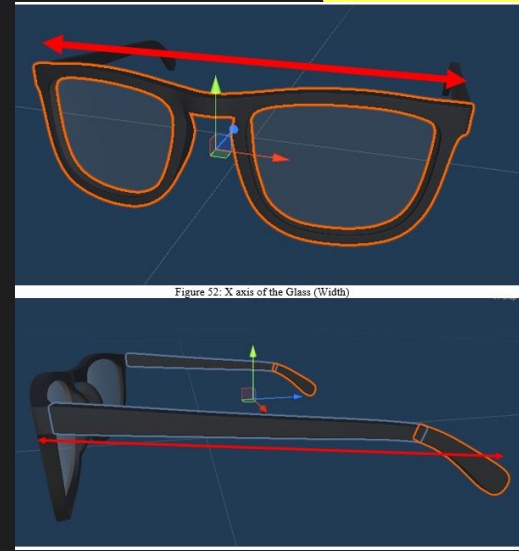


Personalisation

- Face Scanning
 - Retrieve measurements to deliver custom-fitted products
- Recently Viewed History
 - User's try-on activity is recorded and displayed in the recently viewed section
 - User can tap on the item and be redirected to the item details page
- Custom generated Accessories, Masks, Glasses
 - E.g. Glasses models are constructed from frames, temples, and temple ends
 - Application analyses user's try-on history combines the different parts to form an entirely new pair of glasses.

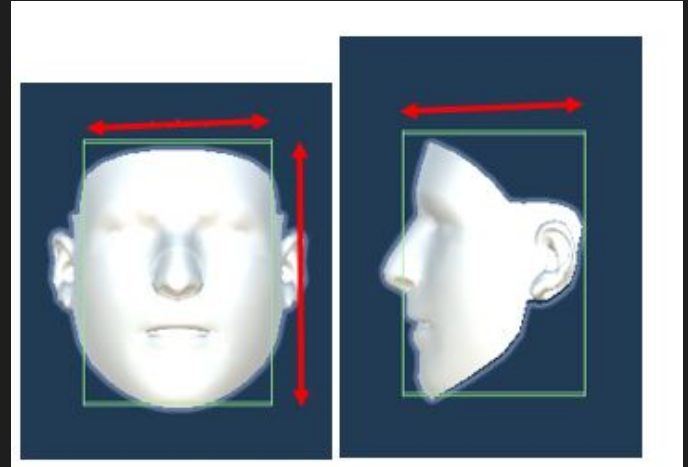
Face Scanning

- Ensure items dimensions fit user
- Compares measurement of face against items
 - Width and depth for glasses
 - Width and Length for masks
 - Width and Length for Accessories
- Customised product if it doesn't fit



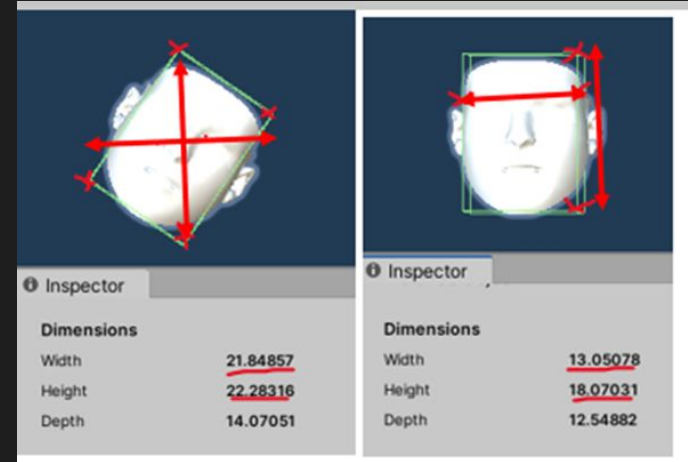
Face Scanning

- Enclose face mesh within boundary box
- Takes 3 measurements from the face
 - Width (x)
 - Length (y)
 - Depth (z)

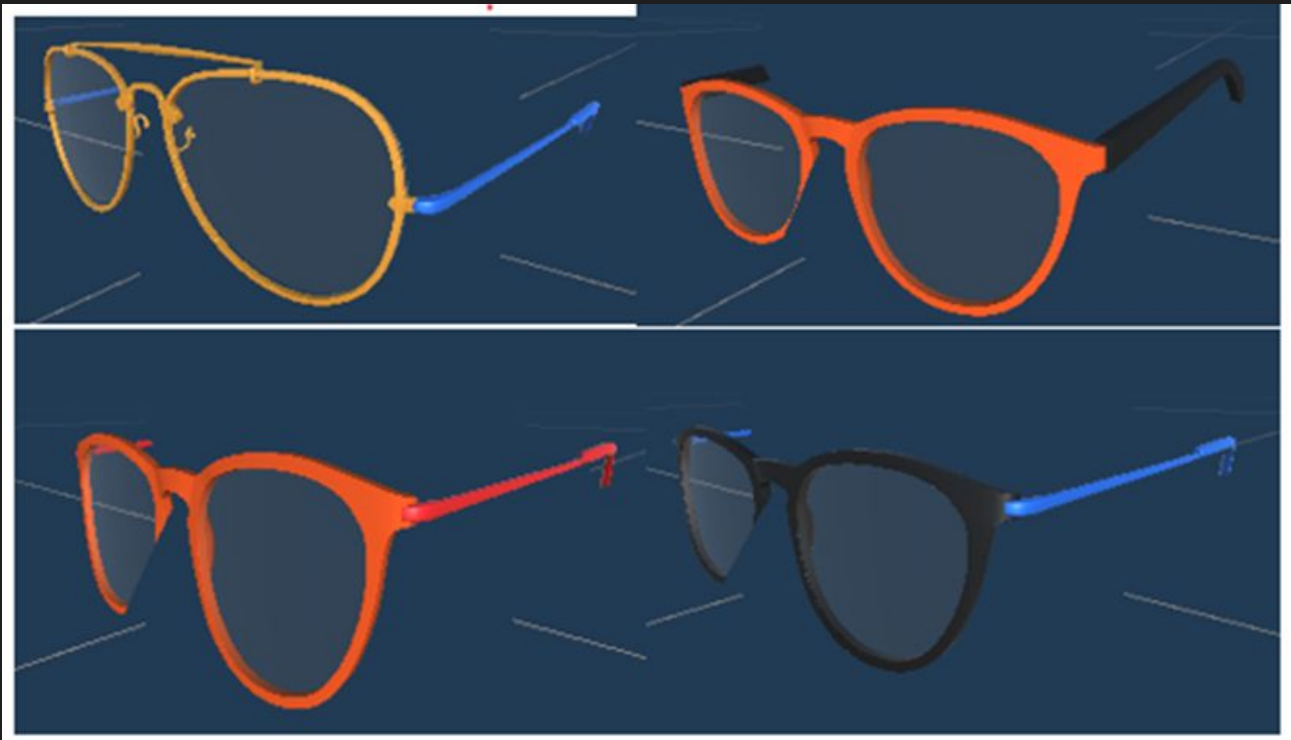


Face Scanning

- To get an accurate scan of a user's head, we keep track of the user's 6 Degrees of Freedom(DoF) in the 3D space
- To avoid inaccurate measurements, user's head must be facing forward and positioned upright
 - Track Yaw value or Rotation Y in Unity3D (Facing forward)
 - Track Roll value or Rotation Z in Unity3D (Positioning upright)
 - Small margin of error allowed (+-1)

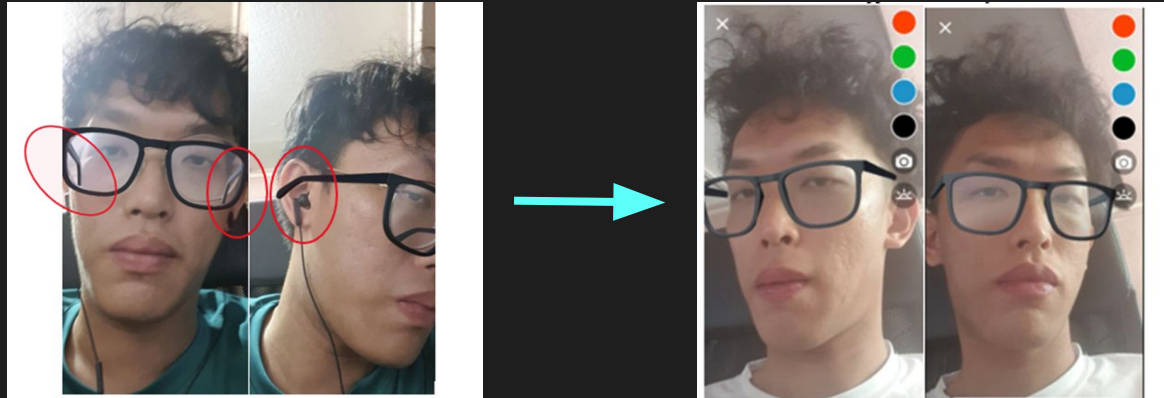


Custom Generated Glasses



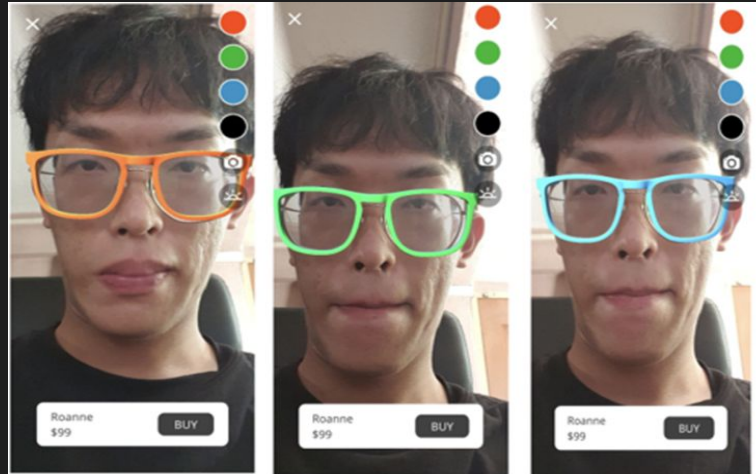
Occlusion Technique (Glasses)

- Ensure projected glasses look realistic
- Apply a masking shader on the face mesh which will have a higher Z-Buffer value than the pair of glasses
 - Some parts of glasses with lower Z-buffer value will not be rendered and are occluded



Effects in AR Scene

- Color change
 - 4 different colours are available for item customization (Red, Green, Blue, Black)
 - Implemented by modifying the RGB values of the color material attached to the item



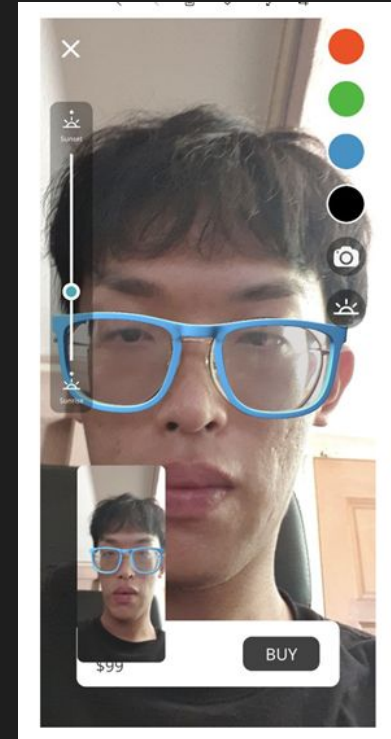
Effects in AR Scene

- Sunrise/Sunset Effect
 - Uses a directional light to imitate sun's glow
 - Varying the light intensity simulates the sunrise/sunset effect
 - Reflection probe is added onto the scene to simulate reflection



Effects in AR Scene

- Screenshot Feature
 - Allows users to seamlessly take a picture of themselves wearing their favourite pair of glasses
 - Saved to the user's gallery where they can share the image with their friends and family
 - Compare different styles easily



Firestore & Stripe Integration

- Firestore Authentication
 - Account creation and Sign-in process
- Firestore Cloud Database
 - Store user's face dimensions, item details, and delivery address
- Stripe
 - Payment gateway service for users to pay for their purchases



Firestore



stripe



Firestore

🔥 Firebase

🏠 Project Overview ⚙️

Build

👤 Authentication

🔥 Firestore Database

📄 Realtime Database

📁 Storage

🌐 Hosting

⚡ Functions

🧠 Machine Learning

Release and monitor

📊 Crashlytics

📈 Performance

🧪 Test Lab

📦 App Distribution

Analytics

Dashboard, Realtime, Events, Conve...

Engage

A/B Testing, Cloud Messaging, In-A...

Extensions

Spark

No cost \$0/month Upgrade

NTUFYP

Go to docs 🔔 E ?

Realtime Database

Data Rules Backups Usage

🛡️ Protect your Realtime Database resources from abuse, such as billing fraud or phishing [Configure App Check](#) ✕

🔗 https://ntufyp-2aa62-default-rtdb.asia-southeast1.firebaseio.com/

⚠️ Your security rules are defined as public, so anyone can steal, modify or delete data in your database [Learn more](#) [Dismiss](#)

ntufyp-2aa62-default-rtdb

orders

order1

Address: "Blk 73 Geylang Bahru #04-330073"

Depth: 14

Email: "ben@hotmail.com"

Model: "Roanne"

Width: 14.2

order2

Address: "Blk 74 Geylang Bahru #04-330073"

Depth: 15

Email: "john@hotmail.com"

Model: "Roanne"

Width: 15.2

order3

Address: "Blk 75 Geylang Bahru #04-330073"

Depth: 16

Email: "peter@hotmail.com"

Model: "Roanne"

Width: 16.2

📍 Database location: Singapore (asia-southeast1)



New Business	Activate account	Search...	Create	Help			
Home	Payments	Balances	Customers	Products	Reports	Connect	More
TEST DATA				Developers Test mode			
Payments		Payments		Filter Export Create payment			
All payments	All	Succeeded	Refunded	Uncaptured	Failed		
All transactions							
Fraud & risk							
Invoices							
Subscriptions							
Quotes							
Payment links							
		AMOUNT	DESCRIPTION		CUSTOMER	DATE	
		€15.23	Succeeded	blah ! blah !	defaultuser@gmail.com	20 Mar, 22:51	
		SGD 99.00	Succeeded	"order1": {"Email": "ben@hotmail.com", "Model": "Roanne", "Width": 14.2, "Depth": 14, "Address": "Blk 73 Geylang Bahru #04-330073"}	ben@hotmail.com	20 Mar, 22:45	
		SGD 99.00	Succeeded	"order2": {"Email": "john@hotmail.com", "Model": "Roanne", "Width": 15.2, "Depth": 15, "Address": "Blk 74 Geylang Bahru #04-330073"}	john@hotmail.com	20 Mar, 22:45	
		SGD 11,111.00	Succeeded	"order3": {"Email": "peter@hotmail.com", "Model": "Roanne", "Width": 16.2, "Depth": 16, "Address": "Blk 75 Geylang Bahru #04-330073"}	peter@hotmail.com	20 Mar, 22:44	
		SGD 15.00	Succeeded	"order6": {"Email": "shinzo@hotmail.com", "Model": "Roanne", "Width": 19.2, "Depth": 19, "Address": "Blk 76 Geylang Bahru #04-330073"}	shinzo@hotmail.com	20 Mar, 22:43	
		SGD 12.00	Succeeded	"order4": {"Email": "luke@hotmail.com", "Model": "Roanne", "Width": 17.2, "Depth": 17, "Address": "Blk 76 Geylang Bahru #04-330073"}	luke@hotmail.com	20 Mar, 22:42	
		SGD 12.00	Succeeded	"order5": {"Email": "vader@hotmail.com", "Model": "Roanne", "Width": 18.2, "Depth": 18, "Address": "Blk 77 Geylang Bahru #04-330073"}	vader@hotmail.com	20 Mar, 22:42	
		SGD 12.00	Succeeded			20 Mar, 22:40	
		SGD 12.55	Succeeded			17 Mar, 22:40	
		SGD 10.00	Succeeded			17 Mar, 22:30	
		SGD 10.00	Succeeded			17 Mar, 22:27	
		SGD 12.34	Succeeded			15 Mar, 15:36	
		€15.15	Incomplete			14 Mar, 15:52	
		€15.15	Succeeded			14 Mar, 14:38	
		€51.00	Succeeded			14 Mar, 01:06	
		€51.00	Incomplete			14 Mar, 01:04	
		€51.00	Incomplete			14 Mar, 01:01	

Contributions (Luo Hao, Fazli, Ernest)

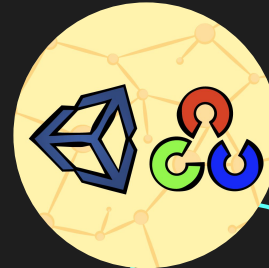
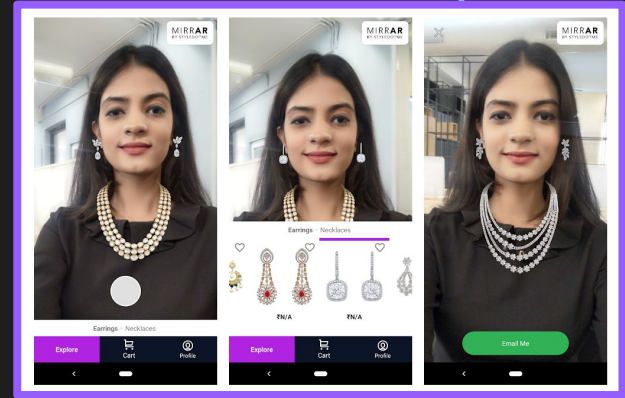
- Front-end Development
 - UI Design & Implementation (Luo Hao)
 - AR Setup & Implementation (Luo Hao, Fazli)
- Back-end Development
 - Firebase and Stripe Integration (Ernest)

Contributions (Rachel, He Wanru)

- Debug
 - QA Testing (Rachel)
- Video Editing and Flow
 - App Demo (He Wanru)
- Presentation Slides (Rachel, He Wanru)

Areas of improvement

- Increase variety of products to try on
 - Clothing
 - Apparel
 - Jewellery
- Build for iOS Application
 - Currently only available for android users
- Integration of Machine Learning & Computer Vision
 - Detection of already worn-on objects
 - Prompt user to remove worn-on objects
 - Better UI/UX





App Demo

Credits

- BariaCG (Glasses and Face Filters)
 - Products. BariaCG. (n.d.). Retrieved April 12, 2022, from <https://bariacg.com/product>
- Masks Pack 2 (Masks) : By Dmitriy Dryzhak, Unity Asset Store

References

- P. Wadhvani and S. Gankar, "Augmented reality (AR) market size to cross \$50bn by 2024," Global Market Insights Inc., 16-Sep-2019. [Online]. Available: <https://www.gminsights.com/pressrelease/augmented-reality-ar-market#:~:text=Augmented%20Reality%20Market%20size%20is,the%20augmented%20reality%20industry%20growth.> [Accessed: 06-Apr-2022].

The background is dark gray with several decorative elements: a cyan circle outline in the top left, a solid cyan circle in the top center, a solid red circle in the top right, a solid green circle in the bottom left, and a red circle outline in the bottom center. The text 'Thank you' is centered in a white, bold, sans-serif font. The letter 'T' is highlighted with a yellow-to-green gradient circle behind it.

Thank you