

Engineering
Awesome
Conference.

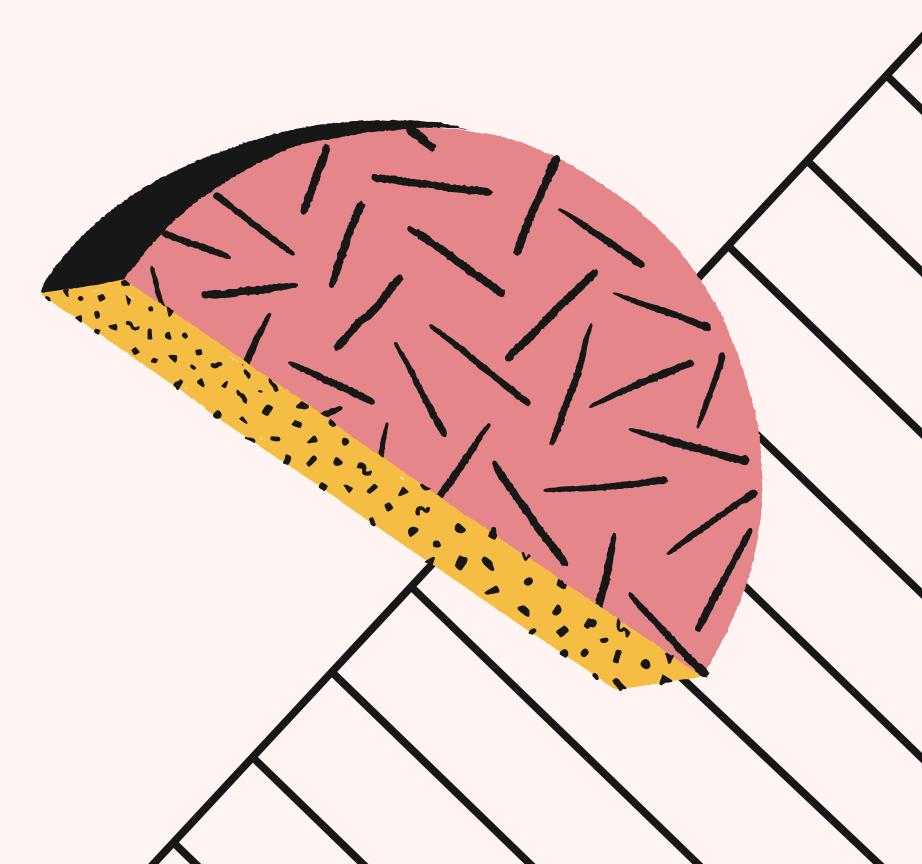
BUILDING AUGMENTED REALITY EXPERIENCES WITH IOS

Roxana Jula



“Build unparalleled augmented reality experiences for hundreds of millions of users on iOS and iPadOS, the biggest AR platforms in the world.”

- Apple



~ 650 million ARKit-compatible devices

- arinsider.co (2019)

Connecting back with our surroundings



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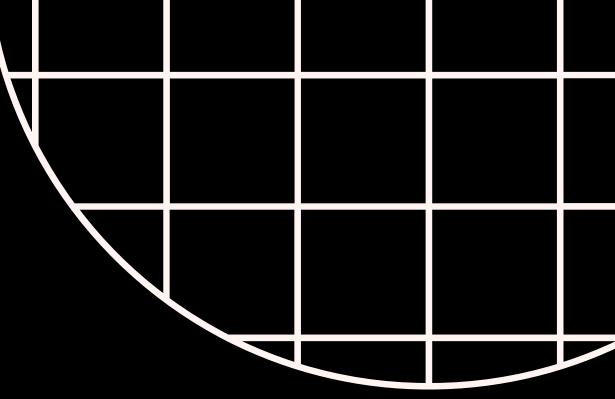
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Image Source [David Grandmougin](#)



Apple AR Glasses coming soon?

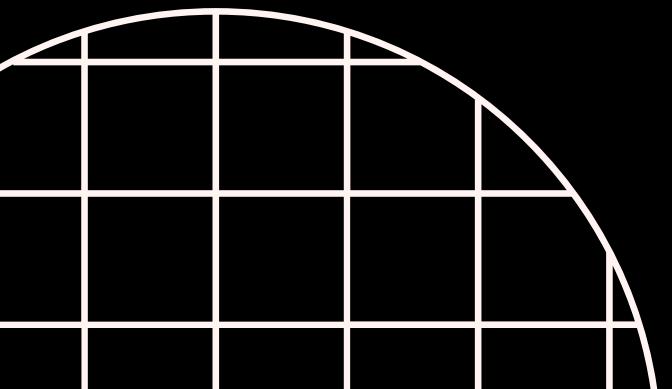
[Great roundup by MacRumours](#)



Facebook Project Aria

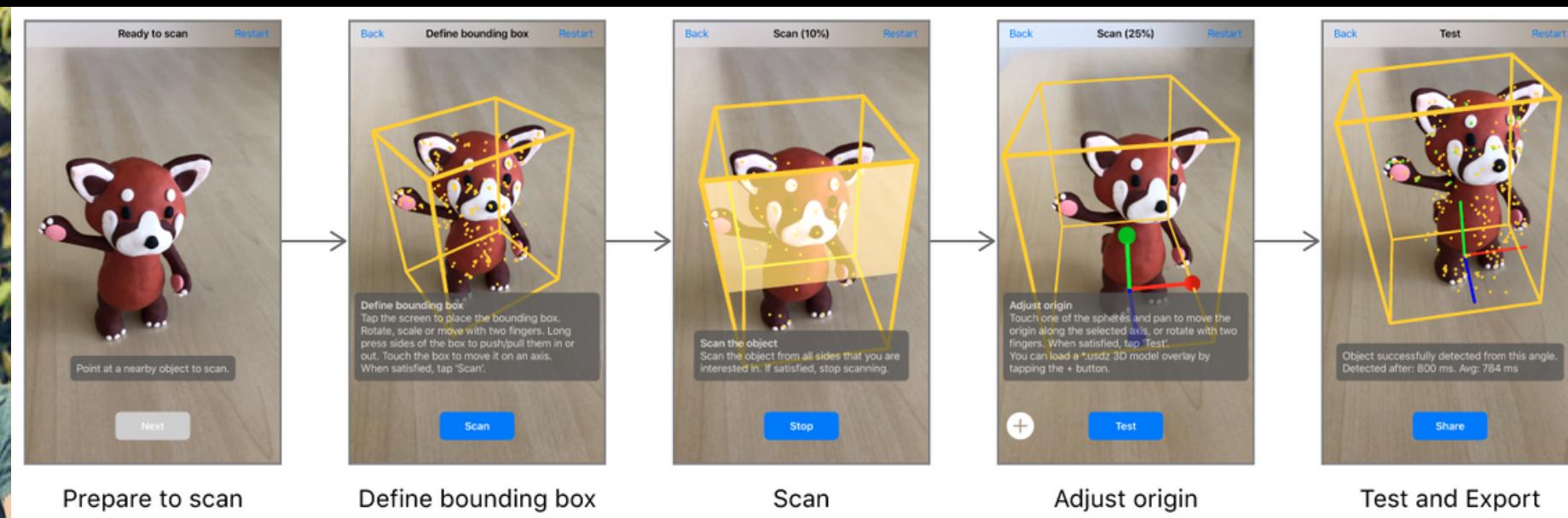
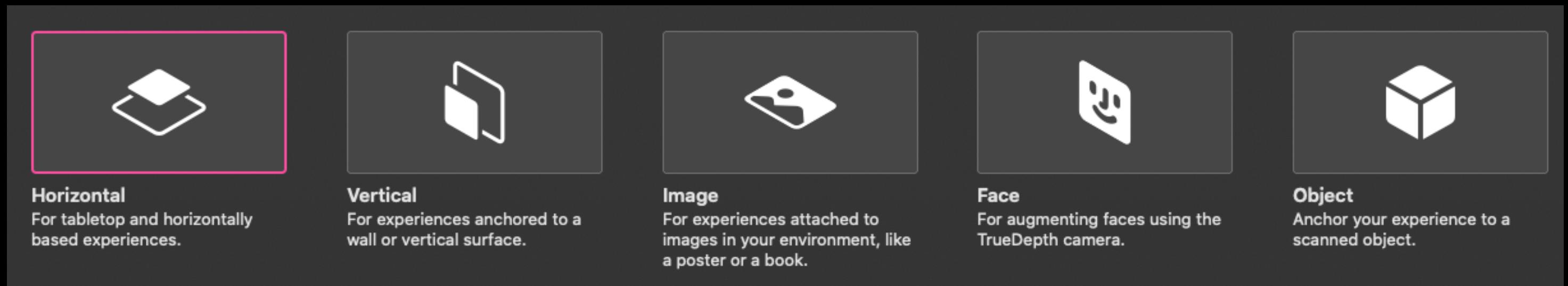
A Research Project on the Future of
Wearable AR

Announced last week at the FbConnect
event



Types of AR Experiences

Based on anchor types

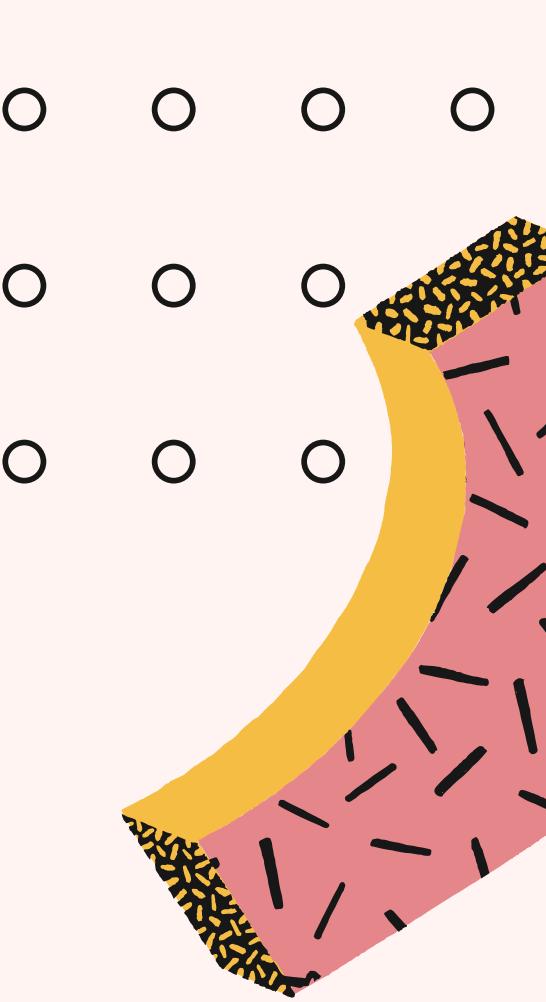




Location Anchoring

Geo-referenced AR content

- Apple Maps visual location
- [ARGeoTrackingConfiguration](#) - will combine GPS, the device's compass and world-tracking features to enable back-camera AR experiences to specific locations
- Location anchors ([ARGeoAnchor](#)) will be used to specify the latitude, longitude, and optionally, altitude
- ARGeoTrackingStatus to help guide the user
- Great potential for developing AR street routes, AR scavenger hunts games and more
- *Available on select cities and areas*
- *Requires iPhone XS, iPhone XS Max, iPhone XR, or later*

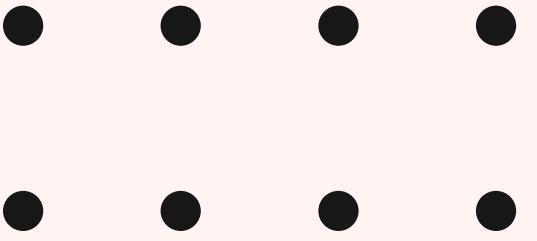


Types of AR Experiences :



Based on camera types

- You can augment the user's environment through either the front or back camera of iOS devices
- Since **ARKit 3**, you can get data from both cameras simultaneously but you can still show AR content on only one at a time



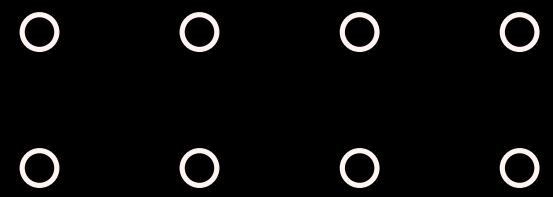
BACK CAMERA

- [ARWorldTrackingConfiguration](#)
- Most common
- Used to display AR content and interact with it on top of the user's real world
- The experiences are more immersive
- Objects and images recognition
- Real-world lighting conditions

FRONT CAMERA

- [ARFaceTrackingConfiguration](#)
- Real-time tracking for the pose and expression of faces
- You can even omit the camera view and use facial expressions to animate virtual characters (Like the Memoji for iMessage)





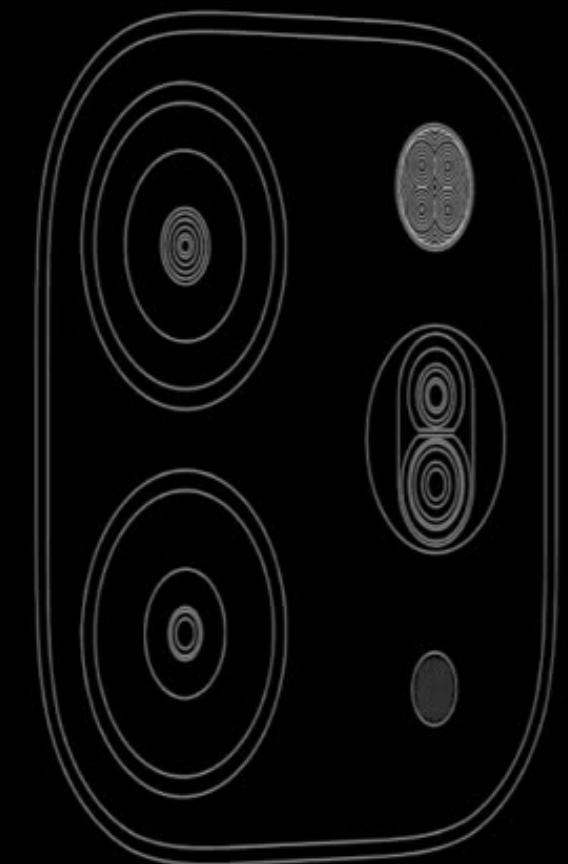
LiDAR Scanner

Light Detection and Ranging

- Measures the distance to surrounding objects up to 5 meters away
- Works both indoors and outdoors
- Allows instant placement of AR objects in the real world without scanning
- Operates at the photon level at nano-second speeds
- *Available on the latest iPad Pro*



LiDAR Scanner



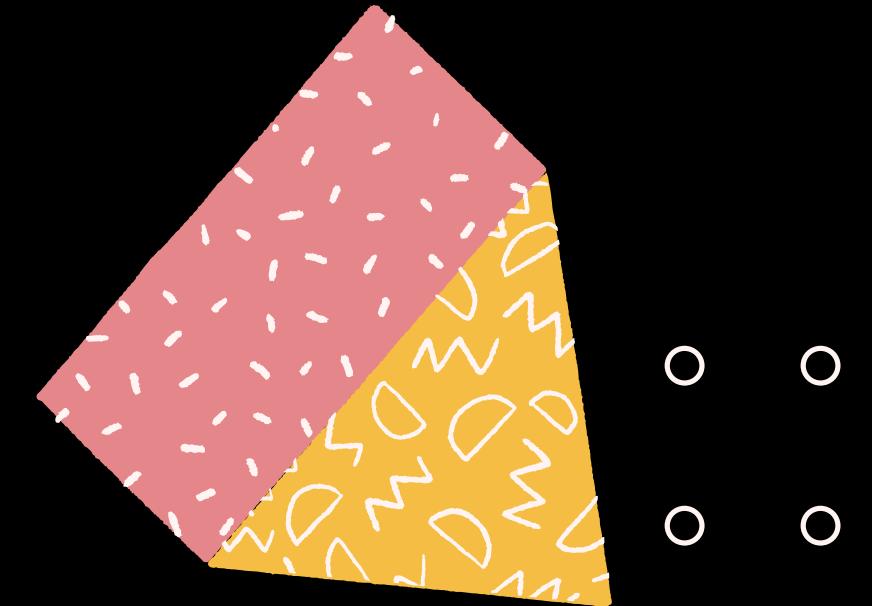
LiDAR Scanner

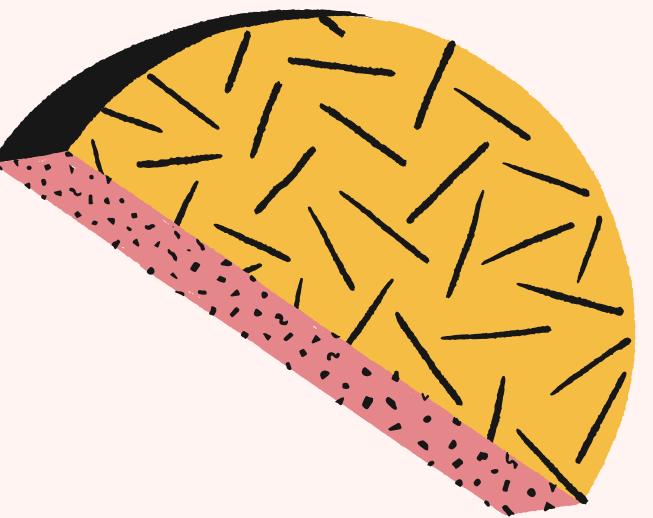
- Improved Object Occlusion
Rendering



Depth API

- Powered by the LiDAR scanner
- Gives developers access to use per-pixel depth information about the surrounding environment
- Occlusion and placement of 3D content even more realistic
- Potential use cases:
 - Taking more precise measurements
 - Applying effects to a user's environment
 - Taking body measurements for more accurate virtual try-ons
 - Testing how your room will look like with different wall colors
- *Available from ARKit 4, on the latest iPad Pro*





People Occlusion



AR Content placed in front or behind of people

- Machine Learning powered. All possible thanks to Apple's Neural Engine
- Recognises multiple people in the frame, even if they are only partially visible
- It isolates the pixels with people and using depth estimation it approximates the distances of people
- If a person is closer to the camera than the AR content, those pixels will be rendered on top of everything, else they will be rendered behind the AR content.
- *Potential for green screen-style effects in almost any environment*



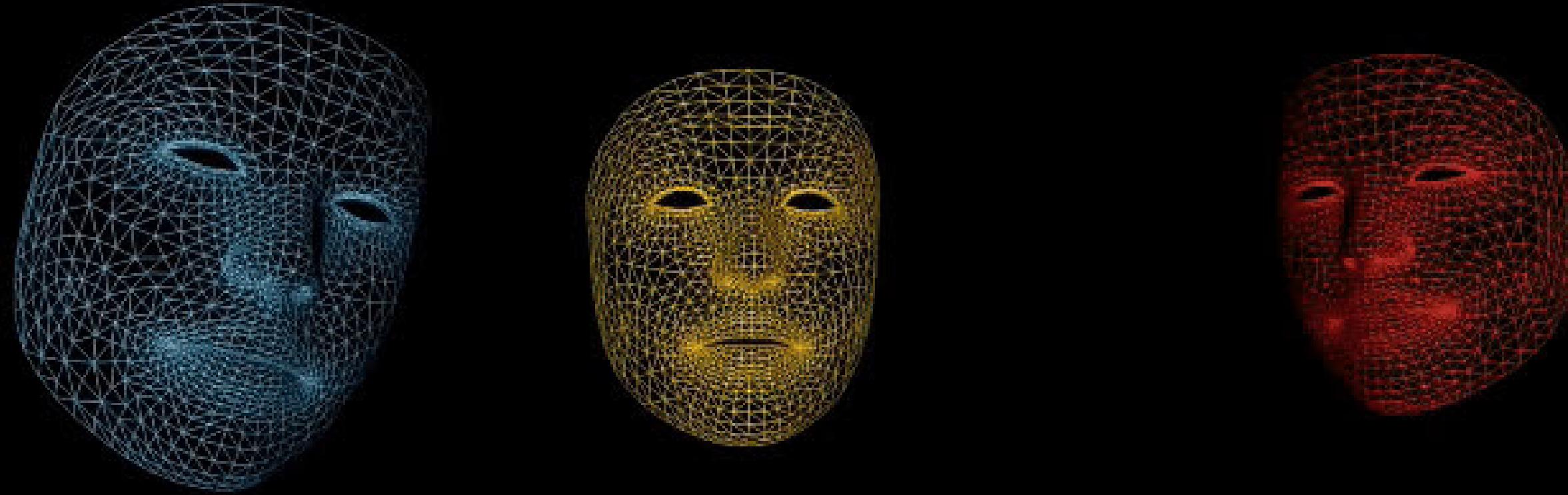
Motion Capture

- Capture the motion of a person in real time with a single camera
- Previously possible only with special equipment
- Gives developers a skeleton representation of the human body
- Powered by Apple's Neural Engine
- Great potential for the gaming industry

```
root
hips_joint
left_upLeg_joint
left_leg_joint
left_foot_joint
left_toes_joint
left_toesEnd_joint
right_upLeg_joint
right_leg_joint
right_foot_joint
right_toes_joint
right_toesEnd_joint
spine_1_joint
spine_2_joint
spine_3_joint
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spine_7_joint
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right_forearm_joint
right_hand_joint
right_handThumbStart_joint
right_handThumb_1_joint
right_handThumb_2_joint
right_handThumbEnd_joint
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right_handIndex_1_joint
right_handIndex_2_joint
right_handIndex_3_joint
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right_handRing_2_joint
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left_handPinky_3_joint
left_handPinkyEnd_joint
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jaw_joint
chin_joint
nose_joint
right_eye_joint
right_eyeUpperLid_joint
right_eyeLowerLid_joint
right_eyeball_joint
left_eye_joint
left_eyeUpperLid_joint
left_eyeLowerLid_joint
left_eyeball_joint
neck_1_joint
neck_2_joint
neck_3_joint
neck_4_joint
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Face tracking



- Supported on the front-facing camera of any device with A12 Bionic chip and later
- Track up to 3 faces simultaneously

Collaborative sessions

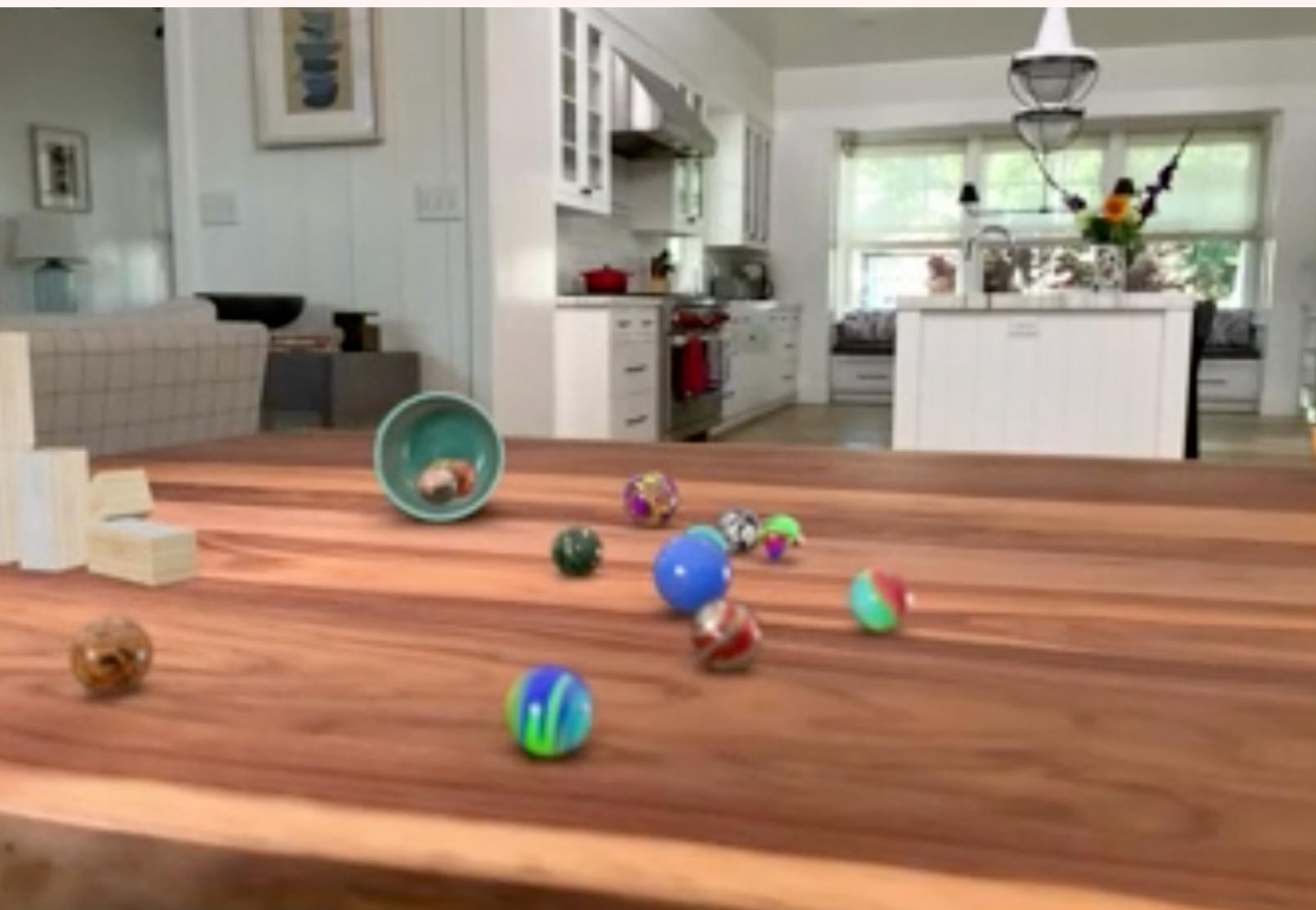
You can build a collaborative world map between multiple people, making it faster for you to develop AR experiences and for users to get into shared AR experiences like multiplayer games.



Visual coherence

for realistic AR experiences

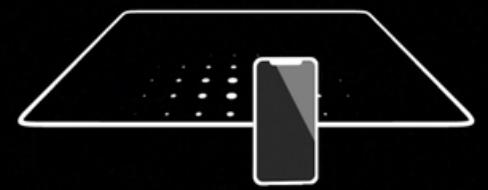
- **Depth of field effect** - this makes the virtual content blend with the environment more naturally by adjusting the focus of the objects to be the same as with the real content through the camera
- **Motion blur** - on virtual content when the object moves quickly or when you move quickly to add an extra dimension to the realism of the experience.
When you don't have any motion blur on your objects, they stand out from the rest of what you are seeing
- **HDR environment textures**
- **Camera grain** - when we are in a low light environment the camera will produce grain and ARKit will now add that grain to the virtual content so it doesn't stand out



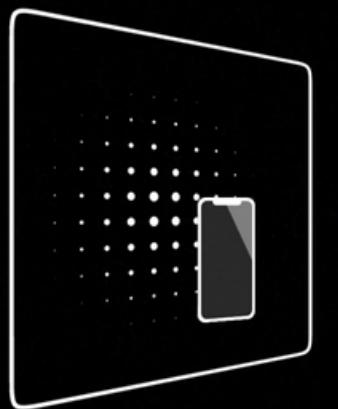
AR Coaching UI

to easily guide your users

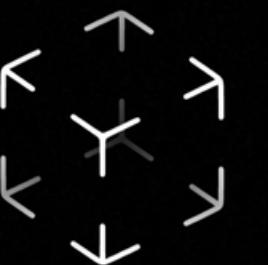
- A built-in user interface overlay for AR apps that will ensure a good tracking experience
- Consistent in all apps so users will be familiar with it



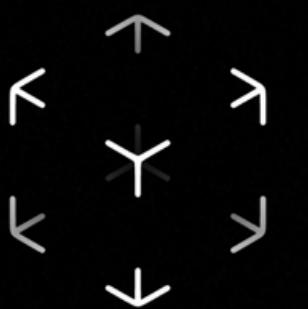
Move iPhone to start



Move iPhone to start



Continue to move iPhone



Move slowly



AR Quick Look & USDZ

AR QUICK LOOK

- AR Quick Look provides a very powerful augmented reality experience with user interactions like moving/scaling the object, people occlusion and sharing of the model supported “out of the box”.
- AR Quick Look supports 2 input formats: **.usdz** and **.reality**.

USDZ

- The technology behind it is called **USD (Universal Scene Description)**.
- It is a 3D file format developed by **Pixar** and it has a focus on speed, scalability and collaboration.
- USDZ is the distribution format for USD, which is a compact single file that is optimised for sharing.

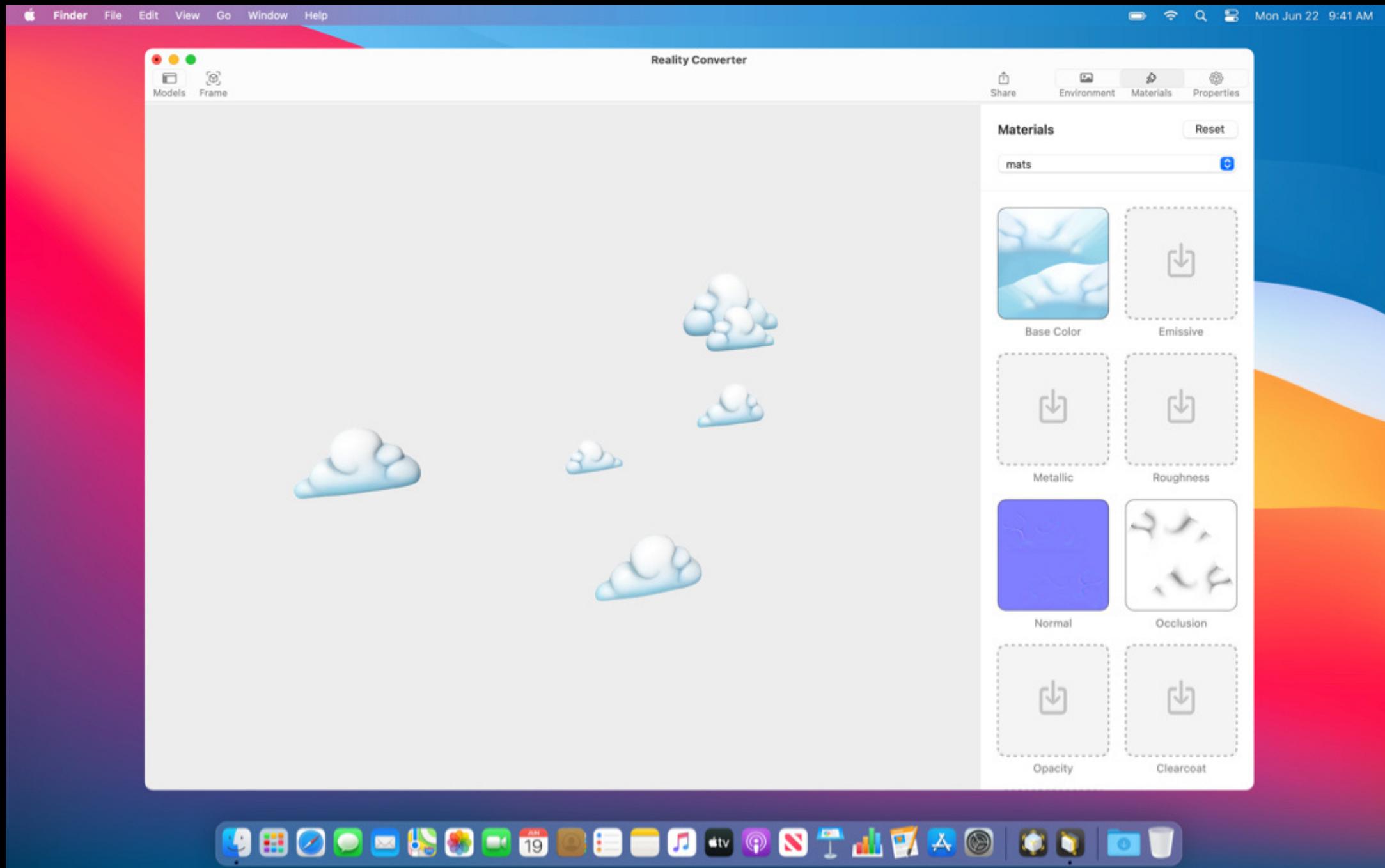
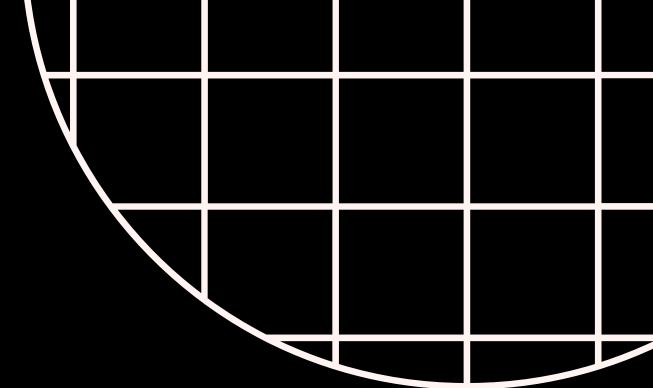


Reality Composer

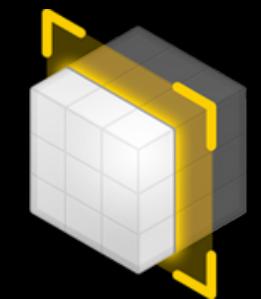
- Prototype and produce content for AR experiences that you can integrate in Xcode or export to AR Quick Look
- Great for creators with no prior 3D experience
- Built-in AR Library
- Live linking
- Seamless tools
- Animation and spatial audio
- Record and play
- [Available on the App Store](#)
- Available on iOS, iPadOS, macOS



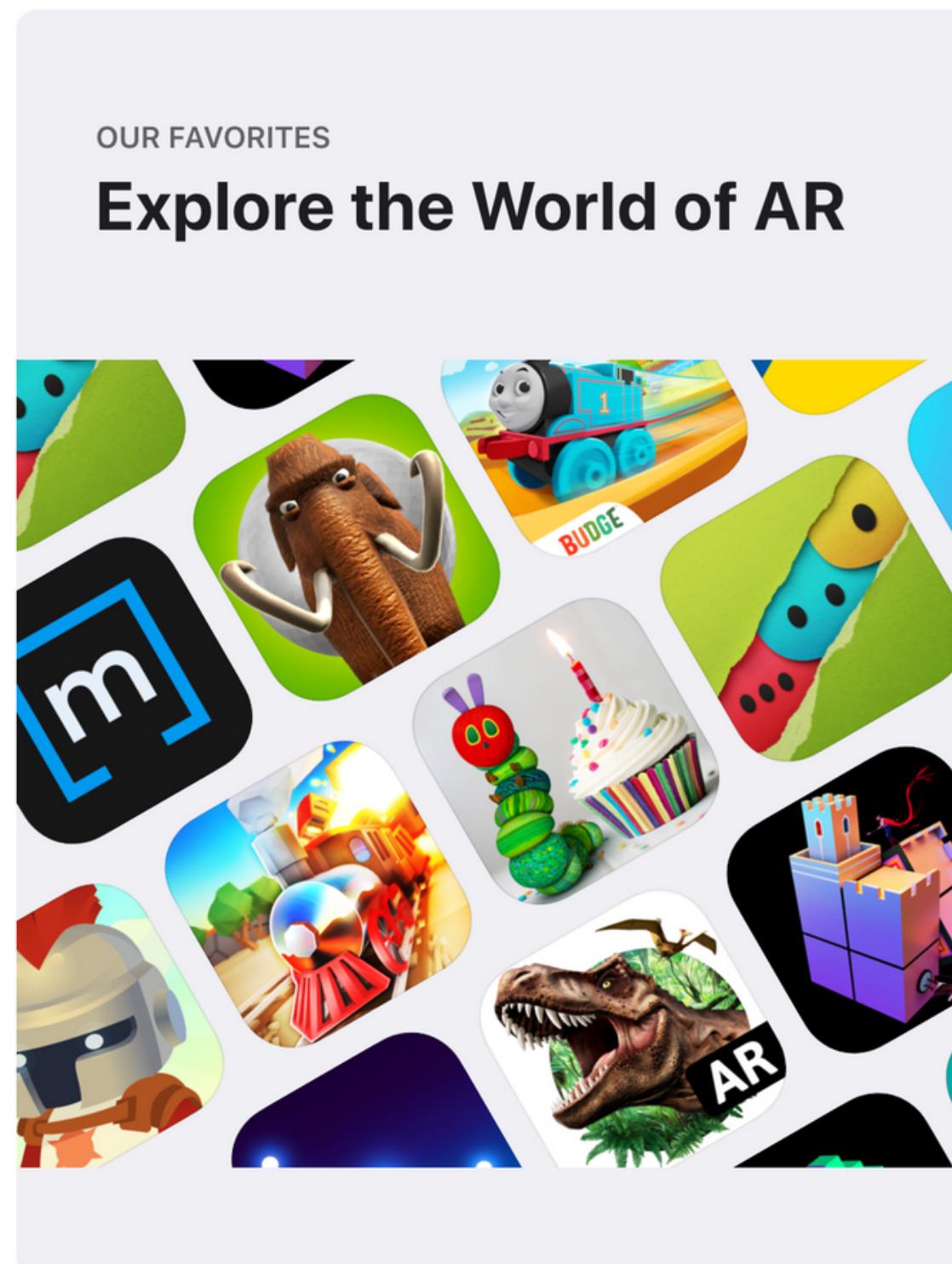
Reality Converter



- BETA 3 version
- Convert, view and customise USDZ 3D objects
- Drag and drop functionality
- Supports common file formats such as .obj, .gltf and .usd
- Preview the objects under different lighting and environment conditions
- USDZ Python based tools also available for generating, validating and inspecting USDZ files
- *Available on macOS*



Explore the world of AR



AR Apps

-  My Very Hungry Caterpillar AR
Explore the world together [VIEW](#)
-  Human Anatomy Atlas 2021
Complete 3D Human Body [VIEW](#)
-  Sky Guide
View Stars Night or Day [VIEW](#)
-  IKEA Place
Augmented Reality Furnishing [VIEW](#)
-  magicplan
Measure Sketch Report Estimate [VIEW](#)
-  Thomas & Friends Minis
The ultimate train set builder [VIEW](#)
-  GIPHY World: AR GIF Stickers
Augmented Reality GIFs in 3D [VIEW](#)
-  Houzz - Home Design & Remodel
Remodeling Ideas & Local Pros [VIEW](#)



50 iOS Augmented Reality Apps **to inspire your next idea**





THANK YOU!

ANY QUESTIONS?

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