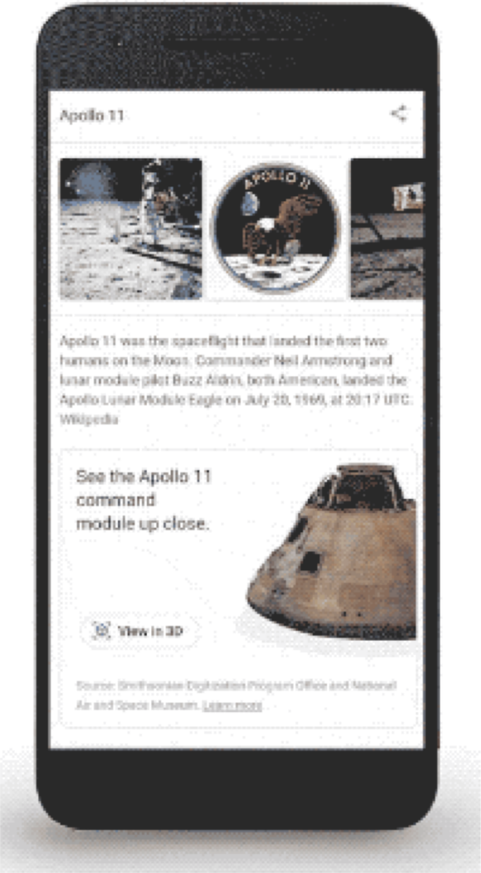
glTF 2.0 in Google Search

Adrian Perez
July 2019

Who I am and why I'm here

- Hello, I'm Adrian from Google
- Previously: Bungie, Suckerpunch
- I'm here on behalf of the team that delivered the "View in 3D / View in your space" capability in Search



Apollo 11

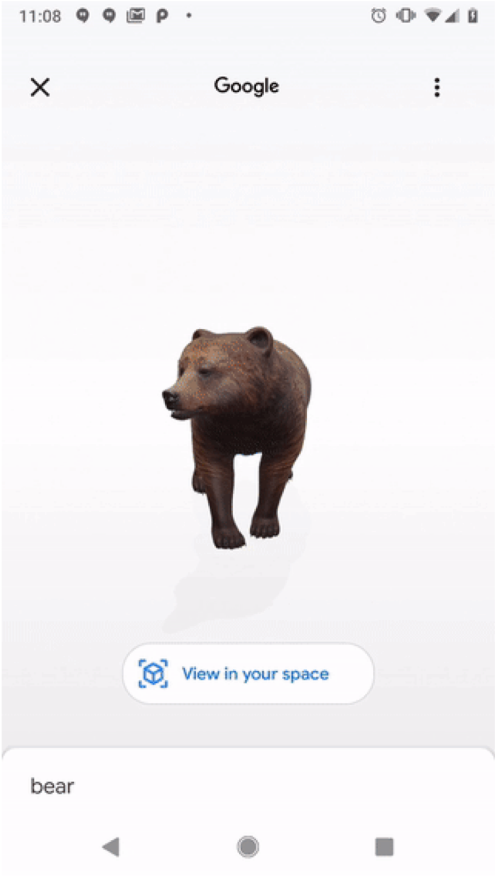
Apollo 11 was the spaceflight that landed the first two humans on the Moon. Commander Neil Armstrong and lunar module pilot Buzz Aldrin, both American, landed the Apollo Lunar Module Eagle on July 20, 1969, at 20:17 UTC. Wikipedia

See the Apollo 11 command module up close.

Source: Smithsonian Digitization Program Office and National Air and Space Museum. Learn more

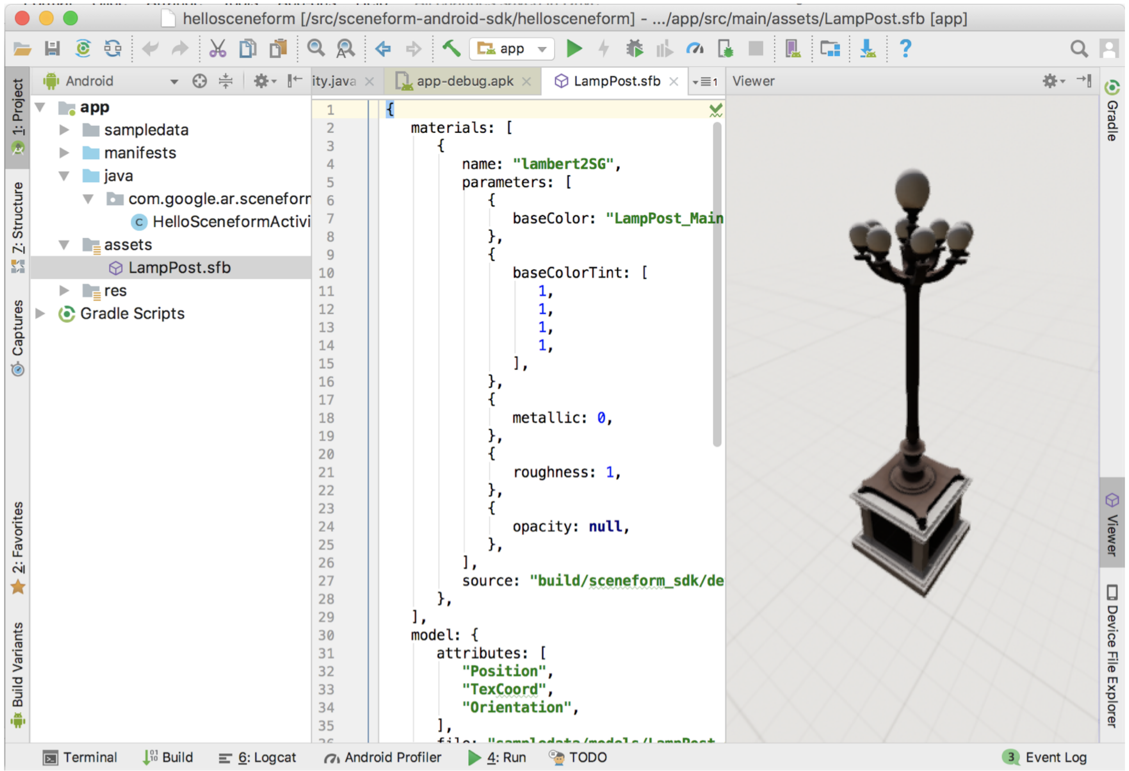
Who I am and why I'm here

- Our team had domain experience having shipped Sceneform in 2018
- Sceneform had a lot of challenges delivering on its vision via .obj / .fbx
- The glTF format addresses many of these issues, and for us it's a match made in heaven.



What is Sceneform

- Helps non-experts make AR activities on Android
- App side: a easy to use java API using Android idioms (scene management, material modification, hit testing, UI helpers, &c)
- Tool side: A wizard for importing .obj/.fbx files, a viewer, and build rules for Android Studio / Gradle
- Both built on Filament, a modern PBR renderer
- Many 1p/3p clients, e.g. Google Maps, Target.



```
{
    materials: [
        {
            name: "lambert2SG",
            parameters: [
                {
                    baseColor: "LampPost_Main
                },
                {
                    baseColorTint: [
                        1,
                        1,
                        1,
                        1,
                    ],
                },
                {
                    metallic: 0,
                },
                {
                    roughness: 1,
                },
                {
                    opacity: null,
                },
            ],
            source: "build/sceneform_sdk/de
        },
    ],
    model: {
        attributes: [
            "Position",
            "TexCoord",
            "Orientation",
        ],
        file: "sampledata/models/LampPost
```

Challenges achieving Sceneform’s vision

- **Creating automatic metallic-roughness PBR materials from an obj/fbx is *really subjective***
  - Stingray materials made the best case better, but can’t be a requirement
  - Ex: *some* use contexts ignore per-vertex color, so some assets have it in there as an authoring aid
  - OBJ files are a try-your-best, provide after-the-fact editing (e.g. which edges are hard? transparency?)
- **Loading obj/fbx on device is *really impractical***
  - Our solution was to build a runtime format (.sfb) which e.g. combined encoded images into a single flatbuffer structure
- **Delivering (rather than packing in) our runtime format is *really unpalatable***
  - Our primary clients want to put known-quantity assets in *their* CDN and *be done with it*
  - It can be made to work (Google Maps), but is a hassle (e.g. we need to customize the delivered asset per-version because of small material incompatibilities as features get added to Filament)

glTF 2.0 To the Rescue

- **No need for per-asset compiled materials**
  - Permutation space is much smaller
  - Lighting mode, Blending mode, &c
  - Material pack can be downloaded once and re-used
- **No need for asset pre-processing**
  - Format is simple enough to parse live
  - Mild filament fixups (quaternion tangent spaces, normalized blend weights)
- **No need to get in the way**
  - We built a fuzzed, sandboxed loader with tight runtime/binary constraints
  - gltf/glb’s can live *wherever* and delivered *however* and be loaded safely.
  - Loaded data is driven by Sceneform UX code

Next Steps for glTF @ Google

- **Make our sandboxed glTF loader available in Sceneform**
  - Loads 5-10x faster than our existing glTF loader and can safely load downloaded assets
- **Work to address remaining ambiguities**
  - ADOBE_materials_thin_transparency (or a similar glass-supporting transparency model) would remove a stumbling block for our partners
- **Address corner cases with our implementation**
  - Prioritized by partner requests
- **Wider platform support**
  - E.g. a small/fast loader works great in WASM

Thank You!

- https://developers.google.com/ar/develop/java/sceneform/
- https://github.com/google/filament
- https://careers.google.com/jobs/