Graphics on Smartphones

Bohdan Romashchenko

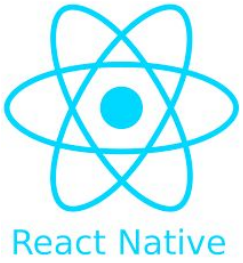
Goal

- Learn, describe and demonstrate a couple of ways to bring custom 3D graphics to mobile apps

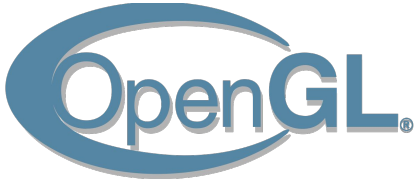
Motivation

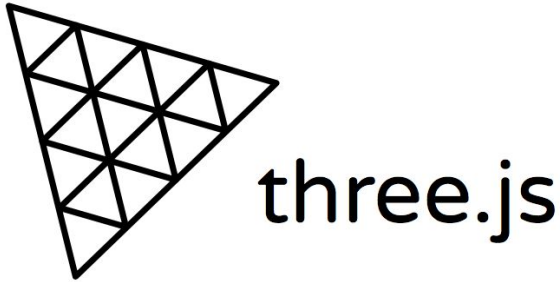
- CG course 2020/2021
- Mobile app enthusiast

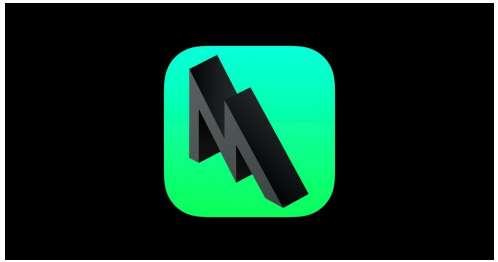
Mobile apps



3D graphics







Android OpenGL

- Up to OpenGL ES 3.1
- Both SDK and NDK
- Good control over graphics

Android SDK OpenGL

- **GlSurfaceView**
- **GlSurfaceView.Renderer**
  - onSurfaceCreated()
  - onDrawFrame()
  - onSurfaceChanged()

DEMO

Three.js

- JS based cross-platform mobile apps (React Native, Ionic, etc.)
- Relatively easy to use
- OOP

React Native + Three.js

- Through Expo!
- Packages: three, expo-three, expo-gl

React Native + Three.js

```
return (
    <GLView
      style={{ flex: 1 }}
      onContextCreate = {async (gl) => {

        //THREE CODE GOES HERE

        // Render function
        const render = () => {
          requestAnimationFrame(render);
          renderer.render(scene, camera);
          gl.endFrameEXP();
        };
        render();
      }}
    >
```

React Native + Three.js + React Three Fiber

- Three.js classes as React components
- No overhead

React Native + Three.js + React Three Fiber

```
return (
  <mesh
    {...props}
    ref={mesh}
    scale={active ? [1.5, 1.5, 1.5] : [1, 1, 1]}
    onClick={(e) => setActive(!active)}
    onPointerOver={(e) => setHover(true)}
    onPointerOut={(e) => setHover(false)}
  >
    <boxBufferGeometry attach="geometry" args={[1, 1, 1]} />
    <meshStandardMaterial
      attach="material"
      color={hovered ? "hotpink" : "orange"}
    />
  </mesh>
);
```

DEMO

Sources

1. OpenGL ES | Android Developers
2. OpenGL ES - OpenGL Wiki (khronos.org)
3. Three.js – JavaScript 3D Library (threejs.org)
4. expo/expo-three: Utilities for using THREE.js on Expo (github.com)
5. react-three-fiber