

# BUILD\_FAQ.md — iOS Portfolio (Next.js + R3F + Spline + Vercel)

A living FAQ/troubleshooting guide to prevent and fix common issues while building the **3D/Game** portfolio. Copy this file into your repo root.

## Preflight Checklist

- Node  $\geq$  **18.18** (LTS), npm or pnpm  $\geq$  **8**
- Next.js **15+** (App Router)
- Packages: `react`, `react-dom`, `@react-three/fiber`, `@react-three/drei`, `three`, `three-stdlib`, `framer-motion`, `zustand`, `next-seo`
- Optional: `gsap`, `@supabase/supabase-js`, `@vercel/og`, `resend`
- Accounts set up: **Vercel**, **Cloudflare R2** (assets), **Supabase** (optional), **Resend** (email)
- **Environment variables** configured in Vercel → Project → Settings → Env Vars

## Required env vars

```
NEXT_PUBLIC_MODE_DEFAULT=recruiter
NEXT_PUBLIC_ASSETS_BASE=https://<your-r2-public-endpoint>
RESEND_API_KEY=xxxxxxxxxxxxxxxxxxxxxxxxxxxx
NEXT_PUBLIC_SITE_URL=https://<your-domain>
```

## Optional env vars

```
SUPABASE_URL=https://xxxxx.supabase.co
SUPABASE_ANON_KEY=eyJhbGciOi...
PLAUSIBLE_DOMAIN=<your-domain>
```

## Routing & App Router Gotchas

**Q:** Refreshing a nested route (e.g., `/projects/pulse-incident-ios`) 404s?

**A:** On Vercel (SSR/SSG) it should work. If you used `next export` (static only), dynamic routes won't render. Use normal `next build` + Vercel, not `next export`.

**Q:** `Link` navigation is instant locally but slow on prod.

**A:** Enable route prefetch (default) and ensure images are optimized via `next/image` with `remotePatterns` (see below).

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## Assets (R2/S3) — CORS, MIME, and Cache

**Q:** GLB/MP4/WebP not loading or shows CORS errors in console?

**A:** 1) Set **CORS** on R2 bucket to allow your domain:

```
[
  {
    "AllowedOrigins": ["https://<your-domain>", "https://<your-vercel-subdomain>.vercel.app"],
    "AllowedMethods": ["GET", "HEAD"],
    "AllowedHeaders": ["*"]
  }
]
```

2) Ensure correct **Content-Type**: - `.glb` → `model/gltf-binary` - `.gltf` → `model/gltf+json` - `.ktx2` → `image/ktx2` - `.mp4` → `video/mp4` - `.webm` → `video/webm` - `.webp` → `image/webp`  
3) Add `Cache-Control: public, max-age=31536000, immutable` for versioned assets.

**Q:** Video scrubbing broken?

**A:** Enable **Range requests** in R2 and upload with correct `Content-Length`. Use `<video controls preload="metadata">`.

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## next/image Remote Patterns

**Q:** Images from R2/Cloudinary aren't rendering with `next/image`.

**A:** Add to `next.config.mjs`:

```
export default {
  images: {
    remotePatterns: [
      { protocol: 'https', hostname: '<your-r2-host>', pathname: '/*' },
      { protocol: 'https', hostname: 'images.unsplash.com', pathname: '/*' }
    ]
  }
}
```

## React Three Fiber / three.js Issues

**Q:** `window is not defined` or R3F explodes during SSR.

**A:** Dynamically import 3D components **client-side only**:

```
const Hero3D = dynamic(() => import('./Hero3D'), { ssr: false })
```

Also place `"use client"` at the top of any R3F component file.

**Q:** GLB model loads black / no texture.

**A:** - Ensure materials bake or correct texture paths. - If using KTX2, add a KTX2 loader via `drei`'s `useKTX2` or set `useGLTF.preload`. - Use an HDRI env map; check color spaces: set `gl.outputColorSpace = THREE.SRGBColorSpace`.

**Q:** Performance tanks on mobile.

**A:** - Clamp DPR: `<Canvas dpr={[1, 1.5]}>` - Disable heavy shadows; use baked lighting; reduce poly count; use instancing. - Lazy-load scenes with `Suspense`; split routes.

**Q:** Raycasting taps are offset/misfiring.

**A:** Pass correct pointer events container, ensure canvas size matches layout; convert clientX/Y to normalized device coords; verify `OrbitControls` options.

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## Spline Embeds

**Q:** Spline iframe doesn't show.

**A:** - Use `<iframe loading="lazy" allow="xr-spatial-tracking; fullscreen" />`. - If blocked by CSP, update `Content-Security-Policy` to include `frame-src https://my.spline.design https://prod.spline.design` and `script-src` if required.

**Q:** Page shifts layout while Spline loads.

**A:** Give the iframe a fixed height (`h-[60vh]`) and a skeleton fallback.

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## Contact Form / API Routes

**Q:** 500 error from contact API.

**A:** - Verify `RESEND_API_KEY` exists in Vercel and **project redeployed**. - Resend requires a verified sender domain or `from` address; use a `@yourdomain` address. - Add basic rate limit middleware to avoid spam.

**Q:** Form works locally but fails on prod.

**A:** Check Vercel function region (default OK). Ensure you're using **Route Handlers** under `app/api/contact/route.ts`.



## Supabase (Achievements/Trophies, Optional)

**Q:** CORS or `Failed to fetch` when saving trophies.

**A:** Add your site origins in **Supabase → Auth → URL Configuration → Allowed Redirect URLs** and in **Auth → Settings → Additional Redirect URLs**. Also configure **Auth → Policies** if you're writing to a row-level table; ensure RLS policies allow the insert for anon or logged-in users.

**Q:** Exposing `SUPABASE_ANON_KEY` safe?

**A:** Yes, the anon key is intended for client use with RLS. Never expose service role key.



## Security Headers & CSP

**Q:** Mixed content / blocked by CSP.

**A:** Serve everything via **HTTPS**. Add a middleware (`middleware.ts`) to set headers:

```
import { NextResponse } from 'next/server'
export function middleware(req: Request) {
  const res = NextResponse.next()
  res.headers.set('Referrer-Policy', 'strict-origin-when-cross-origin')
  res.headers.set('Permissions-Policy', 'camera=(), microphone=(),
geolocation=()')
  res.headers.set('X-Frame-Options', 'SAMEORIGIN')
  // Relax frame-src for Spline
  res.headers.set('Content-Security-Policy', [
    "default-src 'self'",
    "img-src 'self' data: https:",
    "media-src https: data:",
    "script-src 'self' 'unsafe-inline' https:",
    "style-src 'self' 'unsafe-inline' https:",
    "connect-src 'self' https:",
    "frame-src https://my.spline.design https://prod.spline.design",
  ].join('; '))
}
```

```
    return res
  }
```



## Performance & Lighthouse

**Q:** Lighthouse mobile score low due to JS size.

**A:** - **Recruiter Mode** default: no 3D imports. - Use `dynamic(() => import(...), { ssr: false })` for game components. - Code-split routes; tree-shake Drei imports; avoid importing `three/examples/jsm/*` globally. - Serve images as WebP/AVIF; set `priority` for LCP image; preconnect to R2 host.

**Q:** LCP is the Spline iframe.

**A:** Lazy load the iframe after first interaction or move it below the fold; provide a static hero for Recruiter Mode.



## Accessibility

**Q:** Motion sickness reports / prefers-reduced-motion.

**A:** Respect media query:

```
@media (prefers-reduced-motion: reduce) {
  /* disable auto animations, parallax */
}
```

Provide skip links, keyboard navigation, ARIA labels for interactive 3D hotspots.



## iOS Safari / Mobile WebXR Quirks

- **Autoplay** blocked → require user gesture before playing video/audio.
- **WebGL context loss** → keep scenes light; detect `webglcontextlost` and recover.
- **Pointer events** → prefer `onPointerDown` over `onClick` for reliability.
- **PWA:** add `apple-touch-icon`, splashscreens, and `viewport-fit=cover`.



## SEO & Social

**Q:** Pages not indexed / poor previews.

**A:** - Use `next-seo` per route. - Generate OG images (Vercel OG) for `/projects/[slug]`. - Add `sitemap.xml` and `robots.txt`; submit to Google Search Console.

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## Testing

**Q:** Playwright fails on WebGL.

**A:** Run with `--use-gl=egl` or skip 3D-specific assertions on CI; use data-testid fallbacks; test presence of canvas and interactive hotspots via ARIA roles.

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## Common Error Messages & Fixes

- `TypeError: Cannot read properties of undefined (reading 'scene')` → `useGLTF` path wrong or missing `public/` asset; confirm URL & CORS.
  - `Hydration failed` → server markup differs; avoid conditional rendering that changes between SSR and client; gate 3D with `useEffect` or `ssr:false`.
  - `Unhandled Runtime Error: ResizeObserver loop limit exceeded` → usually safe to ignore; throttle layout changes, avoid infinite re-renders.
  - `403 Forbidden` from R2 → object ACL not public or wrong auth; verify URL and bucket policy.
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## Post-Deploy Checklist

- ☒ `/?mode=recruiter` loads fast (<2s)
  - ☒ Top 3 projects visible above the fold
  - ☒ Contact form sends via Resend
  - ☒ 3D hero loads on toggle to Game Mode
  - ☒ Two working portals in `/game`
  - ☒ Lighthouse (mobile) Recruiter Mode  $\geq 90$
  - ☒ Sitemap/robots present; OG previews correct
  - ☒ Analytics receiving events (view\_project, toggle\_mode)
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## Snippets

**Dynamic import for 3D-only client:**

```
import dynamic from 'next/dynamic'
const GameWorld = dynamic(() => import('@/app/game/GameWorld'), { ssr: false })
```

**Clamp DPR and basic canvas:**

```
<Canvas dpr={[1, 1.5]} shadows camera={{ fov: 45, position: [0,1.4,3] }}>
  <ambientLight intensity={0.5} />
</Canvas>
```

#### Video with good defaults:

```
<video controls playsinline preload="metadata" poster="/posters/pulse.webp">
  <source src="https://r2.example.com/pulse/demo.mp4" type="video/mp4" />
</video>
```

#### next-seo basic config:

```
export const SEO = {
  titleTemplate: '%s | Your Name – iOS Developer',
  defaultTitle: 'Your Name – iOS Developer',
  description: 'SwiftUI • ARKit • Core Data • High-performance iOS apps',
  openGraph: { type: 'website', site_name: 'Your Name' }
}
```

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## <sup>July</sup> 17 When All Else Fails

- Check browser console/network for CORS/MIME.
- Compare dev vs prod env vars on Vercel.
- Reproduce errors with a minimal page (drop all 3D, add back step-by-step).
- Use Vercel preview deployments to bisect changes.

Keep this file updated as you discover new edge cases. PRs welcome in your own repo ✓