

SynapseDesk AI — Autonomous Spatial Workspace Protocol

Executive Whitepaper & Architecture Dossier | Meta VR Start Competition 2026

1. Executive Summary & Vision

SynapseDesk AI is an entrant-built, hands-first autonomous spatial cognition workspace built exclusively for Meta Quest 3 and Quest 3S via the official **Meta Immersive Web SDK (IWSDK v1.1.0)**. Traditional VR productivity solutions force users into standing roomscale reaching and awkward physical keyboard dependencies. SynapseDesk AI re-architects spatial work around human ergonomics: operating strictly within a **2-foot seated radius arc (r=0.55m)**, requiring **zero controllers**, and utilizing an autonomous 3D agent (The Synapse Core) that decomposes high-level ambitions into prioritized physical task prisms with real-time force-directed auto-clustering.

2. Official Contest Rule & Evaluation Matrix

Criteria / Test	Meta 2026 Mandate	SynapseDesk AI Implementation
Hands-First Test	Fully usable with hands end-to-end. Can someone complete the experience without controllers?	100% Controller-Free. Powered by Meta IWSDK Hand Tracking, PokeInteractable fingertip physics, and OneHandGrabbable 3D pinch mechanics.
Airplane Seat Test	Seated, stationary use. Limit roomscale. Every interaction within a 2ft radius.	Strict 2ft Radius (r=0.55m). Curved cylindrical cockpit and floating lap plinth keeping all cards within reach without leaning.
One Bus Stop Test	Fast cold start. Clean pause/resume. Complete moment in <= 10 minutes.	5-Minute Sprint Mode. Instant WebXR streaming via GitHub Pages. Focus timer with procedural Web Audio feedback.
Originality Test	Core experience is Entrant-built. Thin API wrappers highly discouraged.	Entrant-Authored Engine. Custom semantic decomposition state machine, force-directed spatial relaxation, and Web Audio synthesizer.
Performance	Minimum 60+ FPS lock on Meta Quest hardware.	60+ FPS Lock. Procedurally batched Three.js r185 primitives + Havok WebAssembly physics. Zero heavy GLTF download latency.

3. Agentic Intelligence & Special Award Qualification (\$25,000 Focus)

SynapseDesk AI targets the **Best Agentic Interaction Prize (\$25,000)** through three technical pillars:

- **Autonomous Semantic Decomposition:** Breaks natural language goals into prioritized sub-tasks, estimating cognitive load and time duration.
- **Force-Directed Spatial Relaxation:** The floating 3D Synapse Core computes repulsion/attraction forces in real-time, arranging cluttered nodes into an optimal 40° field-of-view corridor.

- **Cognitive Load Telemetry:** A dynamic heuristic evaluates active vs. completed tasks, streaming real-time flow state metrics (Deep Flow, Balanced, Overload Risk) to the user.

4. Technical Stack & Platform Implementation

- **Core Engine:** Meta Immersive Web SDK (@iwsdk/core v1.1.0-rc.2)
- **3D & Shaders:** Three.js (r185 / super-three) with procedural materials
- **Physics Engine:** Havok Physics compiled to WebAssembly
- **Spatial UI:** @pmndrs/uikit-horizon & @pmndrs/uikit-lucide (Meta Horizon Dark System)
- **Procedural Audio:** Pure Web Audio API Synthesizer (pentatonic chimes, zero mp3 delay)
- **Continuous Deployment:** Automated GitHub Actions -> GitHub Pages (HTTPS WebXR streaming)

5. Verification & Live URLs

- **Live WebXR Application (Vercel):** <https://synapsedesk-ai.vercel.app/>
- **Mirror Deployment (GitHub Pages):** <https://akshatanand-cell.github.io/synapsedesk-ai/>
- **Public Code Repository:** <https://github.com/akshatanand-cell/synapsedesk-ai>
- **Developer / Entrant:** Akshat Anand (Meta VR Start Program Member)