

Illusio: Spatial extensions for image-based applications

Approach, applications and development prospects of a scene engine: how images become interactive spatial displays, and the additional challenges on the path to context-aware AR applications.

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1. Starting point: images as access to space

People perceive objects, distances and spatial relationships in images. A display can therefore communicate more than a flat interface. Digital objects, information and interactions can extend a depicted scene and make content tangible in its context.

A camera image also depicts a spatial environment. Appropriate technical additions require image coordinates, depth, perspective and, where relevant, camera movement to agree. A single two-dimensional image does not automatically provide a complete, metrically reliable description of that space.

2. The approach and role of Illusio

Illusio is a Java/libGDX engine for interactive 2.5D and 3D scenes. Its current approach combines prepared background images and depth information with spatial objects, camera perspective, lighting and interaction. The engine is integrated into an application as a library.

The host application defines the content and purpose: a game, a visual presentation, a learning experience or another interaction flow. Illusio supplies scene components. Prepared images, maps and models are assembled for the use case, connecting image-based design with spatial interaction.

3. Reference: Mental Aerobic: Memory Span

Mental Aerobic: Memory Span is a game about remembering numbers and positions. Its integration edition integrates Illusio for interactive scenes in the main menu and game pauses. The scene is designed as a quiet contrast and playful diversion from repeated memory tasks.

This use shows how an independent Android application integrates the engine. It is a showcase of a particular usage concept. It does not establish therapeutic effects, measurable stress reduction or general improvement in memory. The published store version must be distinguished from this integration edition.

4. Possible application directions

In Java-based camera/display systems, smartphones or AR glasses, digital content could extend a visible scene: information about a shop being viewed, opening hours at the relevant location or guidance for a work step. A visual communication application could add spatial annotations to a shared image.

Other possible directions include interactive learning and product presentations, image-based software interfaces and spatially extended websites. Therapeutic applications, such as in the context of EMDR, are also conceivable as independently developed application ideas. They would require appropriate expertise, evidence and assessment of their intended use; this paper does not offer such a therapy application.

5. From a scene to an AR application

The current reference integration works with prepared scene data. Live camera integration, real-object recognition, spatial tracking and anchoring in a moving environment are separate tasks. They must be combined with rendering for a concrete target system.

Each platform also needs suitable graphics, input and device interfaces. The existing Java/Android integration does not establish support for every Java platform or AR headset. A browser edition needs its own integration or porting path. These tasks describe development directions rather than included functionality.

6. Development around concrete questions

The intended benefit and the situation of the people using an application are central. Which information helps? Where should it appear? How is a selection made? Which data is needed, and how does the application behave when observations are insufficient? These questions precede the choice of technical components.

Further development follows concrete application scenarios. Selected scenarios can help investigate integration scope, interaction, device suitability and acceptance. This paper publicly describes the approach and direction; further technical details are agreed according to the project.

Context and further information

- [libGDX · 3D Graphics](#)
- [W3C · WebXR Device API · Candidate Recommendation Draft, 09.06.2026](#)

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