

Use Case Outlines

Use Case 1: Scan and Project

Title: Scan Environment and Project Box

Goal in Context: The user scans the environment and places a virtual box into the AR scene.

Scope: AR experience

Level: User-level

Primary Actor: User

Stakeholders:

- User: wants to simulate projection mapping
- App: needs to track surface and display projection

Preconditions:

- The app is running on a supported ARKit device
- The AR session is initialized
- User is in a well-lit, feature-rich environment

Guarantees:

- A single box appears at a fixed distance in front of the initial anchor position
- The box reflects the current projection mode visually

Main Success Scenario:

1. User launches the app.
2. App initializes ARView and camera.
3. User taps the “Scan” button.
4. App captures the camera position.
5. An anchor is placed.
6. A colored box is displayed in front of the anchor.
7. The box appears with behavior matching the selected mode (e.g., pulse, rotate).

Extensions:

- 3a. If anchor already exists, the box is updated but anchor remains in place
- 3b. If camera transform cannot be retrieved, show error (not implemented, but logical extension)

Use Case 2: Change Projection Mode

Title: Change Box Projection Mode

Goal in Context: The user changes how the projected box appears (static, pulsing, rotating).

Scope: AR visual customization

Level: User-level

Primary Actor: User

Stakeholders:

- User: wants to preview different projection styles
- App: updates the rendered object and animation accordingly

Preconditions:

- A box has been placed in the AR scene
- AR session is active
- “Scan” has been tapped at least once

Guarantees:

- The visual appearance and animation of the box changes to match the selected mode

Main Success Scenario:

1. User taps the “Change Mode” button.
2. App updates the internal `ProjectionMode` state.
3. The existing box is removed and a new one is created with a different color and effect.
4. The new box is added to the existing anchor.
5. The animation or color reflects the new mode.

Extensions:

- 1a. If no box exists, the mode changes but nothing is updated visually
- 3a. If animation is not supported on device, show fallback (not implemented)