# Description

The Archi-VR application offers the functionality of previewing architectural projects on a wide range of technologies, with different levels of immersion/hardware needs.

The application is targeted for the following platforms:

* Desktop
  + Windows
* Mobile
  + 2D
  + GearVR(TODO)
  + Google Cardboard (TODO)
* VR Headset
  + Oculus
  + Google DayDream (TODO)
  + Windows Mixed Reality (TODO)

The application has notion of the concept ‘Project’.

# Project

A project represents all data related to a specific architectural project. This includes all data during the entire lifetime of the project. Data from different discrete snapshots in time are subdivided into project Phases.

The application has an ‘active’ Project. The active Project references the construction project (from the list of included available Projects) to be currently viewed.

# Phase

* Before
* During
  + Tear-down
  + Rebuild
    - Step 1
    - Step 2
* After

# Modes

The Archi-VR application will have the following modes:

* MainMenu
* View Project
* Settings (TODO)

# Startup

Application starts up in the Main Menu mode.

# Main menu

When entering this mode, the Main Menu is loaded and shown.

In this menu, the user can:

* Browse the available architectural projects, selecting the Active Project
  + By click or tap on the ‘<’ or ‘>’ button.
  + By left/right swipe on the project preview.
* Open the active project for viewing.
  + By click or tap on the ‘Go’ button.
* Exit the app.
  + By click or tap on the ‘X’ button.

The active Project is previewed using a full-screen 2D preview image. The name of the active project is shown at the bottom of the window. At the top of the window, the portfolio name is shown, and also the credit ‘Powered by Archi-VR’.

When opening a project:

1. The application leaves the Main Menu.
2. The application enters ‘View Project’ mode, for the active architectural project.

# View Project mode

When entering this mode:

1. The application opens the 3D model of the active project.
2. The application loads and shows the UI controls for the **View Project** menu.

## View Project menu

The View Project menu is shown when ‘Show UI’ option is on. It is hidden when ‘Show UI’ option is off.

### View Project menu controls

The View Project menu contains the following controls:

* **Home** button
* **Show/Hide UI** button
* **Rotate Mode** button
* **View Mode** button
* **Time** button
* **Construction Lighting Mode** button

### VR and Non-VR flavours

The ‘View Project’ menu exists in 2 flavours:

* Non-VR
* VR

The **View Project** menu is always represented by a single canvas that contains all of the UI controls that represent the menu.

In the **non-VR** flavour, the ‘View Project’ menu is represented by a screen-space overlay canvas. The controls are standard UI controls that can be interacted with by mouse clicks and taps.

In the **VR** flavour, the ‘View Project’ menu is represented by a world-space canvas. The controls are special UI controls targeted at VR, that can be interacted with by gazing. The canvas is attached to the player position, and is located on an horizontal ground plane a bit below the player position. When the user is looking forward or up, the menu is oriented automatically to the user viewing direction. This ensures that the menu is always located in front of the player when he starts looking down. When the player looks down, and the menu cones in view, the canvas orientation becomes fixed, in order to enable the player to gaze at controls in order to interact with them.

## Keyboard key functions

|  |  |
| --- | --- |
| M | Show/hide Menu |
| C | Toggle Construction light mode |
| U | Move Up |
| D | Move Down |
| Arrow up | Move Forward |
| Arrow down | Move backward |
| Arrow Left | Move left |
| Arrow Right | Move right |
| Shift | Fast movement |
| L | Show/hide debug Logging |
| Fx | Show debug logging menu x |

TODO?

* F: Show/Hide FPS counter
* Home: Open main menu

## Show/Hide UI

While in the View Project mode, all UI can by shown/hidden by:

* On devices with keyboard: pressing the ‘M’ key. (from UI)
* On touch-enabled devices: tapping anywhere on the window, where there is no UI control.

## Time animation

The animation of time can be controlled with the following keyboard keys:

* F: Increase animation speed Forward.
* B: Increase animation speed Backward.
* S: Stop animation. (Set animation speed to 0)

The user can also tap or click the corresponding on-screen overlay controls. (TODO)

The time animation controls the celestial lighting in the scene.

## Construction lighting mode

The **Construction Lighting Mode** can be set to one of the following modes:

* AUTO: Construction lights are automatically turned ON or OFF, dependant on the current time.
* ON: Construction lights are always ON, irrespective of the current time.
* OFF: Construction lights are always OFF, irrespective of the current time.

When entering the ‘View Project’ state, the **Construction Lighting Mode** is initially set to AUTO.

In the menu, a ‘Construction Light Mode’ button is present, that represents the current ‘Construction Light Mode’ by means of a dynamic icon:

* ON: lightbulb with rays.
  + 
* OFF: lightbulb without rays.
  + 
* AUTO: lightbulb with caption ‘A’. (from Auto)
  + 

While in the View Project mode, the construction light mode can be changed by:

* On devices with keyboard:
  + Pressing the ‘C’ key. (from Construction light Mode)
* On devices with mouse input:
  + Clicking the ‘Construction Light Mode’ button.
* On devices with touch input:
  + Tapping the ‘Construction Light Mode’ button.

## FPS counter

The application can show an FPS counter, that displays the current Frames-Per-Second. The FPS counter is shown be default. In non-VR mode, the FPS counter is located in the screen-space overlay canvas. In VR mode, the FPS counter is shown on a world-space Text UI control that is attached at a fixed offset in front of the player head position.

Show/hide FPS counter can be done as follows:

* On devices with keyboard: pressing the ‘F’ key. (from FPS)
* On touch-enabled devices:
* TODO: In VR mode?

Note: The FPS counter is subject to the **Show UI** option. If **Show UI** option is off, the FPS counter is hidden, along wit hall other UI, irrespective of the **Show FPS counter** option.

## Navigating through the model

The user can navigate through the model using different control modes:

* Touch + Gyro
* Touch Only
* Mouse & KB

### Touch + Gyro

Look around by rotating the device in real world (like a camera).

Translate using the virtual joysticks:

* Left joystick: Translate in vertical directions (up/down).
* Left joystick: Translate in horizontal directions (forward/backward/left/right)

### Touch Only

Look around using mouse swipe.

Translate using the virtual joysticks:

* Left joystick: Translate in vertical directions (up/down).
* Left joystick: Translate in horizontal directions (forward/backward/left/right)

### Mouse & KB

Desktop mode.

Look around using mouse drag.

Translate using following keyboard keys:

* Arrow Up: Move forward.
* Arrow Down: Move backward
* Arrow Left: Move left
* Arrow Right: Move right
* U: Move Up
* D: Move Down
* Right Shift: Fast translation speed

# Procedure: Add a construction project

Add model

Add review image -> UI sprite

Add Lighting

# Procedure: Disable a construction project

TODO

# Procedure: Remove a construction project

TODO

# TODO:

* Add proper lighting to P006
* ALign P006 With World Axes. This will enable using terrains more easily
  + Fix terrain for Tuin Achter
  + Add Terrain(s) in tuin voor
  + Add terrain(s) for tuin links/rechts)
    - Zet beplanting als ‘mesh’ details
* Add proper lighting to P008
* Add proper lighting to P011
* Add proper lighting to P024
* Add proper lighting to P025
* Add proper furniture to P011
* Review and finalize reusable lighting components as prefabs
* Initialize lighting in project 008 and 001 properly
* Load reusable ‘furniture’ components as prefabs.
  + Set material settings.
* Create ‘Furniture-less’ version of model for each project (skp v2015)
* Use furnitureless model in project scenes
* Prepare furniture in projects, using tweaked unity furniture
* Imlement FPS
* Implement Ligting from Moon not working (missing shadows etc…)
* Sky: Implement Clouds
  + Based on perlin noise?
  + Add heightmap for extra visual ‘depth’
* SkyDome : Implement Fog
* SkyDome : Implement Finegrained control over Sky gradient.
  + Shader: add property \_SkyLight1InfluenceRangeAngle
* SkyDome Shader: implement properly support for arbitrary number of celestial objects.
* Sky behavior: use SkyDome Shader support for arbitrary number of celestial objects, to properly represent both sun and moon.
* SkyDome : Implement making rendering ground optional.
* SkyDome : Implement timed ‘Ground Colors’