Improving Performance in VR-Design Studio (formerly UC-win/Road)

If you are using VR-Design Studio for drive simulation or if your 3D environment is large, populated by many roads and models, you may be required to alter some settings to improve the performance.

At the bottom left hand side corner of the main window, the software displays the Frame Rate. The Frame Rate is displayed as fps (Frames per Second). The frame rate is an important factor in the video quality, and you can expect to achieve a frame rate close to, or sometimes above, 100 fps in VR-Design Studio, if you are running a light 3D environment on a high-spec PC. The frame rate is improved by improving the software performance.

Here are some examples from various media and its typical frame rate to give you an idea of what kind of frame rate you should aim for, according to your needs:

Frame Rate	Media
24 fps	Movies, Blu-ray
25 fps	PAL DVDs and Television Broadcasts
30 fps	NTSC DVDs and Television Broadcasts
50/60 fps	Console Games

*Source: CNET Asia

We now explain how you can improve your frame rate in VR-Design Studio (formally UC-win/Road).

1. Visual Options

1.1. Display Setting

By de-selecting various visual features, the software performance can be improved. Go to Visual Options and de-select the items below from the Display tab to improve performance:

- Transparent Terrain
- Shadows
- Advanced Lighting
- Lighting Object (Bloom)
- Road Surface Reflection
- 3D Trees
- Shoreline
- Video Walls

If you require any of the above during a scenario, you can use contexts (Edit – Edit Context: see help files for more).

1.2. View Distance

As a default, the terrain view distance is set at 2000m in VR-Design Studio. By reducing the view distance, the performance can be improved dramatically.

View Distance can be found in the Performance tab in the Visual Options. You can change the view distance of the terrain, the road, the tunnel, the bridge and the cutting and banking.

1.3. Visibility Angle and the LOD (Level Of Details)

Also in the Performance tab, under the Global Settings, you can select or de-select "Hide far objects". By selecting this option, the visibility angle can be adjusted. The visibility angle is the vertical angle of vision. From the camera position, any object that fits within this visibility angle will be hidden from the environment (thus hiding smaller objects). In this way, objects far away can be hidden from view (objects far away will appear smaller, therefore, it will fit within the smaller visibility angle). As you get closer to the object that is hidden, it will appear larger, therefore, it will reappear when the camera moves close enough for the object to exceed the size that can fit within the visibility angle. NB: a very small object may remain invisible even if the camera is very close to the object, if it fits within the visibility angle.

Similarly, the visibility angle for MD3 Characters (pedestrians etc.) and 3D trees can be altered separately from the standard 3D models. In the Performance tab, by changing the mode angles under the Characters (MD3 and FBX) section, and Trees section, you can determine the various levels of details for the pedestrians and 3D trees respectively. For the trees, the three mode angles represent the angle at which the model changes from the normal 3D display to 8-pane display (8 branches), to 4-pane display (4 branches) and to a single-pane display. For pedestrians, you can set the mode angles to switch from 3D to 2D (see images below).

From left: 8 branches, 4 branches and single branch
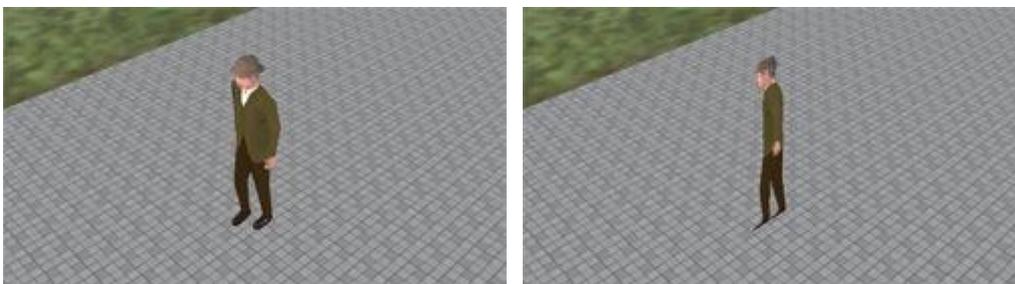
Left: Full 3D Pedestrian, Right: 2D Pedestrian

In the Reflections section, you can select not to display reflections on the surface of the water, and if the reflection is enabled here, you can multiply the visibility angle for the objects displayed in the reflected surface by a given factor. By increasing the multiplication of the angle, less objects will be reflected on the water surface, therefore, it will improve the performance. Adjusting the other figures in this tab can also improve performance.

2. **Data Creation**

When building an environment for drive simulation, you should try to build roads with poor visibility. By building a windy road, instead of a straight one, and hiding the horizon with buildings, the visibility angle can be reduced without affecting ht realism of the environment.

Using the before and after views, models that are not visible during certain parts of scenarios should be hidden.

When building 3D models to populate the environment, it is important to minimise the polygon count and the number of layers. For example, when building a round surface, you can use several surfaces instead, or textures can be used to illustrate some of the details on the surfaces of models (e.g. doors, windows and beams).

Using polygons instead of using transparency settings for textures can also be effective, and by choosing not to display textures on both sides of the polygon can also make the model lighter.

3. **Reduce the volume of traffic and number of pedestrians.**

Improving the Hardware:

Improving the CPU and the GPU is the most effective way to improve the software performance.

The important factor with the CPU (the processor) is that you choose the CPU with the highest core clock speed.

For the GPU (graphics card), we recommend the NVIDIA GeForce series. It is recommended that you choose the GPU with the highest specification possible.