# FraCuda Usage

## Contents



## General

In this document I will describe how to use the FraCuda application. The application consists of two main executables and one supporting java program. The main executables are the Real-time-Renderer and the High-Quality-Renderer. The java application is only here to give you an easy time generating the needed input files for the two main executables.

The workflow should be as followed:

- Use the Real-time-Renderer to explore the fractal and save camera positions
- Use the interpolator to generate a setup file and camera file with a sequence for video rendering
- Call the High-Quality-Renderer to generate the images.
- Use an application of your choice to generate a video file from the generated images

This document should be within a folder, where you can find .bat-files for the application calls.

## Real-time-Renderer

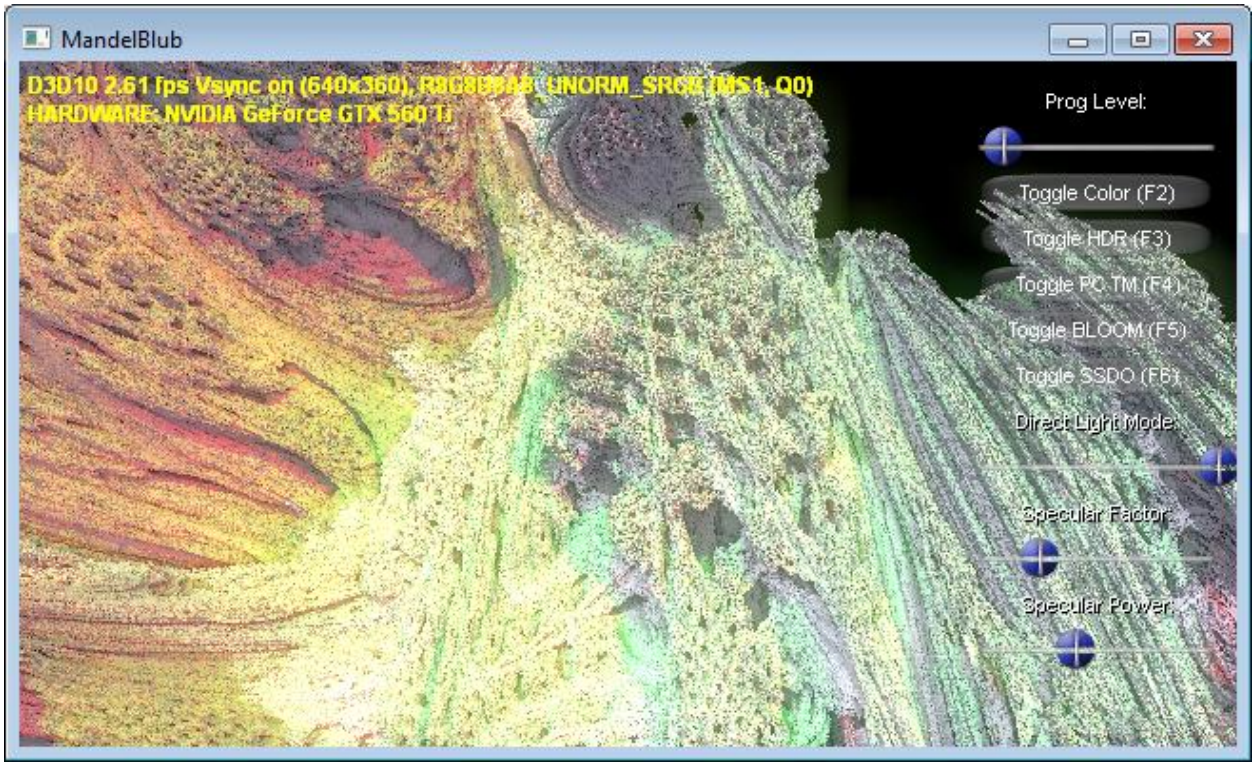


Figure 1: The interface of the Real-time-Renderer

The Real-time-Renderers purpose is to let the user explore the fractal and save interesting camera positions. If there are two files named *env_lights.txt* and *point_lights.txt* in the calling directory, the application reads the environment files and the point lights from those files. For more details on the content of the files, consult section “Files”.

## Keys

- **Spacebar**: saves the camera position to a text-file and a screenshot as well (in .png format).
- **W/A/S/D**: moves the camera forward/left/backwards/right
- **Left mouse button**: hold it pressed and move your mouse to look around with the camera.

## GUI

- **Prog Level**: With this slider you can increase the progressive refinement, that is applied while moving the camera
- **Toggle HDR**: activates/deactivates tone mapping
- **Toggle PC TM**: toggles between luminance and per channel tone mapping
- **Toggle BLOOM**: activates/deactivates the bloom effect
- **Toggle SSDO**: toggles between uniform and improved sampling for SSDO
- **Direct Light Mode**: toggles between “no shadows”, “No direct light” and “shadows”
- **Specular factor**: This slider you can change the specular factor of the fractals material
- **Specular power**: This slider you can change the specular power of the fractals material

## High-Quality-Renderer

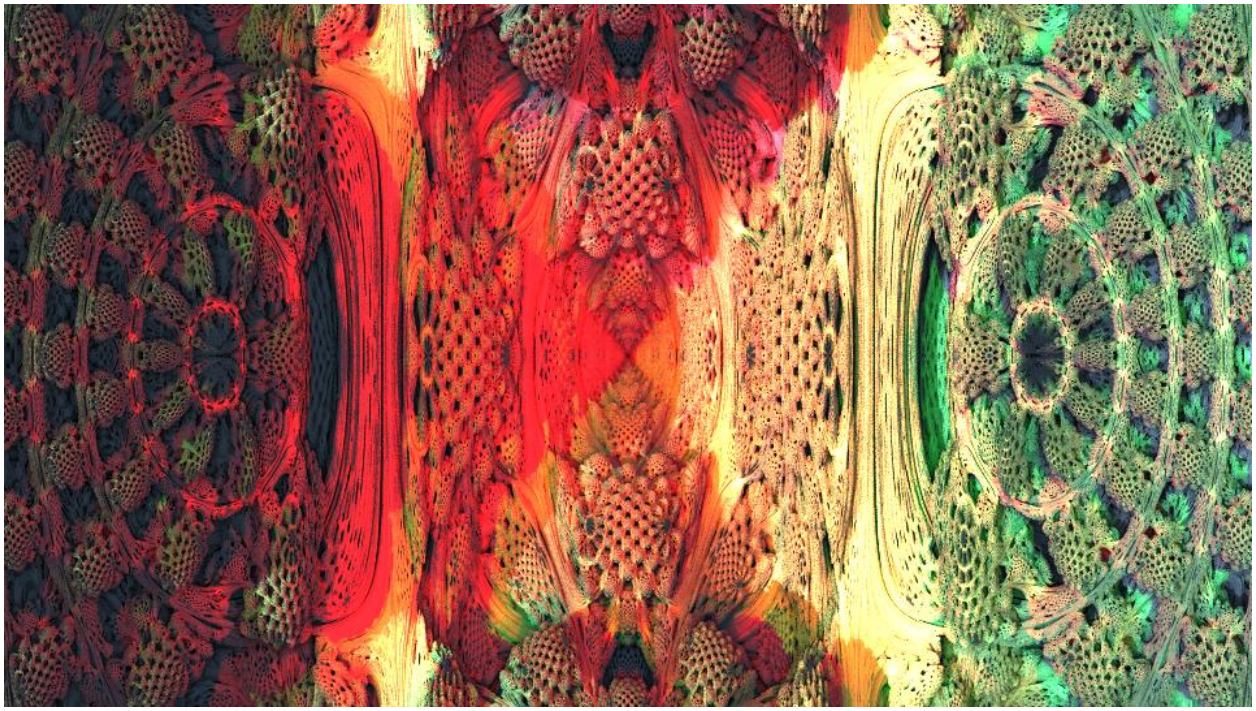

Figure 2: Example output of the High-Quality-Renderer

The High-Quality-Renderer generates sequences of high quality images. It takes three arguments: a setup file, a camera file and an output-directory. The call may look like this: *FraCudaRenderer.exe setup.txt cameras.txt folder/outputDir.* For more details on the content of the files, consult section "Files". The output-files are images of the .bmp format. The filename includes the current timestamp and, if the stereoscopic 3D options is selected, the ending "_L" and "_R" to identify the two images.

# Interpolator

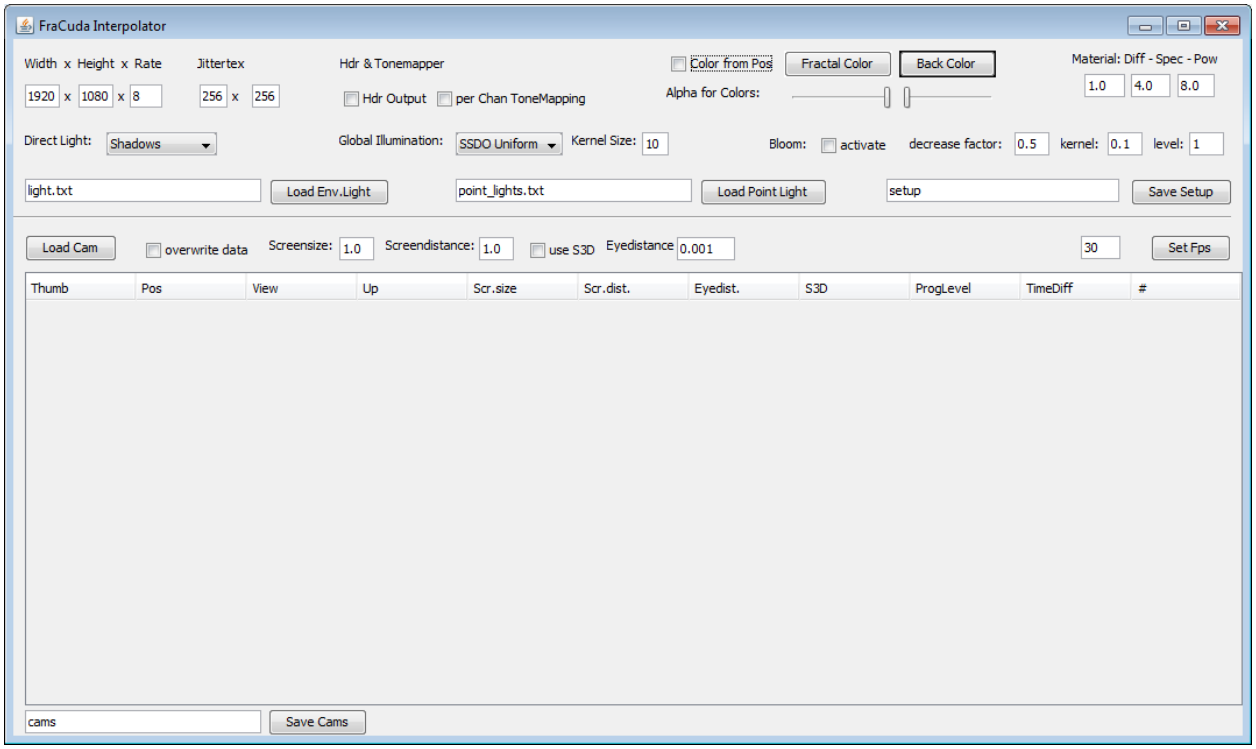


Figure 3: The GUI of the Interpolator

The interpolator is a convenient way to generate the setup and camera file for the High-Quality-Renderer. It is divided into two parts: Above the separator you can find input fields for the setup file and under it you can generate the camera file. For the latter you can load the saved camera positions from the files generated by the Real-time-Renderer. The thumbnail-images are loaded automatically, if they have the same filename and the ending ".png". In the last two columns of the tables you can change the time-difference and the ordering of the frames. Furthermore you can find input fields for changing the frames per second and the screen configuration

# Files

## Camera

The Real-time-Renderer and the Interpolator produce the same camera file. In each line one camera-position is written as described below:

*pos.x pos.y pos.z view.x view.y view.z up.x up.y up.z screensize screendistance eyedist s3d-boolean progressive level*

Every camera vector must be normalized.

One line may look like this:

*0.848403 -0.00895053 0.102985 -0.107104 0.451847 0.885643 -0.97859 0.109557 -0.17424 1.0 1.0 0.001 false 1*

## Setup

The Setup file for the High-Quality-Renderer contains different configuration values in each line. They are grouped by the part of the rendering pipeline to which they belong.

| Line in File | Detail information |
|---|---|
| tex <width> <height> <oversampling- rate> | Size of the output texture and the square-root of the sampling rate for each pixel. |
| jitter <width> <height> | Size of the jitter texture |
| color <fractal-color rgba> <background-color rgba> <diffuse-factor> <specular-factor> <specular-power> | Sets color and material for the rendering. The rgba-values should be separated by a blank. |
| tonemapper <hdr-output> <per-channel-tonemapping> | Two Booleans. |
| envlightfile <env-light-file> | As described below |
| pointlightfile <point-light-file> | As described below |
| gi <mode> <kernel-size> | Mode:<br>• Uniform sampling<br>• Improved (Horizon based) sampling<br>Kernel size in pixels |
| bloom <activate> <decrease aka border> <kernel-radius> <bufferlevel> | Sets the bloom attributes.<br>The decrease (aka border) factor, decreases each color channel.<br>Kernel-radius: float value, which is relative to the screen size<br>Bufferlevel: mipmap-level used for the calculation |
| dl <direct-light-mode> | Direct light mode:<br>• `NO SHADOW: 0`<br>• `NO DIRECT LIGHT: 1`<br>• `SHADOW: 2` |

The setup file may look like this:

*tex 960 540 4*
*jitter 256 256*
*color 0.5 0.5 0.5 1.0 0.0 0.0 0.0 1.0 1.0 1.0 20.0*
*tonemapper false true*
*envlightfile grace_lightgen3.txt*
*pointlightfile point_lights.txt*
*gi 1 5*
*bloom false 0.5 0.1 1*
*dl 2*

## Point light

In each line, one point light is described as followed:

<pos.x> <pos.y> <pos.z> <color.r> <color.g> <color.b> <radius>

A line of the point light file may look like that:

*1.0 0.0 0.0 0.85 0.0 0.0 0.01*

## Environment light

The file parses the “grace lightgen” format.:

Light<number with 4 digits>:
<pos.x> <pos.y> <pos.z>
<color.r> <color.g> <color.b>

An environment light file may look like that:

*Light0001:*
*0.5 0.0 0.0*
*1.0 0.0 0.0*

*Light0002:*
*0.5 0.5 0.5*
*1.0 0.0 1.0*

*Light0003:*
*0.0 0.5 0.0*
*0.864063 -0.271293 0.424022*