

## JOB DESCRIPTION

Job Title : Post doctoral researcher (R2) in computer graphics, texture synthesis and rendering

### Job Summary :

(English, max 1000 characters)

The computer graphics group at University of Strasbourg is hiring a post doctoral researcher (R2 - recognized researcher). We are offering a 2-year position (starting between September 2019 and January 2020) to work on the synthesis and rendering of complex procedural textures. The fellow will work at University of Strasbourg (France), in collaboration with Karlsruhe Institute of Technology (Germany). We expect for the candidates to hold a PhD in computer science, and to have skills in some of the following topics: computer graphics, texture synthesis, procedural textures, rendering, ray tracing, GPU programming.

### Job Description :

(English, detailed information – max 3000 characters)

**WARNING: Please indicate the name of the research lab, group leader and supervisor.**

#### Project.

The huge size of virtual worlds in graphics applications is a challenge for the management (i.e. creation, editing, storage, transfer, processing and rendering) of large amounts of 3D data. Textures are a key ingredient when it comes to increase the visual complexity. Procedural texturing is a content generative approach, which drastically reduces the pre-processing and storage needs by computing the data on demand. This project is concerned with both the modeling and the rendering of procedural textures.

Procedural texturing consists in traversing a directed acyclic graph, the Procedural Texture Graph (PTG): source nodes are mathematical functions; inner nodes are pixel processing operations; sink nodes are the final output textures. Among the various types of base nodes we are interested in procedural noises, linear, and non-linear filters. Current methods for processing the texture are based on a forward traversal of the PTG. This approach is fast because it reduces the need for redundant computation and convenient for anti-aliasing, but the memory cost makes it hardly usable with high-resolution textures. Our goal is to process the texture in a backward traversal: nodes are evaluated on demand, and controlled by the output rendering requests. The rendering technique is ray tracing, so the core question is: how do the virtual light rays interact with the PTG ? To answer this question, we will use two complementary strategies. The first strategy consists in monitoring the footprint of pixels throughout the graph, and in modeling how the filters impact the footprint. The second strategy consists in a statistical analysis of the actual requests when rendering the scene using ray tracing. This will allow to design optimized algorithms for joint processing and rendering of procedural textures, addressing time efficiency, memory compactness, and high quality anti-aliasing.

#### Context.

The postdoc fellow will be hosted at the ICUBE lab, University of Strasbourg (France), in the computer graphics and geometry group. This group has investigated user-friendly methods to generate procedural textures from exemplars, and has developed an open-source library for texture analysis and synthesis. The fellow will work under the supervision of Basile Sauvage (associate professor) and will collaborate with Jean-Michel Dischler (full professor, leader of the research activity about textures) and Frédéric Larue (research engineer).

The research project is a collaboration with the Computer Graphics group at Karlsruhe Institute of Technology (Germany), which has first-hand experience in rendering and anti-aliasing. The fellow will spend several short periods in Karlsruhe, working with Johannes Schudeiske (postdoc) and Carsten Dachsbacher (full professor).

**Salary:** 33k€ to 46k€ per year gross salary (disposable income 26k€ to 37 k€), depending on the candidate's experience.

**Application:** CV and application letter at Basile Sauvage ([sauvage@unistra.fr](mailto:sauvage@unistra.fr)).

Main research field : Computer science

#### JOB DETAIL

Type of contract : Temporary

Status : Full-time

Company / Institute : Université de Strasbourg

Country : France

City : Strasbourg

Postal Code : 67000

Street : 4 rue Blaise Pascal

#### APPLICATION DETAILS (mandatory)

Provisional start date : 01/09/2019

Application e-mail : [sauvage@unistra.fr](mailto:sauvage@unistra.fr)