A propos du centre ou de la direction fonctionnelle
Grenoble Rhône-Alpes Research Center groups together a few less than 800 people in 35 research teams and 9 research support departments.

Staff is localized on 5 campuses in Grenoble and Lyon, in close collaboration with labs, research and higher education institutions in Grenoble and Lyon, but also with the economic players in these areas.

Present in the fields of software, high-performance computing, Internet of things, image and data, but also simulation in oceanography and biology, it participates at the best level of international scientific achievements and collaborations in both Europe and the rest of the world.

Contexte et atouts du poste
The project will take place in the MAVERICK team at Inria and be supervised by Joëlle Thollot and Romain Vergne.

Mission confiée
PhD project

The Atelier Novat has been founded by Pierre Novat in the 60's and became the French standard for mountain panoramas http://atelier.novat.free.fr. Our goal in this project is to reproduce and extend the atelier Novat style using digital means.

Such a style has two main components: a geometrical deformation of the terrain so as to show important landmarks to the viewer and a specific rendering style to expressively describe the terrain components (forest, snow, rocks,...). During this project we will focus on the rendering style.

The Maverick team is working since long on expressive renderings techniques. The panorama case study is very interesting for the stylization of 3D scenes question. This is a very specific application where the goal is to represent a terrain so as to help the viewer to understand the shape and nature of the terrain but also to provide an aesthetic pleasant view of the landscape. This is also an application in which we can explore the designer creative process and try to find an efficient compromise between fully manual design and automatism.

By working with Arthur Novat (Pierre Novat son) we are able to understand the drawing process that was used to paint these panoramas. Based on these insights we will still have to devise concrete and general enough rules to be applied to generic terrains. Part of this work has been started in the team with two master students who are working on shading and shadows models for panoramas.

Based on these preliminary studies, the PhD student will first design a full shading model that will include specific style constraints:

- The shading should make the shape visible everywhere. For that we propose a shading model where the light direction is locally modified to align with the terrain features.
- The shadows shape are not realistic. Several abstraction approaches will have to be studied: filter-based techniques and vector graphics approaches will probably be needed.
- A specific color model will have to be proposed to blend shading and shadows.

In a second step, we would like to work on the terrain decoration: trees, rocks, and other visual elements that describe the nature of the terrain. For that, we plan to take inspiration from stroke-based rendering and element textures design approaches. One important question will be what type of control should be given to the designer.

Even if we take inspiration from the atelier Novat style, care will be taken to propose general approaches that should be applicable for generic terrain rendering.

Bibliography

Panoramas

- R. BALzarini and M. Murat. The effectiveness of panoramic maps design: A preliminary study based on mobile eye-tracking. International Archives of the Photogrammetry, Remote


**Shading**


**Element texture and stroke-based rendering**


**Reference book**

- Image and Video-Based Artistic Stylisation. Editors: Paul ROSIN, John COLLOMOSSE. 2013

**Principales activités**

The PhD will start by a bibliography stage and some preliminary experiments understanding.

Then the candidate will work on shading and shadows before addressing the remaining visual elements of the panorama style.

**Avantages**

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking (after 6 months of employment) and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Social security coverage

**Rémunération**