Job vacancy #2023-06792

Online visualization of 4D models (3D+t) online

Contract type: Internship agreement

Level of qualifications required: Bachelor's degree or equivalent

Fonction: Internship Engineering

About the research centre or Inria department

Grenoble Rhône-Alpes Research Center groups together a few less than 800 people in 39 research teams and 8 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.

Context

Inria, the French research institute dedicated to digital sciences, employs 2,600 people from the best universities in the world, and takes up the challenges of computer science and mathematics. Inria has 9 centers in France, including the Inria Grenoble research center, which employs nearly 730 people. Inria is organized into “project teams” which bring together researchers with complementary skills around a focused scientific project.

The Kinovis platform at Inria Grenoble allows the simultaneous acquisition of 68 video streams color up to 50Hz in a 10mx10m studio, to generate 3D textured models. These models are used in different rendering applications (cinema/TV, fashion, art) and movement measurement (sports, medical).

The capture system is undergoing hardware and software updates. In this context, the entire pipeline from capture to reconstruction and 3D+t visualization is being re-implemented.

Assignment

The 3D models generated by the platform are very large even in low resolution, since for each frame there is a file describing the 3D geometry and a texture file. In fact, the loading time for visualization (and in particular in line) is relatively long: for example 20s with a fiber connection for a short sequence of 100 frames (4 seconds).

The primary objective of the internship would therefore be to significantly optimize the performance on the two sides of the pipeline:

1. server side with better data compression
2. viewer side with more user-friendly progressive decompression

In particular, the pipeline could be significantly improved by using a multi-resolution progressive storage, transmission and visualization method, where very low resolution models would be sent and displayed quickly before being progressively refined by updates, without retransmitting the entire model every time.

The secondary objective would be to increase the rendering quality for an equal volume of data. To do this, we could consider a point-of-view-dependent rendering mode, based on the original images rather than on maps the textures, but also on the temporal consistency of the models and their texture.

Skills

This internship is aimed at M1/M2 candidates.

Very good bases in computer vision, 3D modeling and C++ and Python programming are expected.

Benefits package

- Subsidized meals
• Partial reimbursement of public transport costs
• Professional equipment available (videoconferencing, loan of computer equipment, etc.)
• Social, cultural and sports events and activities

**Remuneration**

Minimum legal gratification

**General Information**

• **Theme/Domain**: Vision, perception and multimedia interpretation
  Software Experimental platforms (BAP E)
• **Town/city**: Montbonnot
• **Inria Center**: Centre Inria de l'Université Grenoble Alpes
• **Starting date**: 2024-03-01
• **Duration of contract**: 6 months
• **Deadline to apply**: 2023-11-30

**Contacts**

• **Inria Team**: MORPHEO
• **Recruiter**: Pansiot Julien / julien.pansiot@inria.fr

**About Inria**

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

**Warning**: you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.

**Instruction to apply**

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**Defence Security**

This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

**Recruitment Policy**

As part of its diversity policy, all Inria positions are accessible to people with disabilities.