R&D Engineer – Online Sketch-Based 3D Modeling

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Context

This engineering position is part of the **D³** project funded by the European Research Council (ERC). This 5-year project aims at developing a new generation of 3D modeling tools that allow designers to create 3D objects by drawing (Figure 1).

Drawing is a fundamental tool for designers to quickly visualize their ideas. However, line drawings are not enough to evaluate the feasibility of a concept. To test their ideas against physical reality, designers have to create 3D models suitable for simulation and 3D printing. Our goal is to bridge the gap between design and engineering by automatically creating 3D models from line drawings. To achieve this goal, the **D³** project will conduct research on complementary fields of computer graphics, computer vision and computer-aided design.

Design drawing   3D model for physical simulation and prototyping
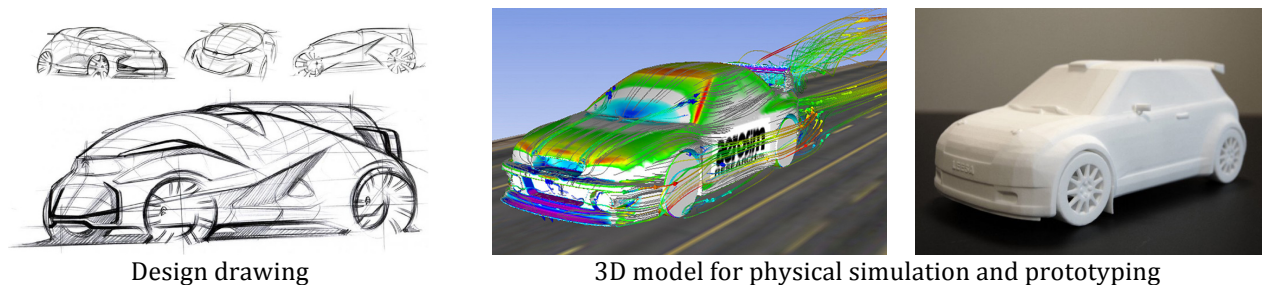
*Figure 1: The goal of the **D³** project is to bridge the gap between design and engineering by converting design drawings (left) into 3D models (right).*

Task

Our group already proposed preliminary solutions to create 3D models from drawings [1,2], and we are currently working on more robust algorithms. The primary task of the engineer will be to design and implement a web-based 3D modeling tool based on these algorithms. We envision a client/server solution, where the client should run in a web browser to allow remote users to test our tools, while the server should record the drawings created by the users and generate the corresponding 3D models.

A secondary task will be to maintain a toolbox of algorithms commonly used for line drawing analysis and 3D modeling (image denoising, line drawing vectorization, mesh processing, stylized rendering, physical simulation, etc). This toolbox will form a common basis for the different research projects of the group.

Required skills

The candidate should have a masters-level degree in computer graphics and/or computer vision, and a strong background in programming (C++/Java) and applied mathematics

(geometry, linear algebra). The ability to work in a multi-disciplinary, international research environment is also a requirement.

Knowledge in some of the following domains will be appreciated. While we don't require expertise in all these domains, the candidate should be willing to acquire these skills while working on the project.
- Web programming (JavaScript, WebGL, web server, SQL)
- Computer graphics and computer vision programming (OpenGL, OpenCV)
- Geometry libraries (CGal, OpenMesh)
- Deep learning (Caffe)

Working environment
Inria is the French National Institute for computer science and applied mathematics. The research center Sophia-Antipolis – Méditerranée hosts around 700 people working in 35 groups. The **D³** project will be conducted in the GraphDeco group, which is composed of around 15 people (researchers, PhD students, postdocs, engineers). The group conducts research in computer graphics (see https://team.inria.fr/graphdeco/).

The Sophia-Antipolis Inria research center is located near Nice and Antibes on the French Riviera. Both towns are connected to the Inria center by frequent buses.

Hiring dates and duration
Ideally, the contract will start on February 1st 2017 for two years, renewable once.

Salary
Starting at around 2500 euros per month (before tax) according to the candidate experience and diploma (standard Inria salary scale).

How to apply?
Send your application via email to Adrien Bousseau (adrien.bousseau@inria.fr) using the topic "D3 – application to engineer position". Please provide the following documents:
- CV
- Cover letter
- Copy of master degree or equivalent
- List of classes and grades over the three last years of study
- Two recommendation letters from recent managers, or contacts of referees

Bibliography

[1] Interactive Sketching of Urban Procedural Models
Gen Nishida, Ignacio Garcia-Dorado, Daniel G. Aliaga, Bedrich Benes, Adrien Bousseau
ACM Transactions on Graphics (SIGGRAPH Conference Proceedings) - 2016

[2] True2Form: 3D Curve Networks from 2D Sketches via Selective Regularization
Baoxuan Xu, William Chang, Alla Sheffer, Adrien Bousseau, James McCrae, Karan Singh
ACM Transactions on Graphics (SIGGRAPH Conference Proceedings) - 2014