Short-term Early-Stage-Researcher position (4 months) at the Faculty of Informatics, Università della Svizzera italiana (USI), Lugano, Switzerland

The innovative training network (ITN) on "learninG, pRocessing, And oPtimising shapES" (GRAPES), funded by the EU's Horizon 2020 research and innovation programme, with 17 partners from all over Europe, aims at considerably advancing the state of the art in Mathematics, Computer-Aided Design, and Machine Learning in order to promote game changing approaches for generating, optimising, and learning 3D shapes, along with a multisectoral training for young researchers. For more information, visit http://grapes-network.eu/.

The Faculty of Informatics is one of the members of the GRAPES Network and offers a SHORT TERM (4 months) open research training position in Lugano, Switzerland.

The Project: Machine learning for volumetric subdivision
Trivariate subdivision algorithms offer an interesting approach to the approximation of volumetric data, as needed for instance for interactive 3D model design, 3D printing or isogeometric analysis. We want to optimize an existing Catmull-Clark-type algorithm with respect to its spectral properties and develop a new Doo-Sabin-type scheme. Unlike in the bivariate case, the variety of structurally different mesh layouts that need to be addressed is not finite. Moreover, an elegant simplification of the setting in the spirit of the discrete Fourier transform is not available so that an individual treatment of each case seems to be unavoidable. To cope with this situation, we want to determine suitable weights for a series of specific cases using standard tools from linear algebra and optimization and then apply learning methods to generalize the findings to new scenarios without having to repeat the tedious analysis repeatedly.

Expected Results
Algorithms to train and apply data-driven methods (e.g., deep NN) for finding suitable 3D subdivision weights. Analysis of the geometric and analytic properties of these weights. Proof-of-Concept implementation for demonstration and evaluation.

Benefits
Marie Sklodowska-Curie ESRs are paid a competitive gross salary of 3,900 €/month, a Mobility Allowance of 600 €/month and, for researchers who have a family, a Family Allowance of 500 €/month. All amounts are subject to deductions and taxes. Family is defined as persons linked to the researcher by (i) marriage, or (ii) a relationship with equivalent status to a marriage recognised by the national legislation of the country of the beneficiary or of nationality of the researcher, or (iii) dependent children who are actually being maintained by the researcher; family status is determined at recruitment and does not evolve.
Eligibility criteria
Eligible candidates should satisfy the following:

- Trans-national mobility: The applicant should not have resided or carried out their main activity (work, studies, etc.) in the country where the research training takes place for more than 12 months in the 3 years immediately prior to recruitment. For refugees under the Geneva Convention, the refugee procedure (i.e. before refugee status is conferred) will not be counted as ‘period of residence/activity in the country of the beneficiary’.

- Be at the date of recruitment an ‘Early Stage Researcher (ESR)’, i.e. have less than 4 years of a research career, and not have a doctoral degree. The 4 years are measured from the date when they obtained the degree which would formally entitle them to embark on a PhD.

- Have — at the date of recruitment — a Master’s degree in Computer Science, Mathematics or Engineering (or any equivalent diploma allowing him or her to embark on a doctorate).

- Be able to communicate fluently in English (speaking and writing). An oral interview with the prospective advisor may be required.

Selection process
To apply for the open positions please send the following documents to the project advisor, Prof. Kai Hormann (kai.hormann@usi.ch):

- a detailed CV including education, work experience, skills, dissertations, research interests, career objectives, and a list of publications if any;

- a letter of motivation regarding the GRAPES network and the position;

- a transcript of the master studies’ grades (including the overall grade and an explanation of the grading system) and the master’s thesis if available;

- the eligibility form properly filled;

- the name and contact details of two senior persons, willing to provide confidential letters of recommendation upon request.