Max-Planck-Institut für Informatik
Computer Graphics Group

Ph.D. position in Computer Graphics
within the MSCA-ITN-ETN project
"RealVision"

Full time appointment for 36 months
Start date January 2018

We are seeking a highly motivated and creative student to work on the EU-funded project "Hyperrealistic Imaging Experience" (RealVision). A candidate should hold a Master's degree in Computer Science, Mathematics, or Physics and have a solid background in computer graphics and machine learning. Excellent programming skills in C++ and fluent communication skills in English are essential.

About MPI Informatik. The Max Planck Institute for Informatics (MPI) in Saarbrücken is a part of the Max Planck Society, Germany's leading research organization. The institute runs an active fellowship program on both the PhD and postdoc levels. The Computer Graphics Group at MPI currently consists of about 40 researchers (including 5 senior-level researchers), and in the last decade over 20 former group members received offers for tenured faculty positions.

About the Project. RealVision is a Marie Skłodowska-Curie Innovative Training Network (ITN) focused on hyperrealistic imaging, encoding and display technologies. This exciting collaborative project is coordinated by Technical University of Denmark, and the academic partners include some of the most renowned research institutions in Europe: Telecom ParisTech, University of Cambridge, University of Nantes, University of Oxford, Bangor University, Fraunhofer-Institute for Integrated Circuits. There are also numerous industry partners involved in the project: DxO Labs, DELTA DANSK ELEKTRONIK, LYS & AKUSTIK, Barco, Arri, BBC, Phase One, and Technicolor.

Each of the project partners contributes world-class competence in a particular area, and the core research contribution of MPI Informatik is in the area of Computer Graphics, Visual Perception, and Computational Displays. In particular, our Ph.D. position will focus on human perception modeling, realistic image display and high quality fabrication.

Description of the Offered Position. MPI Informatik offers a fully paid Ph.D. position for one student, (36 months, paid by the EU), with the possibility to later extend the time in Saarbrücken by one more year (paid by national funding). Apart from the research work itself, the students' participation in the project will involve tight collaboration with project partners and frequent visits to the involved labs, active participation at the annual network events, as well as training in complementary skills such as research management. The student will be a part of the Computer Graphics Group of MPI Informatik, see http://www.mpi-inf.mpg.de.

Position description: *Surface light field quality metric for controlling fabricated object appearance.* **Objectives:** Complex object appearance is characterized by spatial and angular changes of reflected lighting, akin to the surface light field. 3D printers

typically offer too limited gamuts to faithfully reproduce such complex appearance, and an objective quality metric is needed that can guide the fabrication process in a perceptually meaningful way, so that the differences with respect to the target appearance are minimized. Through perceptual experiments such trade-offs in reproducing spatial (color, texture) and angular light reflectance (Bidirectional Reflectance Distribution Function, Bidirectional Texture Function) will be investigated.

Expected results: Existing 2D image quality metrics are focused on spatial and color aspects of human vision and do not take into account interactions with angular viewing directions. A computationally efficient quality metric that models all those factors will be developed:

• A model of the HVS sensitivity for temporal aspects of directional changes in reflected lighting for different head motion scenarios will be developed.

• An efficient, GPU-based metric version will be developed and embedded into an optimization loop that guides 3D fabrication, so that best possible appearance will be achieved given the constrains in the 3D printer gamut.

Planned secondments: University of Cambridge (3 months), University of Oxford (2 months), and Phase One (2 months).

Eligibility for Hiring. In addition to meeting the formal Ph.D. study enrolment criteria at MPI Informatik (possession of a Master's degree in a relevant area of study), candidates must also fulfill the "mobility requirement" imposed by the EU for ITN networks. Which means that they must not have worked or resided in Germany for more than 12 months during the three years prior to them joining the project.

Work Environment. The working language within the Computer Graphics Group at MPI Informatik, and of course also within the RealVision project, is English. In addition to this, M.Sc. and Ph.D. studies in Computer Science at nearby Saarland University are conducted entirely in English. And it is not necessary to speak German in order to live in Saarbrücken as English is widely understood. Free German classes at various levels are provided by MPI Informatik for those who want to improve their German language skills.

Salary. Pay is according to standardized EU rules for ITN grants, which leads to a salary of 3.077,89 € (the net salary ca. 1.971 €) monthly. For applicants with a family the salary amounts to 3.287,39 € (the net salary ca. 2.079 €) monthly. Additionally the mobility allowance of 600 € per month is granted.

Application. Inquiries should be directed to Karol Myszkowski (karol@mpi-inf.mpg.de). Applications have to be submitted via e-mail to the same email address until November 10th with the acronym RealVision in the subject line. The following information has to be attached in a separate PDF file:

1. a CV with a list of publications and/or projects,
2. evidence, such as a scan of the diploma, of having obtained a degree that qualifies the applicant for Ph.D. enrolment,
3. an official transcript of grades obtained during the applicant's bachelor and master studies,
4. a personal statement (up to 2 pages) about the applicants' experience, interests and career goals,
5. and names and contact information of three people who could write a letter of recommendation.