CURRICULUM VITAE

First/last name	Frédéric LARUE	Address	30 rue Martin Drolling, 68127 Oberhergheim, France
Date of birth	July 28th 1981	Phone (mobile)	+33 6 77 21 55 12
Nationality	French	E-mail	frederic.jp.larue[at]gmail.com

QUALIFICATION

Cursus followed at Université Louis Pasteur, Strasbourg, France :

2008	PhD. in Computer Science
2004	Master's degree in Computer Science
2002	Bachelor's degree in Computer Science

PROFESSIONAL EXPERIENCE

Beginning	Duration	Nature of the position and details
2009	18 mo.	ERCIM Post-doctoral fellowship, Fraunhofer Institut IAIS, Bonn, Germany / CNR, Pisa, Italy • Partnership with a museal institution (Deutsches Museum, München, Germany) • Gestion of deliverables with tight deadlines • Involvement in an EU funded project
2008	12 mo.	Post-doctoral position, LSIIT, Strasbourg, France • Software engineering : development of a platform for processing digitized real objects • Technology transfer
2004	4 yr.	Research position in Computer Science (PhD. thesis), LSIIT, Strasbourg, France • Research project : digitization of art pieces in terms of shape and appearance for the realistic rendering in image synthesis *(details on next pages)* • Collaboration with industrial partners • International communications : oral and written *(details on next pages)* • Science & technology watch • Administrative involvement : elected member in the laboratory scientific council • Teaching & training practice supervision *(details on next pages)*
2004	5 mo.	Postgraduate training practice course, LSIIT, Strasbourg, France • Research project : point-based view-dependent rendering of digitized real objects
2003	2 mo.	Voluntary training practice, LSIIT, Strasbourg, France • Use of VR technologies : design of an architectural modeler for immersive environments

EXPERTISE AND SKILLS

Expert in **Computer Graphics**, in the fields of **3D digitization** and **real-time rendering**. Good knowledge in **geometry processing**, **animation**, **virtual reality**, **image processing**, **computer vision** and **AI**.

Programming	Expert :	C/C++, Java, OpenGL, OpenCV, GLSL shaders, SDL, Qt, Python.
	Master :	MATLAB, Assemblers x86/Sparc.
Web development	Expert :	HTML, Javascript, MySQL.
	Initiate :	PHP.
Graphical tools	Master :	TheGimp, Blender, InkScape.
Other	Expert :	Linux/Windows OS, IDE Microsoft Visual C++, LaTeX/Beamer, OpenOffice.

MISCELLANEOUS

Languages	**French** (mother tongue), **English** (fluent, technical vocabulary mastered), **Italian** (fluent), **German** (high school level), **Japanese** (notions).
Hobbies	Music (playing guitar), reading, cooking, videogames, computer science.
Driving licence	European driving licence, category B1/B2.

The major part of my research activities is focused on the digital archiving in the field of Cultural Heritage, with the specific purpose of producing digital copies of cultural artifacts suitable for realistic rendering on standard computers.

PhD. thesis + Post-doctoral position at the LSIIT, Strasbourg, France
(Contact for references : Pr. Jean-Michel Dischler)

My PhD. thesis has started with the collaboration between the research laboratory LSIIT and a french company producing 3D scanning devices, finally materialized in 2004 by a national project funded by the french ministries of Research, Industry, Culture and Communication, aiming at creating a prototype for the digitization of cultural artifacts. The framework I developed for this purpose is able to recover both shape and appearance of real objects, without any contact (which is important while dealing with cultural content), while reducing at the maximum user's interventions, and providing an on-the-fly feedback (thus preventing to wait for the end of the measurement to detect eventual errors). Moreover, due to the constraints of *in situ* measurements (in a museum, for example), only a simple hardware configuration is required : a structured light range scanner, a digital camera and a laptop.

The digital copies finally produced are made of a 3D model and a view-dependent appearance information, considering fixed lighting environments but accounting for the observer's displacement (*surface light field*). The view-dependent component is encoded as a polynomial model to make it easily evaluable on graphics hardware, leading to virtual copies with materials behaving in a realistic manner and rendered at high performances.

In parallel, I also performed a close study on the digitization and realistic rendering of art paintings, which led to the design of a processing pipeline where a lot of problems which classically occur in the general case can be avoided, thanks to the specific shape of this kind of objects. Some other various works have also been developed in the same time, like a new algorithm for real-time rendering of refractive objects (which has led to a scientific publication), or a simulator for training human operators to detect defects in industrial machined pieces.

After getting graduated, I finally spent one more year in this same laboratory in order to strengthen the realized prototype by developing a robust platform for processing digitized 3D models and photometric data, for the purpose of technology transfer to our industrial partner.

ERCIM post-doctoral fellowship at Fraunhofer Institut IAIS, Bonn, Germany
(Contact for references : Dr. Manfred Bogen)

Following my period at the LSIIT, I have been granted for a fellowship from the ERCIM consortium. I spent 9 months at the Fraunhofer institute in Germany, joining a project which took place in the frame of a collaboration with the Deutsches Museum (museum of technologies), in Munich. This project was divided into two parts.

The first one concerns the development of an exhibition for the museum about an ancient spectrometer built during the 19th century by Joseph Von Fraunhofer (1787-1826), thanks to which the famous Frauhofer lines (dark stripes appearing in the light spectrum due to absorption caused by some chemical elements) were for the first time extensively studied. The idea was to propose to visitors means of interaction enabling them to reproduce virtually the experiments performed by Fraunhofer. Thanks to a multimedia terminal, the user is then able to manipulate the virtual spectrometer without any risk for the original one, exhibited next to it, and can study the effect of the refraction phenomenon while observing a light ray through prisms made of different kinds of glasses. Our motivation was to provide to visitors, through the use of new technologies, a better understanding of these experiments thanks to their direct involvement in an interactive and edutaining experience. This exhibition can be seen in the Zentrum Neue Technologien (New Technologies Center) of the Deutsches Museum since its opening, the 19th November 2009.

The second part of the project aimed at developing tools enabling museums to create virtual copies from their cultural artifacts by themselves. Since many years, archiving in museums mostly consists in annotated photographs, and curators are nowadays very used to this specific kind of acquisitions. For this reason, a software for the reconstruction of 3D models from sets of calibrated pictures has then been developed, able to recover a good approximation of the object's shape by using silhouette information in the provided images, following the *visual hull* principle. A simple viewer has also been developed, using a composition of *projective textures* to add view-dependent pictorial details onto the reconstructed object for visualization purposes.

ERCIM post-doctoral fellowship at CNR, Pisa, Italy
(Contact for references : Res.Dir. Roberto Scopigno)

The second 9 month period of my ERCIM fellowship takes place in the Visual Computing Group at the CNR of Pisa, where I am still currently working, in the frame of the European *3D-COFORM* Consortium which aims at establishing 3D documentation as an affordable, practical and effective mechanism for long term documentation of tangible cultural heritage. The work I realized so far concerned the synthesis of diffuse textures (namely, deprived of illumination effects) from a set of pictures onto the 3D models produced by an in-hand scanner constructed by one of our partners, able to

perform real-time 3D scanning. The specific hardware configuration of this scanner has made possible the automatic detection and removal of shadows and specular highlights, producing quality diffuse textures without the artifacts generally produced by classical approaches of naive image blending. I am now working on extending this algorithm, so as to recover not only a diffuse textures, but reflectance parameters all over the object surface.

MAJOR SCIENTIFIC COMMUNICATIONS

International conferences with reviewing process and published proceedings
- F. LARUE, L AMMANN, J-M. DISCHLER, *A Pipeline for the Digitization and the Realistic Rendering of Paintings*, in Proceedings of the 8th Symposium on Virtual Reality, Archaeology and Cultural Heritage, 2007
  (acceptance rate : 50%)
- F LARUE, J-M. DISCHLER, *Automatic Registration and Calibration for Efficient Surface Light Field Acquisition*, in Proceedings of the 7th Symposium on Virtual Reality, Archaeology and Cultural Heritage, 2006
  (acceptance rate : 48%)
- O. GÉNEVAUX, F. LARUE, J-M. DISCHLER, *Interactive Refraction on Complex Static Geometry using Spherical Harmonics*, in Proceedings of Symposium on Interactive 3D Graphics and Games, 2006
  (acceptance rate : 38%)

International conferences without reviewing process
- J-P. CHAMBARD, V. CHALVIDAN, M. TAZEROUALTI, F. LARUE, J-M.DISCHLER, V. VURPILLOT, A-C. LEGRAND, *Digitization of Art Pieces Based on 3D, Colour and Texture Parameters*, in Proceedings of SPIE Symposium on Optical Metrology, Volume 6618- O3A : Optics for Art, Architecture, and Archaeology, 2007

TEACHING ACTIVITIES

My teaching activity extends **from 2004 to 2009**. It represents a total of about **395 course hours**, and the **supervision of 3 training practices**.

Main course topics	Computer architecture, Java programming, Algorithms & data structures, Database & SQL, GUI programming (wxWidget, Java Swing).
Supervised practice trainings	• Real-time rendering of water surfaces using shading languages *(master's degree)* • On-the-fly interactive visualisation of 3D digitization data *(two-year degree)* • Study of 3D mesh denoising algorithms *(master's degree)*