

Amaël DELAUNOY

3D Vision Research Scientist

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STUDIES & QUALIFICATIONS

- 2007 - 2011 **PhD. in Computer Vision** at **Inria Grenoble** (French National Research Institute in Computer Science). Advisors : Dr. **Emmanuel Prados** and Dr. **Peter Sturm**.
Graduate School in Computer Science, Applied and Pure Mathematics, University of Grenoble, France.
Thesis topic : *3D shape reconstruction from multiple cameras*.
- 2006 - 2007 **M.Sc. degree** in *Image and Signal Processing* at **INSA Lyon**, France.
- 2003 - 2007 **Engineering Diploma (M.Sc.)** in *Computer Science* at **CPE Lyon**, France.
Majors : Computer Science, Image Processing and Electrical Engineering. One year abroad in **Chapel Hill, USA**.
- 2001 - 2003 **Preparatory Classes** : two years full-time higher education intensive classes in Mathematics, Sciences and General Studies, in preparation for selective admission to best French engineering schools.

EXPERIENCE

- 2015 **Senior Research Engineer** at **Apple Inc., USA**. (current)
Technologies, Special Project Group.
R&D on 3D Perception for autonomous systems. Led and worked on several projects related and not limited to : camera models, 3D objection detection and tracking, multi-sensor modality fusion, sensor specifications, semantic and geometric deep learning modeling, perception evaluation, depth estimation, accelerated data structures for geometric processing, camera ISP, data pipeline for perception and machine learning infrastructure for 3D DNN.
- 2014 - 2015 **Co-Founder & CEO** at **aquilaviz** (now called astrivis.com), an ETH Zürich spin-off, **Switzerland**. (1.5 years)
Interactive mobile 3D scanner solution on any smartphone. I have led the team on all fronts including business strategy, business plan, hiring strategy, pitch to investors as well as technical decisions : camera tracking, dense 3D point cloud estimation, 3D printable mesh generation.
- 2012 - 2015 **Post-doctoral Researcher** at the computer vision and geometry lab of **ETH Zürich, Switzerland**. (3 years)
Research on Structure-from-Motion and dense multi-view 3D reconstruction with Prof. **Marc Pollefeys**.
Contributed to lead and obtain several Swiss and European research grants related to 3D geometry modeling.
Led the computer vision lab class (project oriented student course) : <https://cvg.ethz.ch/teaching/cvl>
- 2011 - 2012 **Research Fellow** at **Kagoshima University, Japan**. (7 months)
Research on spatio-temporal 3D modeling using multi-view cameras/projectors systems.
- 2011 Research project at Inria in collaboration with **EADS Astrium**. (June - August)
3D reconstruction of asteroids. The code has been licensed to Airbus Defence & Space.
- 2010 **Teaching assistant** in applied mathematics (MAT246) at University of Grenoble, France.
- 2009 **Visiting student** at the computer vision lab of **Columbia University, New York, USA**. (6 months)
Research on integrating visual cues related to appearance and reflectance in 3D reconstruction problems (segmentation, photometry, specularities, Helmholtz reciprocity).
- 2007 **Master Thesis** in the Perception group at **INRIA Grenoble**, France.
3D surface reconstruction from multiple calibrated images. (6 months)
- 2007 **Industrial Project for MSC**, France, with the Junior Entreprise CPE-Lyon.
Software development and study of tools for an illumination system control, for industrial computer vision systems.
- 2005 - 2006 **Research assistant** in medical imaging at the CADDLab at **UNC, Chapel Hill, USA**. (1 year)
3D ultrasound calibration and reconstruction from a 2D freehand probe and a magnetic tracker.
- 2004 **Intern at Kadant-Lamort**, France. (2 months)
Development of a safety electric panel for industrial control.
- 2003 **Intern at the Astrophysics Laboratory of Marseille (LAM)**, France. (2 months)
Software development in image processing for studies about Supernovae.

AWARDS

See references in section Publications.

- **PhD Thesis** award - Prix AFRIF 2011 (best PhD thesis in France in AI/ML/CV).
- **Best Paper** award during WACV 2016.
- **Best Paper** award during BMVC 2008 : **CRS Industrial Prize**.

RESEARCH INTERESTS

- **Geometric Deep Learning** : 3D estimation using geometry cues and deep neural networks, joint semantic and geometry estimation, depth estimation techniques using supervised and self-supervised learning, sensor modality fusion.
- **3D modeling** : Multi-view geometry, structure-from-motion, sensor fusion, photometric stereo, deformable models, physics of vision and generative models.
- **4D modeling** : Spatio-temporal approaches (4D reconstruction), tracking and optical flow.
- **Mobile computer vision** : Real-time 3D reconstruction, SLAM, visual-inertial odometry.
- Other related fields : Robotics, augmented reality, data science, variational methods, linear algebra, convex optimization, computational photography.

Scientific events I have been involved in :

- 2014 ECCV - Finance chair, local organization.
- 2012 3DTV-CON - Finance chair.
- 2012 3DIMPVT (now known as 3DV)- Local organization, finance and website.
- 2011 ORASIS - Congrès francophone des jeunes chercheurs en vision par ordinateur - **Organizer**.
- 2010 CVPR - International Conference in Computer Vision and Pattern Recognition - Student volunteer.
- 2008 ECCV - European Conference on Computer Vision - Website maintenance & organization helper.

PUBLICATIONS

PhD. Thesis

- **Amaël Delaunoy** (Advisors : Emmanuel Prados and Peter Sturm).
[Multi-view Shape Modeling from Images : Contributions to Photometric-based Reconstruction using Deformable Meshes](#).
PhD. Thesis, Inria and Université de Grenoble, France - December 2011.
Prix AFRIF 2011 (Best PHD thesis price from the French association of computer vision and pattern recognition.)

International Journal Papers

- **Amaël Delaunoy** and Emmanuel Prados.
[Gradient Flows for Optimizing Triangular Mesh-based Surfaces : Applications to 3D Reconstruction Problems dealing with Visibility](#).
The *International Journal of Computer Vision* - November 2011.

International Conferences Papers

- Fabio Maninchedda1, Christian Haëne, Bastien Jacquet, **Amaël Delaunoy** and Marc Pollefeys.
[Semantic 3D Reconstruction of Heads](#).
Proceedings of the 14th *European Conference on Computer Vision*, Amsterdam, Netherlands - October 2016.
- Andrea Romanoni, **Amaël Delaunoy**, Marc Pollefeys and Matteo Matteucci.
[Automatic 3D Reconstruction of Manifold Meshes via Delaunay Triangulation and Mesh Sweeping](#). (*Best Paper Award*)
Proceedings of the IEEE Winter Conference on Applications of Computer Vision, Lake Placid, NY, USA - March 2016.
- **Amaël Delaunoy** and Marc Pollefeys.
[Photometric Bundle Adjustment for Dense Multi-View 3D Modeling](#).
Proceedings of the IEEE International Conference on *Computer Vision and Pattern Recognition*, Columbus, USA - June 2014.
- **Amaël Delaunoy**, Jia Li, Bastien Jacquet and Marc Pollefeys.
[Two Cameras and a Screen : How to Calibrate Mobile Devices ?](#)
Proceedings of the International Conference on *3D Vision*, Tokyo, Japan - December 2014.
- **Amaël Delaunoy**, Keyvan Kanani, Peter Sturm and Olivier Dubois-Matra.
[Multi-View 3D Reconstruction of Asteroids](#).
Proceedings of the 5th *International Conference on Astrodynamics Tools and Techniques*, Noordwijk, Netherlands - May 2012.
- **Amaël Delaunoy**, Emmanuel Prados and Peter N. Belhumeur.
[Towards Full 3D Helmholtz Stereovision Algorithms](#).
Proceedings of the 10th *Asian Conference on Computer Vision*, Queenstown, New-Zealand - November 2010.
- Zsolt Janko, **Amaël Delaunoy** and Emmanuel Prados.
[Colour Dynamic Photometric Stereo for Textured Surfaces](#).
Proceedings of the 10th *Asian Conference on Computer Vision*, Queenstown, New-Zealand - November 2010.
- Peter Sturm, **Amaël Delaunoy**, Pau Gargallo, Emmanuel Prados and Kuk-Jin Yoon.
[3D and Appearance Modeling from Images](#).
Proceedings of the 14th *Iberoamerican Congress on Pattern Recognition*, Guadalajara, Mexico, Volume 5856, page 694–704 - November 2009.
- **Amaël Delaunoy**, Ketut Fundana, Emmanuel Prados and Anders Heyden.
[Convex Multi-Region Segmentation on Manifolds](#).
Proceedings of the 12th *International Conference on Computer Vision*, Kyoto, Japan - September 2009.
- **Amaël Delaunoy**, Emmanuel Prados, Pau Gargallo, Jean-Philippe Pons and Peter Sturm.
[Minimizing the Multi-view Stereo Reprojection Error for Triangular Surface Meshes](#). (*Best Paper : CRS Industrial Prize*)
Proceedings of the 19th *British Machine Vision Conference*, Leeds, UK - September 2008.

International Workshops Papers and Technical Reports

- Ryo Furukawa, Ryusuke Sagawa, **Amaël Delaunoy** and Hiroshi Kawasaki.
[Multiview Projectors/Cameras System for 3D Reconstruction of Dynamic Scenes.](#)
Proceedings of the First IEEE Workshop on *Dynamic Shape Capture and Analysis* (in conjunction with ICCV 2011) - November 2011.
- Kuk-Jin Yoon, **Amaël Delaunoy**, Pau Gargallo and Peter Sturm.
[Toward Global and Model based Multiview Stereo Methods for Shape and Reflectance Estimation.](#)
Proceedings of the First International Workshop on *Photometric Analysis For Computer Vision* (in conjunction with ICCV 2007) - October 2007.
- Kuk-Jin Yoon, Emmanuel Prados, Peter Sturm, **Amaël Delaunoy** and Pau Gargallo.
[Shape and Reflectance Recovery using Multiple Images with Known Illumination Conditions.](#)
Technical Report RR-6309, INRIA Rhône-Alpes, Number RR-6309 - September 2007.

National Conferences Papers and Others

- **Amaël Delaunoy**, Emmanuel Prados, Ketut Fundana and Anders Heyden.
[Segmentation convexe multi-région de données sur les surfaces.](#)
Actes du 17ème Congrès de *Reconnaissance des Formes et Intelligence Artificielle*, Caen, France - RFIA 2010 - Janvier 2010.
- **Amaël Delaunoy**, Emmanuel Prados, Pau Gargallo, Jean-Philippe Pons and Peter Sturm.
[Stéréo multi-vues : erreur de reprojection et maillages triangulaires.](#)
Actes des Journées *ORASIS*, Trégastel, France - Juin 2009.
- **Amaël Delaunoy**.
[Vers une Méthode Globale de Reconstruction Multi-vues pour l'Estimation de Surface et d'Apparence.](#)
Master thesis, *Université de Lyon (INSA and CPE)* - September 2007.
- Julien Jomier, **Amaël Delaunoy** and Stephen R. Aylward.
[3D Tracked Ultrasound Reconstruction : from Model-to-Image Calibration to Quaternion Interpolation.](#)
Internal report, CADDLab, Chapel Hill, USA - May 2006. (unpublished)

OTHER SKILLS & INTERESTS

Languages

- French : Native
- English : Fluent
- Spanish : Basic knowledge (8 years at school, to be refreshed)
- Others : German, Japanese, Mandarin (Beginner, to be refreshed)

Information Technology

- C/C++, Python, OpenGL languages, as well as many other graphics, linear algebra, deep learning and computer vision packages or libraries.
- Comfortable with versioning and review systems, CI integration, cross-compiling platforms, AWS, testing and software development practices.

Other

- Sports : *Skiing, Hiking, Climbing. Table Tennis* (competition level), regional table tennis referee (in France).
- Photography and Computational Photography.
- Travels : Visited 40+ countries from all continents.