ALBERTO JASPE-VILLANUEVA

Computer Graphics Researcher & Developer +966 562649676
PhD in **Computer Science** ajaspe@gmail.com
July 10th, 1981 – A Coruña (Spain) http://albertojaspe.net

PROFESSIONAL CAREER

Postdoc Research Fellow at **High-Performance Vis. Group (KAUST)** Since 2020 (Saudi Arabia)

- Researching on Scientific Visualization of massive and complex datasets.
- Participating in the KAUST research community, as well as supervising and helping students.

Expert Research Scientist at **Visual Computing Group (CRS4)** 2016 – 2020 (Italy)

- Research and develop innovative, scalable methods and technologies for complex 3D models acquisition, processing, analysis and rendering, and participate in the Computer Graphics scientific community by publishing research, proposing new projects and chairing conferences.
- Consultant contract for TDM project (see below) from 2019 to 2020.

Adjunct Lecturer at IED (European Institute of Design) 2017 (Italy)

- 32-hours lectures on Virtual Reality and Augmented Reality in the Grade of Media Design.

Marie Curie Researcher at **Visual Computing Group (CRS4)** 2013 – 2015 (Italy)

- 3-years Early Stage Researcher grant founded by the European Marie Curie Program, at DIVA Project (Data Intensive Visualization and Analysis, http://diva-itn.ifi.uzh.ch). Initial Training Network by relevant European Universities, Research Centers and companies.
- Researching and developing new algorithms, techniques and data structures for massive model visualization and exploration, to obtain the PhD grade under supervision of Dr. Enrico Gobbetti.

R&D Lead at **CEGA S.L.** 2011 – 2013 (Spain)

- Creating a R&D department from scratch, following the main business line (audiovisual installations) and opening new ones to learn how to be an entrepreneur.
- Dealing with clients, projects, budgets, outsourcing companies, public founding, etc. and implementing a workflow system.
- Development of 3D multimedia content managers, interactive natural games, etc. for marketing, show-business and museums.

Researcher and Developer at **VideaLAB (University of A Coruña)** 2003 – 2010 (Spain)

- Developed several visualization and interaction systems, such as Empty Museum (wireless and portable virtual reality system), SANTI (real-time terrain simulation), ARGOS (automated HDR *gigapixel* photography acquisition), different natural user interfaces based on Computer Vision, etc., successfully deployed to companies and public exhibitions.
- Research activities such as attending to several international computer graphics conferences, giving talks, writing scientific papers and books, etc.
- Worked closely with a multidisciplinary team (architects, graphics artists, engineers, historians)
- International stays for development collaborations or deployment, such as Paris – France (*Instituto Cervantes*, one month) or Szczecin – Poland (ORAD, one week).

Undergraduate Researcher at **RNASA lab (University of Coruña)** 2002 – 2003 (Spain)

- Developed 3D CT Scan DICOM visualizer for medical industry and different solutions using Artificial Neural Networks.
- Servers administration (web, mail, code repository, DDBB, etc.)

EDUCATION

PhD on Computer Science 2018
Thesis: *"Scalable Exploration of 3D Massive Models"*
University of A Coruña (Computer Graphics specialty)
Bachelor on Computer Science 2012
University of A Coruña (ICT specialty)
Master on High Performance Computing 2011 – 2012
University of A Coruña (Software optimization specialty)
Technical Engineering in Computer Science 2005 – 2011
University of A Coruña (Software development specialty)

COMPUTER SCIENCE COMPETENCES

Domains. Computer graphics, ray-tracing, real-time rendering, point clouds, voxels, scalable acquisition, processing and exploration of complex models, material acquisition, interactive installations, virtual reality, computer vision, natural interfaces. Software design and development, optimization and parallelization techniques, spatial data structures, multiresolution algorithms.

Main technologies, Languages or Tools. C/C++17, Javascript (ES2015), OpenGL, GLSL, Cg, WebGL, OpenCV, CUDA, OpenMP, MPI, CMake, Qt, Visual Studio,), Blender, systems administration, Arduino. Windows and Linux environments.

SELECTED PUBLICATIONS

1. **A practical and efficient model for intensity calibration of multi-light image collections.** Ruggero Pintus, Alberto Jaspe-Villanueva, Antonio Zorcolo, Markus Hadwiger, and Enrico Gobbetti. The Visual Computer (presented in CGI 2021, best paper award)
2. **Web-based Exploration of Annotated Multi-Layered Relightable Image Models.** Alberto Jaspe, Moonisa Ahsan, Ruggero Pintus, Andrea Giachetti, Fabio Marton, and Enrico Gobbetti. Journal of Computing and Cultural Heritage (JOCCH) (2020).
3. **Crack Detection in Single- and Multi-Light Images of Painted Surfaces using Convolutional Neural Networks. T. Dulecha, A. Giachetti, R. Pintus, I. Ciortan ,A. Jaspe, E. Gobbetti.** The 16th Eurographics Workshop on Graphics and Cultural Heritage (GCH) **(2019).**
4. **Automatic modeling of cluttered multi-room floor plans from panoramic images.** G. Pintore, F. Gianovelli, A. Jaspe, E. Gobbetti. Computers Graphics Forum, 38(7), 2019 – Pacifics Graphics **(2019).**
5. **Web-based Multi-layered Exploration of Annotated Image-based Shape and Material Models.** A. Jaspe, R. Pintus, A. Giachetti, E. Gobbetti. The 16th Eurographics Workshop on Graphics and Cultural Heritage (GCH, best paper award) **(2019).**
6. **Objective and Subjective Evaluation of Virtual Relighting from Reflectance Transformation Imaging Data.** R. Pintus, T. Dulecha, A. Jaspe, A. GIachetti, I. Cortan, and E. Gobbetti. The 15th Eurographics Workshop on Graphics and Cultural Heritage (GCH) **(2018)**.
7. **Artworks in the Spotlight: Characterization with a Multispectral Dome.** I. Ciortan, T. Dulecha, A. GIachetti, R. Pintus, A. Jaspe, and E. Gobbetti. Materials Science and Engineering Journal **(2018)**.
8. **Voxel DAGs and Multiresolution Hierarchies: From Large-Scale Scenes to Pre-computed Shadows.** U. Assarsson, M. Billeter, D. Dolonius, Elmar Eisemann, A. Jaspe, L. Scandolo, and E. Sintor. EuroGraphics Tutorials **(2018)**.
9. **Symmetry-aware Sparse Voxel DAGs (SSVDAGs) for compression-domain tracing of high-resolution geometric scenes**. *A. Jaspe, F. Marton, E. Gobbetti*. Journal of Computer Graphics Techniques (JCGT) (**2017**).
10. **PEEP: Perceptually Enhanced Exploration of Pictures.** *M. Agus, A. Jaspe, G. Pintore, E. Gobbetti*. 21st International Workshop on Vision, Modeling and Visualization (VMV) full paper (**2016**).
11. **Point Cloud Manager: Applications of a Middleware for Managing Huge Point Clouds.** *O. A. Mures, A. Jaspe, E.J- Padrón, J.R. Rabuñal.* Chapter 13 of *"Effective Big Data Management and Opportunities for Implementation"* book. Pub. IGI Global. ISBN: 9781522501824 (**2016**)
12. **Virtual Reality and Point-based Rendering in Architecture and Heritage.** *O. A. Mures, A. Jaspe, E.J- Padrón, J.R. Rabuñal.* Chapter 4 of *"Handbook of Research on Visual Computing and Emerging Geometrical Design Tools"* book. Pub. IGI Global. ISBN: 9781522500292 (**2016**)

13. **SSVDAGs: Symmetry-aware Sparse Voxel DAGs.** *A. Jaspe, F. Marton, and E. Gobbetti. ACM SIGGRAPH* i3D full paper (**2016,** best papers selection).
14. **CHC+RT: Coherent Hierarchical Culling for Ray Tracing**. *O. Mattausch, J. Bittner, A. Jaspe, E. Gobbetti, M. Wimmer, and R. Pajarola*. Computer Graphics Forum Journal Vol 32, Num 2. Presented at Eurographics'15 (**2015**)
15. **Mont'e Scan: effective shape and color digitalization of cluttered 3D artworks**. *F. Bettio, A. Jaspe, E. Merella, F. Marton, E. Gobbetti, and R. Pintus*. ACM Journal on Computing and Cultural Heritage, Vol 8, Num 1 (**2015**)
16. **SOAR: Stochastic Optimization for Affine global point set Registration**. *M. Agus, E. Gobbetti, A. Jaspe, C. Mura, and R. Pajarola*. VMV'14 full paper (**2014**)
17. **Automatic room detection and reconstruction in cluttered indoor environments with complex room layouts**. *C. Mura, O. Mattausch, A. Jaspe, E. Gobbetti, and R. Pajarola*. Computer & Graphics Journal Num 44 (**2014**)
18. **Practical line rasterization for multi-resolution textures**. *J. Taibo, A. Jaspe, A. Seoane, Marco Agus, and L. A. Hernandez*. STAG'14 full paper (**2014**)
19. **ExploreMaps: Efficient Construction and Ubiquitous Exploration of Panoramic View Graphs of Complex 3D Environments**. *M. Di Benedetto, F. Ganovelli, M. Balsa, A. Jaspe, R. Scopigno, and E. Gobbetti.* Computer Graphics Forum Journal, Vol 33, Num 2. Presented at EuroGraphics'14 (**2014**)
20. **IsoCam: interactive visual exploration of massive cultural heritage models on large projection setups**. *F. Marton, M. Balsa, F. Bettio, M. Agus, A. Jaspe, and E. Gobbetti*. ACM Journal on Computing and Cultural Heritage, Vol 7, Num 2 (**2014**)
21. **A multiresolution system for managing massive point clouds**. *A. Jaspe, O. A. Mures, E. J. Padrón, and J. R. Rabuñal*. Technical Report, University of A Coruña (**2014**).
22. **Robust Reconstruction of Interior Building Structures with Multiple Rooms under Clutter and Occlusions**. *C. Mura, O. Mattausch, A. Jaspe, E. Gobbetti, and R. Pajarola*. CAD/Graphics'13 full paper (**2013**)
23. **Automatic Geometric Calibration of Projector-based Light-field Displays**. *M. Agus, E. Gobbetti, A. Jaspe, G. Pintore, and R. Pintus*. EuroVIS'13 short paper (**2013**)
24. **Space perception in architectonic visualization using immersive virtual reality**. *L. A. Hernández, J. Taibo, A. Seoane, A. Jaspe*. Architectonic Graphic Expression Journal, Num 18 (**2011**)
25. **Interactive installations and virtual reality in the museum. The *Galicia Dixital* experience.** *L. Hernández, A. Seoane, R. López, A. Jaspe*. ICT'07, Conference in Historical Heritage full paper (**2008**)
26. **Acceleration of AI algorithms using GPUs**. *A. Seoane and A. Jaspe*. Chapter of "Encyclopedia of Artificial Intelligence" book. Pub. IGI Global. ISBN: 978-1-59904-849-9 (**2008**)
27. **Mapping Large Textures for Outdoor Terrain Rendering**. *A. Seoane, J. Taibo, L. Hernández, A. Jaspe*. Chapter of "Game Programming Gems 7" book. Pub. Charles River Media. ISBN: 978-1584505273 (**2008**)
28. **Physically Walking in Digital Spaces: A Virtual Reality Installation for Exploration of Historical Heritage**. *L. A. Hernández, J. Taibo, D. Blanco, J. A. Iglesias, A. Seoane, A. Jaspe y R. López.* International Journal of Architectural Computing, Vol 5, Num 13 (**2007**)
29. **Hardware-Independent Clipmapping.** *A. Seoane, J Taibo, L. Hernández, R. López and A. Jaspe*. WSCG'07 full paper. The 15th International Conference in Central Europe on Computer Graphics, Visualization and Computer Vision (**2007**)
30. **Real-time visualization of geospatial features through integration of GID with a realistic 3D terrain dynamic visualization system.** *L. A. Hernandez, J. Taibo, A. Seoane, R. López, A. Jaspe, A. Varela*. ICC'05 full paper. XXII International Cartographic Conference (**2005**)
31. **The Creativity Space: An Immersive VR Framework for 3D Creation**. *L.A. Hernández, J. Taibo, A. Jaspe, R. López, D. Blanco, R. López, A. Seoane*. Digital Engineering Workshop, CAD/CAM Workshop full paper (**2005**)

Conference Chairing: EuroVIS 2014 Fast-forward track, STAG 2019 poster program.

Program Committee: Conference on Computer Graphics Theory and Applications (GRAPP) since 2019, Smart Tools and Applications in Graphics (STAG) since 2018.

Editorial board member: Frontiers in Virtual Reality since 2021.

Invited reviewer: Computer Graphics Forum (Eurographics), IEEE Transactions on Visualization and Computer Graphics, ACM Journal on Computing and Cultural Heritage, Computer & Graphics Journal, Cartography and Geographic Information Science, Journal of Graphic Tools, ACM CHI Conference on Human Factors in Computing Systems, MDPI Heritage, MDPI Sensors, MDPI Electronics.

Invited talks: Panel of experts on "3D annotations for Cultural Heritage" (GCH2019, Sarajevo – BiH).

SELECTED PROJECTS PORFOLIO

- **ARAMCO TeraCell Project (2021)**
  Project sponsored and conducted with ARAMCO to visualize massive 3D geological models of one trillion cells in real-time. I joined this project in its last stage, where I helped refactoring the main data structure, and implemented some level-of-detail core features that substantially improved the performance of the rendering.
- **Tessuto Digitale Metropolitano – TDM (2018 - 2020) [**http://www.tdm-project.it/en/]
  TDM aims to offer innovative and smart solutions to increase city attractiveness, resource management efficiency and the safety and quality of life of citizens, through the study and development of enabling technologies and innovative vertical solutions for the protection from environmental risks, energy efficiency awareness and cultural heritage management.
- **Scan4Reco** (2015 – 2018) [https://scan4reco.iti.gr/]
  Scan4Reco was an EU funded project under Horizon 2020, and it aims to develop a novel, portable, integrated and modular solution for customized and thus cost-effective, automatic digitization and analysis of cultural heritage objects (CHOs). The main goal was to create highly accurate digital surrogates of CHOs, providing also detailed insight over their surface as well as the volumetric structure, material composition and structure of underlying materials, enabling rendering either via visualization techniques or via multi-material 3D printing.
- **Digital Mont'ePrama** (2013 – 2015) [http://vic.crs4.it/monteprama201411/]
  3D acquisition and exploration of a set of 37 ancient Sardinian statues, with out-of-core techniques and sub-milimetrical precision. Large projection installation in permanent (Museo Archeologico Nazionalle di Cagliari, Italy) and temporal (Roma, Milano Expo) exhibitions.
- **DIVA European ITN** (2013 – 2015) [http://www.diva-itn.eu]
  The DIVA (Data Intensive Visualization and Analysis) Project was a Marie Curie action of Initial Training Network (ITN) funded by the European Union within the 7th Framework Programme. It brought together 6 full partner institutions and 8 associated partners from 6 different EU countries. The main goal of the network was to train the next generation of researchers in the fields of 3D data presentation and understanding, with a primary focus on data intensive application environments. I owned an Early-Stage European Scientific Researcher position in CRS4 (Italia) for develop my PhD on Massive Rendering.
- **ToVIAS & Point Cloud Manager (PCM)** (2012 – 2014)
  Open software library for out-of-core managing and real-time rendering laser-scan acquired point clouds. Founded by the Spanish national institution for R&D, has been used for both academic and production purposed.
- **Anfaplace information and advertising system** (2012 – 2013)
  Design and development of advertisement and info points systems for Anfaplace shopping mall (Casablanca, Morocco) with customized totems and big LED screens.
- **Guitar star** (2011)
  Interactive advertisement installation for Estrella Galicia company. Participants were virtually immersed into a concert stage where should air-play a guitar, while projected in big LED screen. A computer vision system analyses their movements to give the final score.
  Used in different 2011 summer events sponsored by Estrella Galicia, such Muse or Pet Shop Boys concerts, with thousands of participants each time.
- **Science in words** (2010)
  Museum installation based on an image analysis system that interacts with the user through the management of disks with everyday gestures. Its operation uses the metaphor that disks "hunt words of knowledge" and we provide information related to it.
  Permanent installation at Science Museum of A Coruña (Spain)

- **Multi-touch table for 3D exploration** (2009 – 2010)
  Infrared computer vision based devices for agile 3D exploration. Designed for both large (terrain) and close (architectural) visualization, with different paradigms of interaction.
  Used in different projects such as:
    - Spatial, volumetric and sectional analysis of the St. James's Cathedral
    - Smart cities development tool for A Coruña city council
    - Permanent exhibition at University of A Coruña
- **The enchanted fountain** (2007)
  Natural interaction installation with computer vision gesture analysis for entertainment.
  Permanent exhibition at Galicia Dixital (Santiago de Compostela, Spain)
- **Data-intensive photo and video capturing devices and software** (2005 – 2008)
  Gigapixel HDR photo capture device, 360˚ HD video capture device, geotagged car-mounted 360˚ video capture devices, as well as software for exploring the contents.
  Used in different projects such as:
    - The stone book of St. James Cathedral (Galicia tourism website)
    - A Coruña at Clouse Range (City tourism website)
    - Galician Water of Life (Tourgalicia)
    - Immersive windows, St. James's Way (permanent installation at Galicia Dixital)
- **The empty museum** (2003 – 2008)
  Interactive, immersive, multi-user virtual reality system for museums and exhibitions.
  Based in the "hybrid-space" novel concept, was able to generate interactive, complex 3D worlds inside an empty physical room. Permanent exhibition at Galicia Dixital (Santiago de Compostela, Spain) and several itinerant exhibitions (Spain and France)
- **Advanced Interactive System for Navigation on Lands (SANTI)** (2003 – 2010)
  Real-time 3D terrain exploration system, based on texture clipmaps and adaptable geometry, was capable of showing arbitrary amounts of terrain data. It also can show different layers of both raster and vector information and integrated with GIS databases. It has been deployed in different production environments, such as:
    - Spanish northwest traffic control.
    - Galician government tool for critical decision in civil engineering, environment impact, telecommunications, energy, etc.
    - Several permanent and itinerant exhibitions (Spain, Monte Carlo, Netherlands, United Kingdom, Switzerland, Japan, France, USA)

TEACHING AND SUPERVISING EXPERIENCE

Adjunct Lecturer 2017
Virtual and Augmented Reality – European Institute of Design
Graduate Thesis Advisor 2013 – 2015
3 graduated students, Computer Science – University of A Coruña
Seminars on Computer Graphics and Interaction 2006 – 2012
Computer Science Faculty – University of A Coruña
Master on Digital Creativity and Communication 2006
Audio and Video courses. University of A Coruña

HONORS

- **Best Paper** at Computer Graphics International 2021 (CGI'21, Zürich) 2019
- **Best Paper** at Graphics in Cultural Heritage 2019 (GCH19 – Sarajevo)
- **PhD thesis selected for Thesis Fast-forward session at SIGGRAPH 2019** 2019
  Presented at Los Angeles

- **PhD thesis *Cum Laude* distinction** 2018
  Unanimous decision by an international committee for "Scalable Exploration of Massive 3D Models" PhD dissertation
- **Best Papers selection** at Interactive 3D Graphics and Games (i3D – Seattle) 2016
- **Best Graduate Thesis Award** 2013
  Professional Association of Computer Science and Engineering of Galicia
- **Bull's Academic Excellence Award** 2012
  Master on High Performance Computing
- **AMD's Best Master Thesis Award** 2012
  PCM. A multiresolution system for managing massive point cloud datasets
- **CG International Architect Awards 2011** 2011
  Spatial, volumetric and sectional analysis system for architectural visualization
- **Best Conference Paper at SIGRADI 2006 Conference (Chile)** 2006
- **1st price at Business Ideas Contest (University of A Coruña)** 2003
  Mediabox: multimedia services integration
- **1st price at Real Time Battle Contest (University of A Coruña)** 2002

MISCELLANEA

- **Languages**: Spanish & Galician (mother languages). English & Italian (professional proficiency).
- Personal projects on *demoscene*, digital art, rendering, music and photography.
- Open-source contributions such as M.A.RL.I.E. (Multilayered Annotated ReLighting Images Explorer), SymVox (Voxelized model compression), *PCM (Point Cloud Manager library)*, *OpenSceneGraph*, amon, *osgAL, osgNV* or *RealTimeBattle3D.*

REFERENCES

- **KAUST**: Prof. Markus Hadwiger (markus.hadwiger@kaust.edu.sa, High-Performance Visualization Group director)
- **CRS4**: Dr. Enrico Gobbetti (gobbetti@crs4.it, Visual Computing Group director)
- **CEGA**: Enrique Fernández (quique@cega.es, CEO)
- **VideaLAB**: Prof. Luis Hernández (lhernandez@udc.es, director) and Dr. Javier Taibo (jtaibo@udc.es, development coordinator, direct supervisor).
- **RNASA Group**: Prof. Alejandro Pazos (apazos@udc.es, director) and Prof. Julián Dorado (julian@udc.es, CG Professor, direct supervisor).