

# Marco Agus

## Assistant Professor / Visual Data Scientist

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My research interests span different domains in visual computing, from haptics and visual rendering for surgical simulation, to rendering and natural interaction on light field displays, to real time exploration of massive digital heritage models, to processing and visual exploration of connectomics and electron microscopy biology data.

My main ambition is to progress the state of the art in applied visual computing technologies for massive scientific data exploration in high impact application domains, such as medicine, neuroscience and engineering, and to train next generation successful scholars in the field. For these reasons, I am looking for highly stimulating and well established multidisciplinary research environments to join as associate professor.

### SKILLS

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<b>Tools and Languages</b>	C++, Python, Git, $\LaTeX$ , OpenGL, Qt, TensorFlow, PyTorch, FastAI
<b>Expertise</b>	3D graphics, Visualization, Computer Vision, Virtual Reality, Robotics
<b>Communication</b>	English (fluent speaker), Italian (native speaker), French (reading and writing)

### ACADEMICAL EXPERIENCE

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**Assistant Professor** **March 2020 — Present**  
*Hamad Bin Khalifa University (KBKU)* *Doha, Qatar*

- Teaching: scientific and data visualization, computer systems, discrete mathematics, imperative computing
- Research: machine learning applied to 3D reconstruction of indoor environments, visual computing for histopathology and neuroscience
- Management: supervision of master and Ph.D students, principal investigator in research projects funded by Qatar National Research Fund

**Senior Researcher** **October 2019 — February 2020**  
*Center of Research and Development in Sardinia (CRS4)* *Cagliari, Italy*

- Research: machine learning and virtual reality for neuroscience investigations.
- Management: key developer in projects funded by European Community

**Research Engineer** **June 2016 — October 2019**  
*King Abdullah University of Science and Technology (KAUST)* *Jeddah, Kingdom of Saudi Arabia*

- Research: visual computing technologies for connectomics, neuroscience investigations and cultural heritage
- Management: development and administration of competitive research grants funded by KAUST

**Expert Researcher** **January 2008 — May 2015**  
*Center of Research and Development in Sardinia (CRS4)* *Cagliari, Italy*

- Research: visual computing technologies for lightfield displays and real time rendering of massive data
- Management: development, administration and reporting for EU-funded research projects

**Researcher** **January 2003 — December 2007**  
*Center of Research and Development in Sardinia (CRS4)* *Cagliari, Italy*

- Research: visual computing technologies for massive model rendering
- Management: development, administration and reporting for EU-funded research projects

**Junior Researcher** **January 2001 — December 2002**  
*Center of Research and Development in Sardinia (CRS4)* *Cagliari, Italy*

- Research: visual computing technologies for surgical simulation
- Management: development, administration and reporting for EU-funded research projects

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## EDUCATION

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**Ph.D in Mechanical Engineering**, *University of Cagliari, Italy* March 2004  
**M.Sc. in Electronics Engineering**, *University of Cagliari, Italy* October 1999

## ACTIVITIES

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In the following a list of most recent public activities:

Tutorial presented at IEEE CVPR 2023 about Indoor Panoramic Images	2023
Associate Editor for Computer Graphics Forum journal	2023
Committee member for EuroVis conference	2023
Invited speaker at 2nd Summer School BioMedVis in Brno 2022	
Chair of EuroVis Short Papers conference	2021 — 2022
Associate Editor for IEEE TVCG journal	2020 — 2022
Committee member for IEEE VIS conference	2020 — 2022
Admission Commission for HBKU	2021 — 2022
Chair of EG STAG conference	2019
Associate Editor of Computers and Graphics journal	2019
Tutorial presenter on Mobile Visual Computing: Eurographics, Siggraph Asia, 3DV	2017 — 2018

## RESEARCH OUTCOMES

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For a full and updated list of publications, check the following resources:

- **Google Scholar Profile:** [jNN3FacAAAAJ](#)
- **ORCID Profile:** [000-0003-2752-3525](#)
- **SCOPUS Profile:** [7195623616](#)

In the following, I report the most significant recent contributions, categorized by topic:

- **Indoor reconstruction:** Artificial Intelligence technologies for automatic extraction of 3D layouts [1], depth maps [2], and 2D layouts [3] and for removing clutter [4] from single panoramic images representing indoor environments;
- **Artificial Intelligence for Microscopy Images:** technologies for automatic processing of microscopy images for tumour cell analysis in histopathology [5, 6] and brain cell classification in neuroscience [7, 8];
- **Visual computing for Connectomics:** technologies for Virtual Reality exploration of neural branched structures [9], immersive analysis of neuroenergetic phenomena [10, 11], interactive exploration of connectomics volume data [12, 13, 14];
- **3D Interactive systems for Cultural Heritage:** technologies for museal installation of setups for natural exploration of massive 3D digital sculptures [15, 16, 17].

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## REFERENCES

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- [1] Giovanni Pintore, Eva Almansa, Marco Agus, and Enrico Gobbetti. Deep3dlayout: 3d reconstruction of an indoor layout from a spherical panoramic image. *ACM Transactions on Graphics (TOG)*, 40(6):1–12, 2021.
- [2] Giovanni Pintore, Marco Agus, Eva Almansa, Jens Schneider, and Enrico Gobbetti. Slicenet: deep dense depth estimation from a single indoor panorama using a slice-based representation. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, pages 11536–11545, 2021.
- [3] Giovanni Pintore, Marco Agus, and Enrico Gobbetti. Atlantanet: Inferring the 3d indoor layout from a single 360 image beyond the manhattan world assumption. In *European Conference on Computer Vision*, pages 432–448. Springer, Cham, 2020.
- [4] Giovanni Pintore, Marco Agus, Eva Almansa, and Enrico Gobbetti. Instant automatic emptying of panoramic indoor scenes. *IEEE Transactions on Visualization and Computer Graphics*, 28(11):3629–3639, November 2022. Proc. ISMAR.
- [5] Khaled Al-Thelaya, Marco Agus, Nauman Ullah Gilal, Yin Yang, Giovanni Pintore, Enrico Gobbetti, Corrado Calí, Pierre J Magistretti, William Mifsud, and Jens Schneider. Inshade: Invariant shape descriptors for visual 2d and 3d cellular and nuclear shape analysis and classification. *Computers & Graphics*, 98:105–125, 2021.
- [6] Khaled Al-Thelaya, Faaiz Hussain Kahn Joad, Nauman Ullah Gilal, William Mifsud, Giovanni Pintore, Enrico Gobbetti, Marco Agus, and Jens Schneider. Histocontours: a framework for visual annotation of histopathology whole slide images. In *Proc. Eurographics Workshop on Visual Computing for Biology and Medicine (VCBM)*, pages 99–109, September 2022. Best full paper award.
- [7] Marco Agus, Enrico Gobbetti, Giovanni Pintore, Corrado Cali, and Jens Schneider. Wish: efficient 3d biological shape classification through willmore flow and spherical harmonics decomposition. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops*, pages 972–973, 2020.
- [8] Marco Agus, Maria Veloz Castillo, Javier F Garnica Molina, Enrico Gobbetti, Heikki Lehvälaiho, Alex Morales Tapia, Pierre J Magistretti, Markus Hadwiger, and Corrado Calí. Shape analysis of 3d nanoscale reconstructions of brain cell nuclear envelopes by implicit and explicit parametric representations. *Computers & Graphics: X*, 1:100004, 2019.
- [9] Daniya Boges, Marco Agus, Ronell Sicat, Pierre J Magistretti, Markus Hadwiger, and Corrado Calí. Virtual reality framework for editing and exploring medial axis representations of nanometric scale neural structures. *Computers & Graphics*, 91:12–24, 2020.
- [10] Marco Agus, Corrado Cali, A Al-Awami, Enrico Gobbetti, P Magistretti, and Markus Hadwiger. Interactive volumetric visual analysis of glycogen-derived energy absorption in nanometric brain structures. In *Computer Graphics Forum*, volume 38, pages 427–439, 2019.
- [11] Marco Agus, Daniya Boges, Nicolas Gagnon, Pierre J Magistretti, Markus Hadwiger, and Corrado Calí. Glam: Glycogen-derived lactate absorption map for visual analysis of dense and sparse surface reconstructions of rodent brain structures on desktop systems and virtual environments. *Computers & Graphics*, 74:85–98, 2018.
- [12] Khaled Al-Thelaya, Marco Agus, and Jens Schneider. The mixture graph-a data structure for compressing, rendering, and querying segmentation histograms. *IEEE Transactions on Visualization and Computer Graphics*, 27(2):645–655, 2021.
- [13] Johanna Beyer, Haneen Mohammed, Marco Agus, Ali K Al-Awami, Hanspeter Pfister, and Markus Hadwiger. Culling for extreme-scale segmentation volumes: A hybrid deterministic and probabilistic approach. *IEEE Transactions on Visualization and Computer Graphics*, 25(1):1132–1141, 2018.
- [14] Markus Hadwiger, Ali K Al-Awami, Johanna Beyer, Marco Agus, and Hanspeter Pfister. Sparseleap: Efficient empty space skipping for large-scale volume rendering. *IEEE transactions on visualization and computer graphics*, 24(1):974–983, 2017.
- [15] Marco Agus, Fabio Marton, Fabio Bettio, Markus Hadwiger, and Enrico Gobbetti. Data-driven analysis of virtual 3d exploration of a large sculpture collection in real-world museum exhibitions. *Journal on Computing and Cultural Heritage (JOCCH)*, 11(1):1–20, 2017.
- [16] Marcos Balsa Rodriguez, Marco Agus, Fabio Bettio, Fabio Marton, and Enrico Gobbetti. Digital mont’ e prama: Exploring large collections of detailed 3d models of sculptures. *Journal on Computing and Cultural Heritage (JOCCH)*, 9(4):1–23, 2016.
- [17] M Balsa Rodriguez, Marco Agus, Fabio Marton, and Enrico Gobbetti. Adaptive recommendations for enhanced non-linear exploration of annotated 3d objects. In *Computer Graphics Forum*, volume 34, pages 41–50, 2015.