

Guillaume Cordonnier

Research Scientist (Chargé de Recherche), Inria

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Curriculum Vitae

Employment

2021-now	Research Scientist (Chargé de Recherche), <i>Inria Université Côte d'Azur, France</i>
2019-2020	Postdoctoral Researcher, <i>ETH Zurich, Switzerland</i>
2018-2019	Postdoctoral Researcher, <i>Ecole polytechnique (Google chair), France</i>
2018	Research Engineer, <i>Université de Perpignan, France</i>
2018	Expert mission, <i>Total R&D, France</i>

Education

2018	Ph.D in Computer Science, <i>Université Grenoble Alpes, France</i>
2015	Master's degree in Computer Science, <i>Grenoble INP, France</i>
2013	Bachelor's degree in Computer Science, <i>Université de Lyon, France</i>
2012-2015	Eleve Normalien, <i>Ecole Normale Supérieure de Lyon, France</i>

Awards

2019	ETH Fellowship (acceptance rate: 25%)
2019	GdR IG-RV best Ph.D. award (French computer graphics, geometry, VR and visualization)
2015	Ph.D. research grant from the ministry of research

Research Visits

My multi-disciplinary methodology for the simulation of natural phenomena was an opportunities to visit several academic and industrial labs:

2018 (2 months)	Prehistoric ecosystems, <i>European Center for Prehistoric Research at Tautavel (CERP), Université de Perpignan</i>
2017-2018 (32 days)	Subsurface geology from seismic data, <i>Total R&D, Pau, France</i>
2017 (3 months)	Earth Surface Processes, <i>GFZ Research Center for Geosciences, Postdam, Germany</i>

Services to the scientific community

2022-now	Scientific board of GDR-IGRV, chair of the IGRV Ph.D. award
2021	Organization committee of the French Conference in Computer Graphics

Reviews and expertise activities

IPC member: MIG, Eurographics short papers, CASA

Computer graphics and machine learning: Siggraph, Siggraph Asia, ICLR, IEEE TVCG, Eurographics, Pacific Graphics, Computer and Graphics, Graphical Models, Computer Animation and Virtual Worlds

Occasional reviewer in geosciences: Journal of Digital Earth, Geophysical Research Letters, Stochastic Environmental Research and Risk Assessment

Expertise: French National Research Agency (ANR), IP Paris PhD Award

Invited talks

2023	Université de Rennes, <i>Geosciences Rennes</i>
2023	Inria-DFKI European Summer School on Artificial Intelligence
2023	Université de Lausanne, Switzerland, <i>20 years of the geosciences departement</i>
2022	Academie des Sciences, <i>Intersection des applications des sciences</i>
2022	Inria Université Côte d'Azur, <i>Calsito Complex Fluids group</i>
2022	Inria Université Côte d'Azur, <i>Maasai Machine Learning group</i>
2022	LIX, Ecole polytechnique, <i>GeoVic Computer Graphics group</i>
2018	Université de Lausanne, Switzerland, <i>Institute of Earth Surface Dynamics</i>
2018	Total R&D, <i>Geoscience departement</i>
2017	Wisylab (Start-up on terrain modelling)
2017	Ubisoft Paris
2017	Helmoltz Research Center for Geosciences, Potsdam, Germany, <i>Earth Surface Process Modelling group</i>

Teaching

2022	Machine Learning (M2), <i>Polytech Nice Sophia</i>
2021-2023	Graphics and Learning (M2), <i>ENS Ecole Normale Supérieure de Lyon</i>
2019-2020	Seminar 'Advanced Topics in Computer Graphics and Vision' (M2), <i>ETH Zurich</i>
2018-2019	Transverse project 'AI and Computer Graphics' (M2), <i>Ecole Polytechnique</i>
2016-2017	Algorithmics, Programming (Bs), 3D Computer Graphics (Ms), <i>Université Grenoble Alpes</i>
2015-2016	Introduction to Computer Sciences (Bs in Biology), <i>Université Grenoble Alpes</i>

Publications

Major publications

Authoring Landscapes by Combining Ecosystem and Terrain Erosion Simulation

[Cordonnier *et al.*, Siggraph 2017]

This publication introduces a new stochastic simulation method to model the interplay of natural phenomena acting at very different time scales. Applied to the interleaving of erosion and vegetation cycles, this method results in realistic landscapes with consistent layers of geological and ecological materials.

Deep Learning Speeds Up Ice Flow Modeling by Several Orders of Magnitude

[Jouvet, Cordonnier, *et al.*, Journal of Glaciology, 2021]

This collaboration with researchers in glaciology resulted in a deep surrogate model for the evaluation of ice velocity from the geometry of the glacier. We show that deep learning can efficiently replace a costly simulation, and, therefore, accelerate ice flow modeling by several orders of magnitude.

Forming Terrains by Glacial Erosion

[Cordonnier *et al.*, Siggraph 2023]

We propose a new algorithm to model ice flow and the resulting glacial erosion that shape specific patterns on high-altitude mountains. This result improved significantly the accuracy and speed at which we can model glacial erosion in both computer graphics and geomorphology.

Computer Graphics

Cordonnier G., Jouvet G., Peytavie A., Brau, J., Cani M.-P., Benes B., Galin E., Guérin E., Gain J., **Forming Terrains by Glacial Erosion**, *ACM Transactions on Graphics*, 42(4) (2023), Presented at Siggraph 2022.

Rosset N., Cordonnier G., Duvigneau R., Bousseau A., **Interactive design of 2D car profiles with aerodynamic feedback**, *Computer Graphics Forum*, 42 (2). (2023). Presented at Eurographics 2023.

Petitjean A., Poirier-Ginter Y., Tewari A., Cordonnier G., Drettakis G., ModalNeRF: **Neural Modal Analysis and Synthesis for Free-Viewpoint Navigation in Dynamically Vibrating Scenes**, *Computer Graphics Forum*, 42(4). (2023). Presented at EGSR 2023.

Tang J., Azevedo V., Cordonnier G., Solenthaler B., **Neural Green's functions for Laplacian systems**, *Computer and Graphics*, 107, pp. 186-196. (2022).

Lastic M., Rohmer D., Cordonnier G., Jaupart C., Neyret F., Cani M.-P., **Interactive simulation of plume and pyroclastic volcanic ejections**, *Computer Graphics and Interactive Techniques*, 5(1), 1-15. (2022). Presented at I3D 2022

Kim B., Huang X., Wuelfroth L., Tang J., Cordonnier, G., Gross, M., Solenthaler, B., **Deep Reconstruction of 3D Smoke Densities from Artist Sketches**, *Computer Graphics Forum*, 41 (2), 97-110 (2022), Presented at Eurographics 2022.

Ecornier-Nocca P, Cordonnier G., Carrez P., Moigne A.-M., Memari P, Benes B., Cani M.-P., **Authoring Consistent Landscapes with Flora and Fauna**, *ACM Transactions on Graphics*, 40 (4), 1-13 (2021), Presented at Siggraph 2021.

Tang J, Azevedo V., Cordonnier G., Solenthaler B., **Honey, I Shrunk the Domain: Frequency-aware Force Field Reduction for Efficient Fluids Optimization**, *Computer Graphics Forum*, 40 (2), 339-353 (2021), Presented at Eurographics 2021, *best paper award*.

Vimont U., Gain J., Lastic M., **Cordonnier G.**, Abiodun B., Cani M.-P., **Interactive Meso-scale Simulation of Skyscapes**, *Computer Graphics Forum*, 40 (2), 339-353 (2019), Presented at Eurographics 2020.

Galin E., Guérin E., Peytavie A., **Cordonnier G.**, Benes B., Cani M.-P., Gain J., **A Review of Digital Terrain Modeling**, *Computer Graphics Forum*, 38 (2), 553-577 (2019), presented at Eurographics 2019

Cordonnier G., Ecomier P., Galin E., Gain J., Braun J., Cani M.-P. , **Interactive Generation of Time-evolving, Snow-Covered Landscapes with Avalanches**, *Computer Graphics Forum*, 37(2), 497-509 (2018), presented at Eurographics 2018

Cordonnier G., Cani M.-P., Benes B., Braun J., Galin E., **Sculpting Mountains: Interactive Terrain Modeling based on Subsurface Geology**, *IEEE Transactions on Visualization and Computer Graphics*, 24(5): 1756-1769, (2018), presented at I3D 2018

Cordonnier G., Galin E., Gain J., Benes B., Guerin E., Peytavie A., Cani M.-P., **Authoring Landscapes by Combining Ecosystem and Terrain Erosion Simulation**, *ACM Transactions on Graphics*, 2017, 36(4), 134:1-12 (2017), presented at SIGGRAPH 2017

Gain J., Long H., **Cordonnier G.**, Cani M.-P., **EcoBrush: Interactive Control of Visually Consistent Large-Scale Ecosystems**, *Computer Graphics Forum*, 36(2), 63-73 (2017), presented à Eurographics 2017

Cordonnier G., Braun J., Cani M.-P., Benes B., Galin E., Peytavie A., Guerin E., **Large Scale Terrain Generation from Tectonic Uplift and Fluvial Erosion**. *Computer Graphics Forum*, 35(2), 165-175 (2016), presented at Eurographics 2016

Earth Sciences

Gailleton B., Malatesta L., **Cordonnier G.**, Braun J. **CHONK 1.0: landscape evolution framework: cellular automata meets graph theory**, *Geoscientific Model Development* (2024).

Jouvet G., **Cordonnier G.**, **Ice-flow model emulator based on physics-informed deep learning**, *Journal of Glaciology* (2023)

Jouvet G., **Cordonnier G.**, Kim B., Lüthi M., Vieli A., Aschwanden A., **Deep learning speeds up ice flow modelling by several orders of magnitude**, *Journal of Glaciology* (2021)

Cordonnier G., Bovy B., Braun J. **A Linear Complexity Algorithm for Flow Routing in Topographies with Depressions**, *Earth Surface Dynamics*, 7(2), 549-562 (2019)

Yuan X. P., Braun J., Guerit L., Rouby D., **Cordonnier G.**, **A new efficient, O(n) and implicit method to solve the Stream Power Law taking into account sediment transport and deposition**, *Journal of Geophysical Research: Earth Surface*, 124, 1346-1365 (2019)