Miguel Crespo

PhD Student in Computer Science

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RESEARCH SUMMARY 🧪

My current focus is the field of differentiable rendering, which is the subject of the thesis I am now working on.

Previously, my research background has covered several interrelated light transport applications within the areas of computer graphics and computational imaging.

Under the regime of transient light transport, I focused on exploiting the simulation of time-resolved radiance for non-line-of-sight geometry reconstruction under scattering media.

On traditional steady-state light transport, I focused on a new integration strategy that leverages Monte Carlo integration by combining it with quadrature rules. Even while it was designed for rendering, it could be used in other problems involving numerical integration.

Differentiable Rendering   Physically-Based Rendering

Neural Graphics   Computational Imaging

Computational Photography

EDUCATION 🎓

Ph.D. in Computer Science
📅 Sep. 2021 - Present

École Polytechnique Fédérale de Lausanne   📍 Lausanne, Switzerland

👤 Advisor: Wenzel Jakob

M.S. in Biomedical Engineering
📅 Sep. 2018 - Dec. 2019

Universidad de Zaragoza   📍 Zaragoza, Spain

👤 Advisor: Adrian Jarabo

📑 Thesis: Vision through Turbid Media using Phasor Fields

B.S. in Computer Science
📅 Sep. 2014 - Jul. 2018

Universidad de Zaragoza   📍 Zaragoza, Spain

👤 Advisor: Adolfo Muñoz

📑 Thesis: Adaptative Rendering using Quadrature Techniques

EXPERIENCE 🏢

Junior Researcher
📅 2018 - 2020

Graphics & Imaging Lab   📍 Zaragoza, Spain

🏢 Academic research lab

👤 Supervisors: Adolfo Muñoz & Adrian Jarabo

TALKS GIVEN ❞

[T1] **Primary-Space Adaptive Control Variates using Piecewise-Polynomial Approximations**. Technical paper presentation. Virtual (originally scheduled in Los Angeles, U.S.).
📅 Aug. 2021

[T2] **Vision through Turbid Media using Phasor Fields**. MSc thesis defense. Universidad de Zaragoza - Spain.
📅 Dec. 2019

[T3] **Adaptative Rendering using Quadrature Techniques**. BSc thesis defense. Universidad de Zaragoza - Spain.
📅 Jul. 2018

SKILLS 🧠

C++   Python   C   Java   Javascript

PyTorch   Matlab   Linux / MacOS

Spanish — native   **English** — fluent

French — beginner

COMPETITIONS 🏆

Hackathon
📅 22, 23 & 24 Mar. 2019

UCODE - 2019   📍 Zaragoza, Spain

We solved the Adidas Advanced Division's problem about classifying movement sequences using Machine Learning applied in frequency space (94% accuracy)

Hackathon
📅 9, 10 & 11 Mar. 2018

UCODE - 2018   📍 Zaragoza, Spain

We proposed a solution to solve the challenge of GPS indoors using location-based Bluetooth beacons and later smart guidance of users in stores based on a recommendation system to optimize user engagement with products

Hackathon
📅 10, 11 & 12 Mar. 2017

UCODE - 2017   📍 Zaragoza, Spain

We developed a Deep Learning system that extracted semantic content from videos, allowing them to be searched and clipped intelligently

PUBLICATIONS

✳   Joint first authors

[P1] **"Non-line-of-sight imaging in the presence of scattering media using phasor fields"**.
Pablo Luesia ✳ , *Miguel Crespo* ✳ , *Adrian Jarabo*, and *Albert Redo-Sanchez*.
In: *Opt. Lett.*, vol. 47, Aug. 2022. DOI: 10.1364/OL.463296. 🔗 Webpage, 📄 PDF

[P2] **"Primary-Space Adaptive Control Variates using Piecewise-Polynomial Approximations"**.
Miguel Crespo, *Adrian Jarabo*, and *Adolfo Muñoz*.
In: *ACM Transactions on Graphics*, vol. 40, Jul. 2021. DOI: 10.1145/3450627. 🔗 Webpage, 📄 PDF

TEACHING

◉ **Advanced Computer Graphics (CS-440)**

   👤 *Teaching assistant* . . . . 📅 Spring 2023
   👤 *Teaching assistant* . . . . 📅 Spring 2022

◉ **Numerical Methods for Visual Computing and Machine Learning (CS-328)**

   👤 *Teaching assistant* . . . . 📅 Fall 2022

AWARDS & GRANTS

⭕ **Scholarship for Strategic Masters**

   Gobierno de Aragón . . . . 📅 2018
   4,770 EUR

⭕ **Honor mention in M.S.**

   Universidad de Zaragoza . . . . 📅 2019
   Mention for outstanding performance in MSc Final Thesis

⭕ **Honor mentions in B.S.**

   Universidad de Zaragoza . . . . 📅 2018
   Mentions for outstanding performance in Computer Graphics, Robotics, Hardware Project, and Operating Systems

SUPERVISED STUDENTS 👥

👤 **Ningwei Ma** . . . . 📅 Fall 2022

   📄 *Hair shading implementation in Mitsuba 3*

   🔖 Semester project

👤 **David Neill** . . . . 📅 Spring 2022

   📄 *Alternative Optimization Methods for Differential Rendering*

   🔖 Semester project

👤 **Haley Owsianko** . . . . 📅 Fall 2021

   📄 *Differentiable Mipmapping in Mitsuba 2*

   🔖 Semester project

Last updated on February 12, 2023