

CARLOS LOPEZ GARCES

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Portfolio and blog: carlos-lopez-garces.github.io · Code repository: github.com/carlos-lopez-garces

EDUCATION

University of Pennsylvania 2023 – May 2025
M.S. Computer Graphics and Game Technology (CGGT) Philadelphia, Pennsylvania, USA

Indiana University 2020 - 2023
B.S. Mathematics Richmond, Indiana, USA
Selected coursework: Linear Algebra, Probability, Mathematical Statistics, Topology, Real Analysis.

Tecnológico de Monterrey 2006 - 2010
B.S. Computer Science Guadalajara, Jalisco, Mexico
With a specialization in Computer Graphics and AI.

SELECTED PERSONAL PROJECTS

carlos-lopez-garces.github.io/projects/cdxr A DirectX 12 Raytracing (DXR) real-time hybrid rasterization-raytracing renderer and unidirectional path tracer on top of NVIDIA's Falcor for NVIDIA RTX GPUs.

carlos-lopez-garces.github.io/projects/cdx A DirectX 12 renderer featuring a few real-time rendering techniques, such as shadow mapping, SSAO, and stencil mirrors. C++.

carlos-lopez-garces.github.io/projects/cpbtr My implementation from scratch of the offline path tracer of the book *Physically Based Rendering: From Theory to Implementation* by Pharr, Jakob, and Humphreys. C++.

WORK HISTORY

HOVER Inc. (hover.to) January 2019 – July 2023
Real-time rendering and interactive 3D modeling of homes. San Francisco, California, USA
Senior 3D Graphics Engineer

- Implemented global illumination algorithms, normal and roughness mapping, a linear workflow for color management, procedural generation of terrain, procedural generation of geometry for enhancing the base polygon mesh of the HOVER house model.
- Implemented detection algorithms for types of roofs over the polygon mesh of the HOVER house model.
- Contributed to HOVER's real-time path tracer on the web.

Apcera, now a subsidiary of Ericsson ([Apcera on Wikipedia](https://en.wikipedia.org/wiki/Apcera)) May 2016 – December 2018
A container runtime and orchestrator for the cloud. San Francisco, California, USA
Senior Software Engineer

- Go programming language.
- Led team of 9 in the implementation of rolling update and restart of replicas.
 - Implemented autoscaling of replicas using a proportional-integral-derivative controller.
 - Maintained the container runtime (process setup and execution using Linux namespaces, cgroups, union filesystems), job scheduler (submission of containers to nodes and processors for execution), replica health manager, and consensus protocol (Paxos/Raft).
 - Participated in the reimplementing of the container runtime for compliance with the Open Container Initiative industry standard.

Oracle Corporation ([oracle.com](https://www.oracle.com)) January 2011 – April 2016
RDBMS database kernel. Guadalajara, Jalisco, Mexico
Senior Member of Technical Staff

- C programming language.
- Worked across the Virtual OS, a part of the RDBMS's kernel: bug fixing for memory allocators, background process manager, synchronization primitives, and multi-threading manager.
 - Responsible for maintaining the Shared Server architecture and the kernel's diagnostic system.
 - Participated in porting Oracle 12c from Linux x64 to HP-UX IA64 and AIX PowerPC-64. In particular, the startup and shutdown services of the RDBMS server and the Oracle Java Virtual Machine.

SKILLS

Real-time and offline ray tracing and path tracing

C (5+ years professionally)

C++ (5 years, side and school projects)

Multi-threaded programming

Linux systems programming (5+ years professionally)

DirectX Raytracing (1 year, side projects)

DirectX12/HLSL (4 years, side projects)

WebGL/GLSL (4+ years professionally)

Vulkan (2 years, small projects)

Linear algebra, 3D math

PUBLICATIONS

Carlos Lopez Garces, Nayeong Kong, "Derivation and Evaluation of Monte Carlo Estimators of the Scattering Equation Using the Ward BRDF and Different Sample Allocation Strategies," Mathematics and Statistics, Vol.12, No.1, pp. 55-62, 2024. DOI: 10.13189/ms.2024.120108

TALKS

28th Indiana University Undergraduate Research Conference (IUURC) December 2022
Derivation and Evaluation of Monte Carlo Estimators of the Scattering Equation Using the Ward BRDF and Different Sample Allocation Strategies IUPUI Campus

HONORS AND AWARDS

Honors and Excellence Distinction for B.S. Computer Science 2010
A distinction given by Tecnológico de Monterrey to students that graduate with GPA higher than 95 / 100. Ranked 1st of class 2010.

Academic Merit Award 2009
Awarded by the Student Affairs Division and Alumni Association of Tecnológico de Monterrey for obtaining the highest GPA (98.83 / 100) of all undergraduate engineering, architecture, and health sciences students in the whole year 2009.

CERTIFICATIONS

Georgia Tech on edX 2021
Linear Algebra IV: Orthogonality & Symmetric Matrices and the SVD [[Certificate](#)]

DeepLearning.AI on Coursera 2017 - 2018
Neural Networks and Deep Learning [[Certificate](#)]
Improving Deep Neural Networks: Hyperparameter Tuning, Regularization [[Certificate](#)]
Structuring Machine Learning Projects [[Certificate](#)]

Ardan Labs 2017
Ultimate Go (programming language) [[Course](#)]

The Linux Foundation 2014
Developing Applications for Linux (LFD401) [[Course](#)]

INTERNSHIPS

Google Summer of Code (GSoC) 2010 May - August 2010
A student program sponsored by Google for contributing to open-source software.
· Better Print Support project: Scalable maps for mapnik.org. [[Archive record](#)]