

Diogo Costa

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Technical Skills

From personal and professional projects. Most of the links below are to my website/portfolio.

Graphics programming: shader programming (HLSL and CG) for texture synthesis, [resolution and color filters](#), custom lighting, post processing effects (using auxiliary buffers and cameras like [sun shafts](#), outlines and portals), [skyboxes](#) (including a night sky with individually twinkling stars with custom densities, colors, etc.), [ray marching](#), [fractals](#), [reaction-diffusion system](#), [cellular automata](#) and various visual effects.

Computational Geometry and Linear Algebra: convex hull algorithms (to create 3D [cross-sections of complex 4D polyhedra](#)), voronoi diagrams (to create [tilings](#), [terrain erosion](#), and [others](#)), camera and [vehicle controls](#), custom [3D modelling tools](#), [Bezier curves](#).

Procedural Generation: terrain generation (including simple noise functions as well as custom [erosion based](#) algorithms applied on meshes and heightmaps), puzzle generation (using [cellular automata](#) as well as SAT (boolean satisfiability) programming), ornament generation (of historical art systems like [Celtic knots](#), [Chinese lattice windows](#), Islamic star patterns as well as abstract systems using [apollonian gaskets](#), [voronoi diagrams](#), noise functions, cellular automata or [digital weaving](#)).

Tool Development: 3D modeling (used to create buildings and props in [Angkhorror](#)), Dialogue Systems (both a simple linear system with animations and text, character and background effects as seen in [The Magic Flute](#) as well as a more cRPG focused branching dialogue system with checks and rolls as seen in [Anarchima](#)), music sheet synchronizer to an live performance (to streamline level creation in [HarmonyCity](#)), among others.

General game programming: variety of [prototypes](#) and full games including (among others):

- Diablo-like skill system (with AoE, DoT, simple/sustained attacks, melee, etc.);
- 2D platformers ([energy conserving grappling hook](#), [castlevania inspired / dashing based air movement](#), [multi-planet gravity system](#), etc.);
- [Vehicle movement](#) (on dune-like terrain);
- Puzzle and board games (including my own [AmalgamA](#) as well as implementations of Akari Light-up, Minesweeper, and networked Shogi).
- Rhythm games (with keyboard/touch and microphone input, mainly for [recorder](#), but also [guitar/ukulele](#), and more traditional prototypes like [this](#) and balinese gamelan);
- Tactical cRPG ([in development](#));

Core Tools: Unity, Python, C#, C++, C, HLSL, CG, GameMaker: Studio, HTML/CSS, React, Git.

Professional Experience

October 2018 - October 2019

INESC-ID, Lisbon – *Junior Researcher (Algorithms and Data Structures)*

- Computational Complexity (3-SAT reductions and 2-SAT and Dynamic Programming solutions to pattern matching problems);
- Creation and analysis of algorithms for detection of recombinant bacterial strains using Suffix Trees and de Bruijn graphs (written in C);
- Information Visualization of recombinant bacterial strains (written in Javascript);
- Included one month as a visiting researcher at the University of Chile.

April 2021 - January 2023

Classplash, Lousã – *Programmer/Designer/VFX Artist*

- Full development of The Magic Flute as programmer, designer and visual-effects artist (see [my portfolio](#));
- Launch and post-launch support of [Harmony City](#);
- Maintenance and implementation of Panoramic Mode feature in [Cornelius Composer](#);
- In-house tools development (including: synchronizing a music sheet with a live performance, automatic difficulty assignment of song levels based on chords, dialogue tool to code the story sequences in [The Magic Flute](#), python scripting to automate various processes);

Other

September 2019 - March 2021

Save or Quit – *Game Reviewer*

- Medium-long form game reviews (1800-3500 words per review).
- Focus on game design and how the various threads fit together.

Education

September 2013 - July 2016

Instituto Superior Técnico, Lisbon – *BSc. Computer Science, 16.0/20*

September 2016 - July 2018

Instituto Superior Técnico, Lisbon – *MSc. Computer Science 18.0/20*

- Focus on: Computational Logic and Complexity, Algorithms and Data Structures, and Machine Learning.
- Thesis on Computational Complexity of Modern Games, including multiple new proofs of NP and PSPACE Completeness (including Hexiom and Cut the Rope).

MOOCs:

- **Certified:**

- Game Theory (Stanford University & The University of British Columbia - Coursera)
- Game Theory II: Advanced Applications (Stanford University & The University of British Columbia - Coursera)
- Learning How to Learn: Powerful mental tools to help you master tough subjects (McMaster University & University of California San Diego - Coursera)
- Principles of Macroeconomics (Marginal Revolution University)
- Principles of Microeconomics (Marginal Revolution University)
- Economics of Media (Marginal Revolution University)
- Euro-crisis (Marginal Revolution University)
- Data Visualization with D3 (FreeCodeCamp)
- Responsive Web Design (FreeCodeCamp)
- Front End Development Libraries (FreeCodeCamp)
- Javascript Algorithms and Data-Structures (FreeCodeCamp, "final projects" only)
- Back End Development and APIs (FreeCodeCamp)
- Quality Assurance (FreeCodeCamp)
- Music as Biology: What We Like to Hear and Why (Coursera)
- So You Think You Know Tango? (Coursera)
- World Music: Balinese Rhythms

- **Audited:**

- Introduction to Genetics and Evolution by Duke University (Coursera)
- The Science of Religion (University of British Columbia - EdX)
- Masterpieces of World Literature (Harvard - EdX)
- Introduction to Biology - The Secret of Life (MIT - EdX)
- A Global History of Architecture (MIT - EdX)
- Creative Writing - The Craft of Plot (Coursera)
- Audio Signal Processing for Music Applications (Coursera - extremely good and in-depth, closest to a really university course I've taken)
- Pixel Art for Video Games (Coursera)
- Getting Started with Musical Theory (Coursera)
- Fundamentals of Music Theory