Diogo Costa

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Technical Skills

Most of these have been learned and applied in personal 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).

General game programming: variety of prototypes including (among others):

- Diablo-like skill/movement system (with AoE, DoT, simple/sustained attacks, mele, etc.);
- 2D platformers (energy conserving grappling hook, castlevania inspired / dashing based air movement, multi-planet gravity system, etc.);
- Rhythm-based missile commander;
- 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 as well as microphone input, mainly this, but also this);
- Tactical cRPG (in development);

Core Language and Software experience: Unity, Python, C#, C++, C, HLSL, CG, GameMaker: Studio, HTML/CSS, React. I am generally tool agnostic and focus on learning underlying skills so there is relatively little overhead for me to switch between them.

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*

- Launch and post-launch support of Harmony City;
- Maintenance and implementation of Panoramic Mode feature in Cornelius Composer;
- Full development of The Magic Flute as programmer, designer and visual-effects artist (see);
- In-house tools development (including: synchronizing a music sheet with an audiophile to create levels for Harmony City, assigning difficulty to songs based on chords, general dialogue tool to code the story sequences in The Magic Flute, general quality of life 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