Jukka Jylänki

IN SHORT

Web games technology developer. Co-lead of the Emscripten WebAssembly compiler toolchain. C/C++, Python and JavaScript programmer with a drive to make things run at 60fps.

EXPERIENCE

STAFF PLATFORM ENGINEER, MOZILLA, 2013-PRESENT

From Senior Platform Engineer to Staff Platform Engineer to Technology Lead on the Mozilla Games Initiative, collaborating with partner companies such as Unity, Epic Games, Autodesk and King to bring new technologies for high performance web gaming to life. Designing and developing asm.js, WebAssembly, SharedArrayBuffer and other web specifications related to games. Co-lead on the Emscripten C/C++ to asm.js/WebAssembly compiler project.

COURSE LECTURER, KAJAANI UNIVERSITY OF APPLIED SCIENCES, 2013

Teaching OpenGL and Unity3D programming to games development track students.

LEAD ARCHITECT, LUDOCRAFT LTD, 2008-2013

From Senior Programmer to Team Lead to Lead Architect at LudoCraft, a Finland-based game development company that developed AirBuccaneers and the RealXtend Tundra online persistent virtual world platform.

SENIOR PROGRAMMER, FARMIND, 2005-2008

Lead AI developer on World Series of Poker 2008 franchise title for Nintendo DS. Senior Game engine and graphics developer on Puzzle Scape for Playstation Portable.

EDUCATION

UNIVERSITY OF OULU, FINLAND, PH.M. IN MATHEMATICS, 2011

Research topics in 2D rectilinear bin packing and algebraic check character systems. Course selection in Group Theory and Algebra, Computer Science and Complexity Theory. Graduated with distinction.

UPPER SECONDARY SCHOOL, OULAINEN, 2004

4 Grades of Laudatur in English, Swedish, Mathematics and Physics/Chemistry in Finnish National Exams, graduated with 9.7/10 GPA.

SKILLS

Strong understanding of 3D graphics, AI, Networking, Audio, Parallel Computing, Software Optimization, Algorithms Design, Mathematics, Computational Geometry and Build Automation and Testing infrastructure.

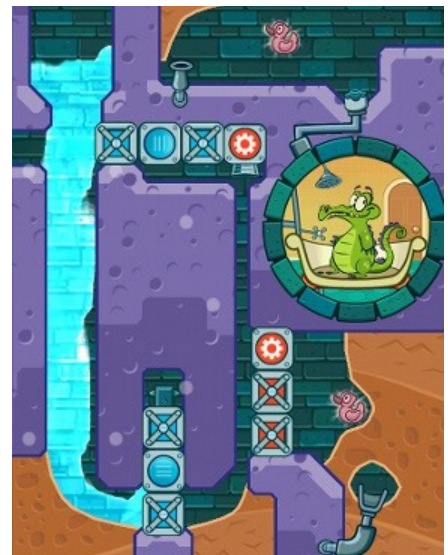**ON THE NEXT PAGES YOU CAN FIND A PORTFOLIO OF SELECT PAST PROJECTS**

My recent focus at Mozilla has been on the Emscripten project and its community. Emscripten is a LLVM based compiler toolchain that enables developers to target the web from traditionally native compiled languages with a POSIX compatible runtime.

In the past years, this work has revolved around building low level OS runtime libraries for developers to target, including APIs for graphics, audio, file system, pthreads and SIMD support.

Part of the work is at supporting the developer industry that utilizes Emscripten and WebAssembly. Some of the past projects and partners I have collaborated with are highlighted here.

Earlier, at LudoCraft I worked on **AirBuccaneers**, a multiplayer airship pirate game that was developed in Unity3D and released on Steam (PC Gamer: 80/100). I was also the Lead Architect on the **RealXtend Tundra** project, an online persistent 3D world platform developed in collaboration with a number of Finnish software companies.

In Kajaani, I lectured 3D graphics programming with OpenGL and game development using Unity3D, and was referred to as the best teacher of the track, although possibly not for the course material.

At Farmind we developed **Puzzle Scape**, a block matching puzzler for the Playstation Portable, and Activision's **World Series of Poker 2008: Battle for the Bracelets** for the Nintendo DS. I headed the development of the AI opponents, 3D engine and audio subsystems.
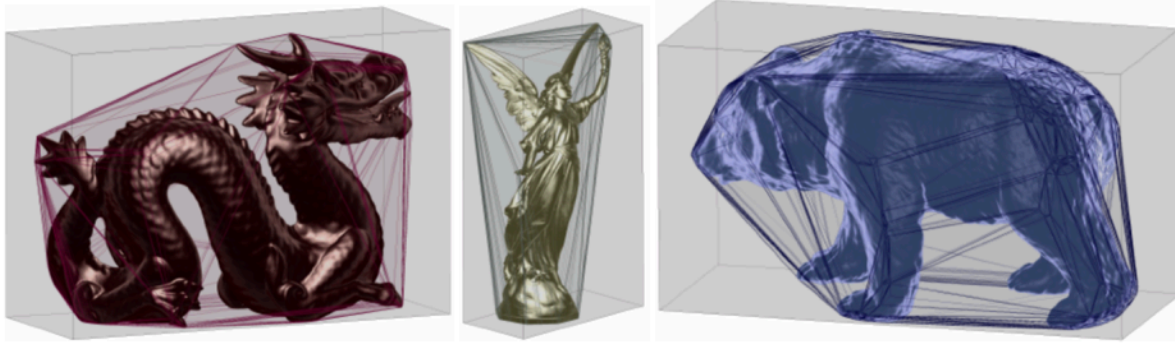
I have a particular gravitation towards computational mathematics and geometry. In 2015 I wrote a paper *An Exact Algorithm for Finding Minimum Oriented Bounding Boxes (*http://clb.demon.fi/minobb/minobb.html*)*, which works towards solving a decades old problem of fitting objects inside smallest volume boxes possible. The paper was conditionally accepted for publication in SIGGRAPH 2015.
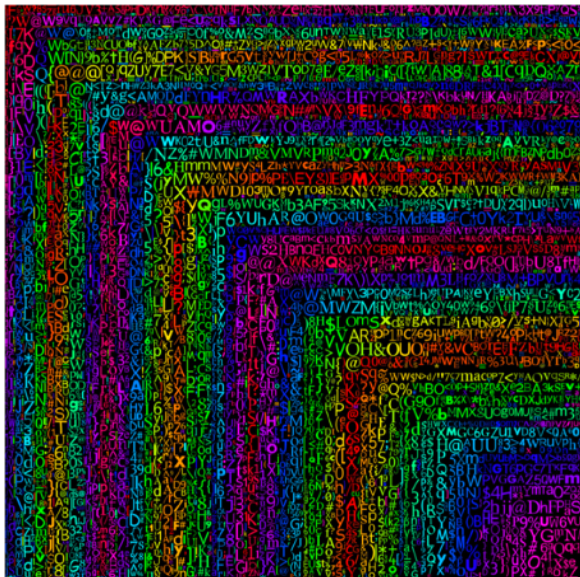
I am also the author of the *MaxRects* 2D bin packing algorithm (http://clb.demon.fi/projects/even-more-rectangle-bin-packing), which is used as a basis for several bin packing and atlas building software around the web, …

… and the creator of the open source kNet networking library, a low level network transport layer for streaming messages e.g. in real time games. It is written in C++, can be configured to work on top of TCP or UDP, and works on Windows, Linux and macOS (http://github.com/juj/knet).

I have also authored *MathGeoLib* (https://github.com/juj/mathgeolib), an open source C++ library for SSE/NEON optimized matrix-vector math and geometric primitive object manipulation..
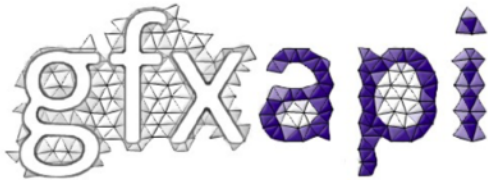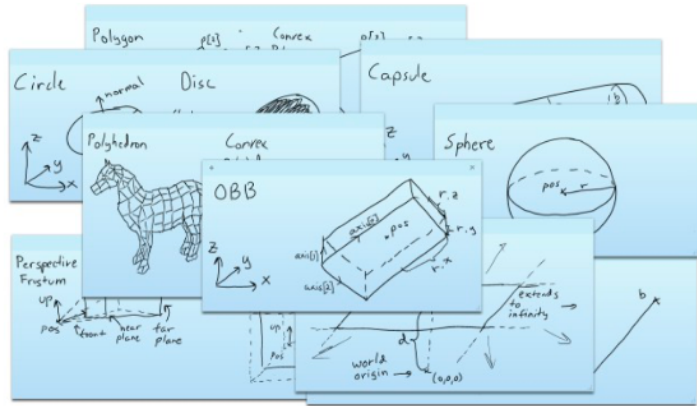
.. and gfxapi, a low level 3D graphics programming interface that targets a wide set of platforms: Windows 10, Windows RT, macOS, Linux, iOS, Android and HTML5/WebAssembly with Direct3D11, OpenGL 3.2, OpenGL ES 3.1 or WebGL. It even targeted Google's PNaCl and Adobe Flash (via flascc) until our Emscripten project supplanted their "compile to web" use cases.
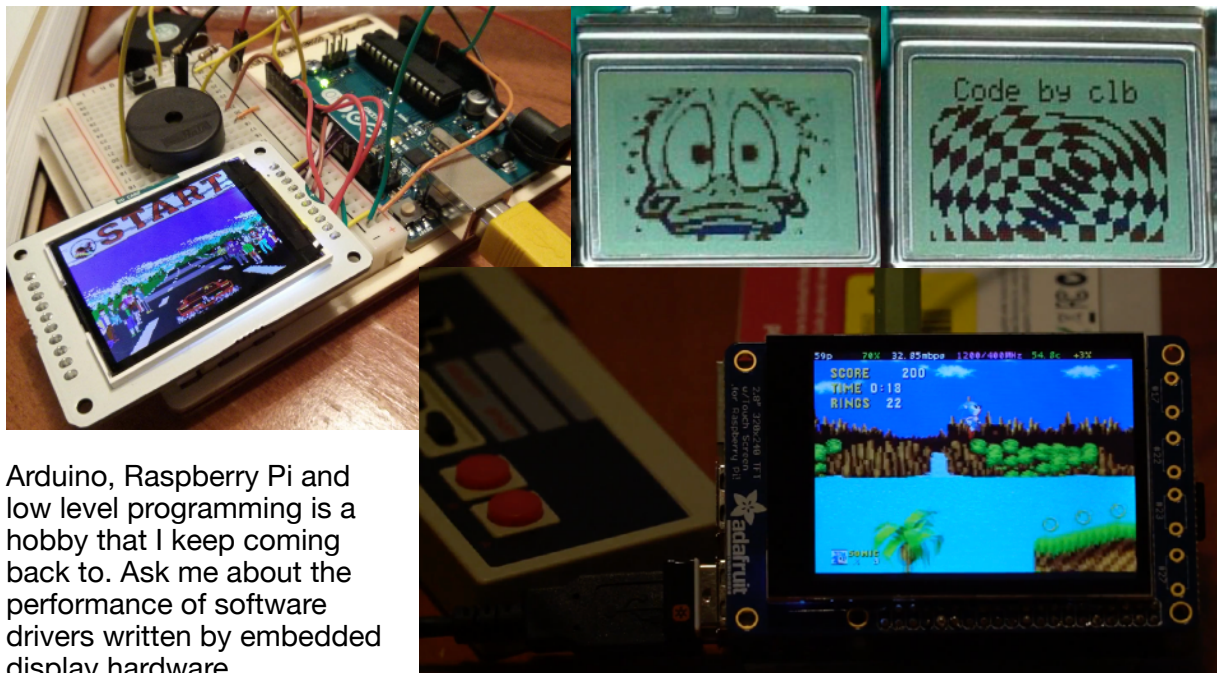
Arduino, Raspberry Pi and low level programming is a hobby that I keep coming back to. Ask me about the performance of software drivers written by embedded display hardware companies, and check out my https://github.com/juj/fbcp-ili9341 and https://github.com/juj/st7735r display drivers if you're interested!

I started programming some time around 1997, around the time when C++ was being standardized. Since then, I have poked on a variety of projects, here's some of the earlier ones I'm still proud of.

A Minimax Alpha-Beta Chess AI, with iterative deepening and transposition tables, which became way stronger in chess than I am,
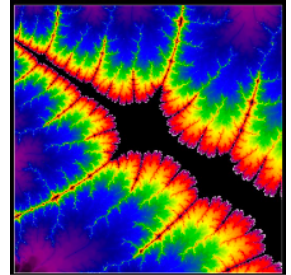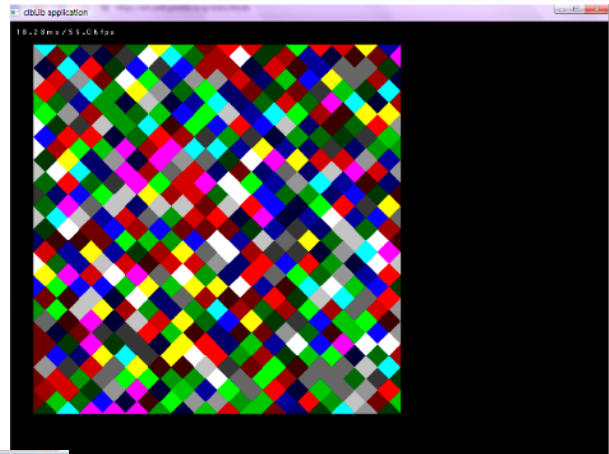

fractals and realtime raytracers,
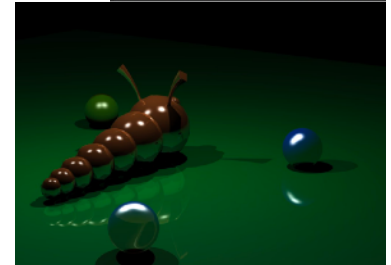
demo scene effects from circa 2005, marching cubes, color quantization, inverse kinematics, cel shading, depth of field, bump mapping and other shader effects.
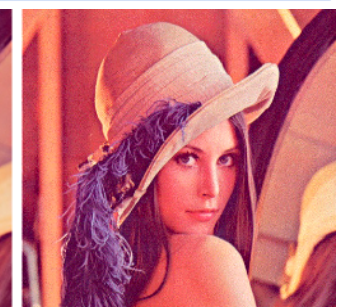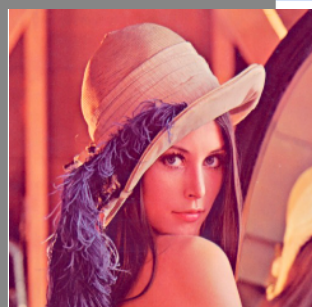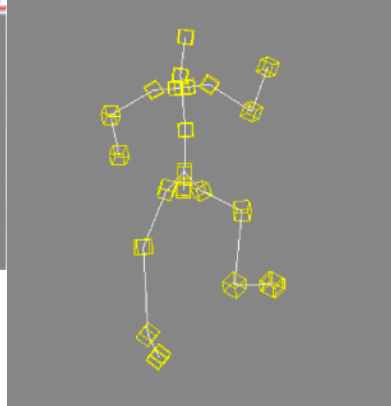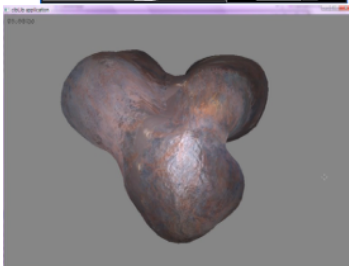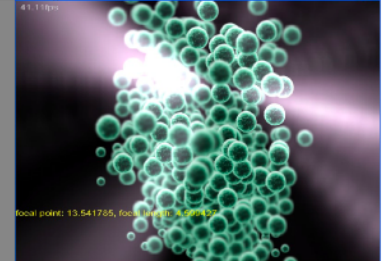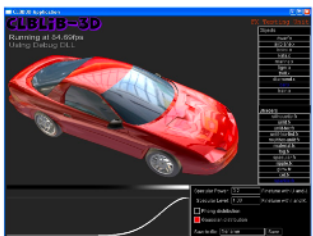
I have experience with designing and writing software algorithms for combinatorial problems. In 2007 I accidentally took apart my friend's 18 piece burr puzzle, and wrote a backtracking computer solver program to put it back together, since my friend had no instructions how to reassemble it.
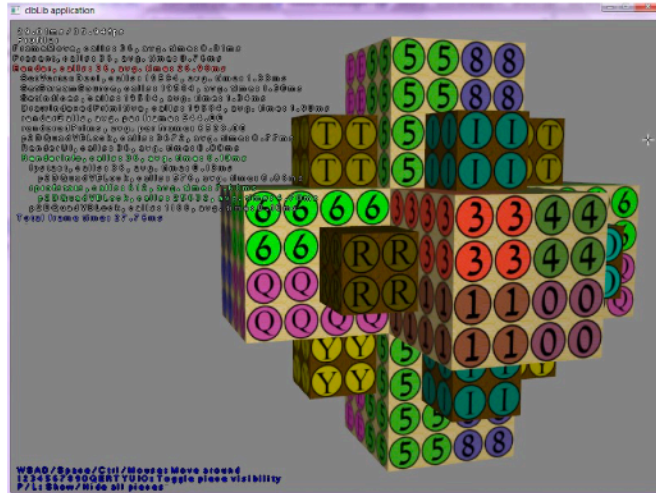
I have written a solver for the Eternity 2 Million Dollar Price puzzle (alas it did not make me a millionaire) ..

.. and an automated sports bet arbitrager (alas it did not make me a millionaire either) ..

.. and on-and-off have worked on some indie game projects, again millions still waiting to be collected.
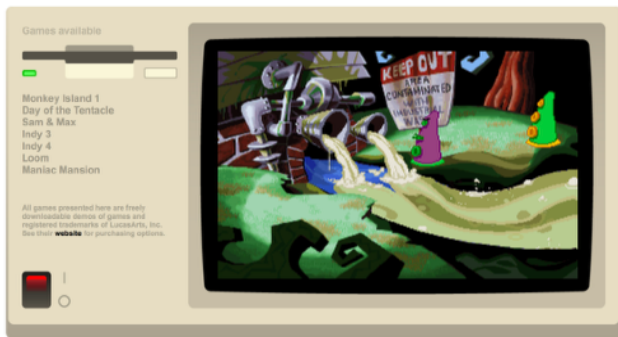
More recently I have worked on porting existing open source software and libraries over to the web. The ScummVM game emulator (http://clb.demon.fi/html5scummvm/) was one such project,

and a WebAssembly port of The Ur-Quan Masters is one that is in the works at the moment.

Besides programming, I enjoy photography in particular, and often
take my camera wherever I travel to.

What would you like to see me work on next?

Let me know.