

RESUME

Jukka Jylänki

In short:

- Born in 1985.
- Software Engineer with a strong focus on C++, graphics programming, Computer Science and Mathematics.
- Holds a Master's Degree in Mathematics from the University of Oulu, Finland.
- Currently lives in Oulu.
- Webpage at <http://clb.demon.fi/>

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Work Experience

2008-Present Senior Programmer and a Team Lead At LudoCraft Ltd.

- Technology Lead on the RealXtend Tundra project. Designed and validated the overall architecture and client-side APIs.
- Technology Lead on the Project Room virtual meeting space. Implemented voip and video streaming, and webcam and screencast sharing.
- Special effects supervisor on the [Miivies](#) project. Developed character systems, shaders and special effects.
- Lead programmer on the GameBridge and Sandbox educational game projects. Wrote the game engine and game code.

2005-2008 Senior Programmer, game engine developer and AI developer at Farmind Ltd.

- **Puzzle Scape, PSP:** Ported and re-developed a Direct3D9-based graphics and game engine for use on the PSP platform.
- **World Series of Poker 2008, Nintendo DS:** Co-developed a game engine for the NDS platform. Implemented the AI opponents.



Education

2004 Graduated in Finnish upper secondary school, Oulaisten Lukio, with a GPA of 9.7/10, and four grades of Laudatur in A-level Mathematics, English, Swedish and Physics/Chemistry. Received a scholarship prize for excellence in natural sciences.

2004 Served nine months in Rovaniemi Lapltr as Military Police, attaining the rank of Corporal.

2005-2007 Studied at the Department of Information Processing Science at the University of Oulu.

2008 Studied a semester of Computer Science and Mathematics at the University of Newcastle in Australia.

2011 Graduated B.Sc. and M.Sc. from the Department of Mathematics at the University of Oulu, with a grade of 5/5. Received a scholarship prize from the Tauno Tönning Foundation for providing novel research in the Master's Thesis "*Check Character Systems over Algebraic Groups*".

Technical Skills

Highly skilled with: C/C++, Direct3D9/10/11, GLES2, Cg/GLSL/HLSL, TCP/UDP, Qt, Ogre3D, Visual Studio, SVN, Git, 3D mathematics, algorithms and data structures, parallel programming.

Experienced with: C#, SSE/SIMD, Boost, HTML/XML/JSON/CSS, JavaScript, Java, .Net Framework, Unity 3D, PHP, MySQL.

Some experience with: Assembly, Python, Desktop OpenGL.

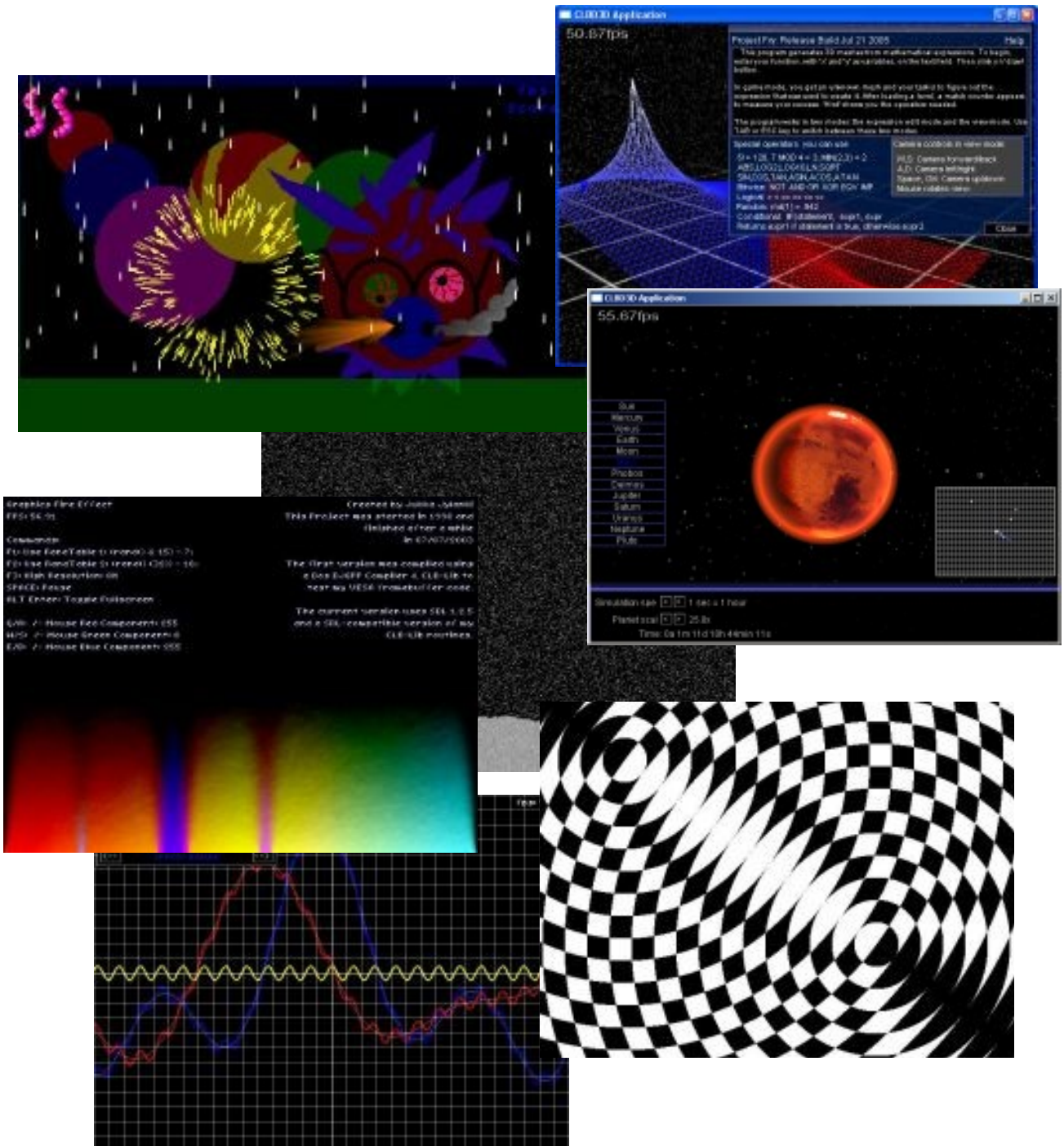
Achievements

- The author of **MathGeoLib**, an open source C++ library for 3D matrix-vector algebra and geometry manipulation. Available under the Apache 2 license from github repository [uj/MathGeoLib](https://github.com/uj/MathGeoLib). Runs on Windows, Linux, Mac and Android.
- The creator of **kNet**, an open source C++ networking library for games and real-time streaming applications. Runs on Windows, Linux and Mac. Implements reliable UDP, message prioritization and multichannel messaging. Available at Bitbucket in the repository [clb/kNet](https://bitbucket.org/clb/kNet) under the Apache 2 license.
- Self-published research [*A Thousand Ways to Pack the Bin - A Practical Approach to Two-Dimensional Rectangle Bin Packing*](#).
- Master's thesis available at http://clb.demon.fi/Gradu_Jylanki_final.pdf (in Finnish).

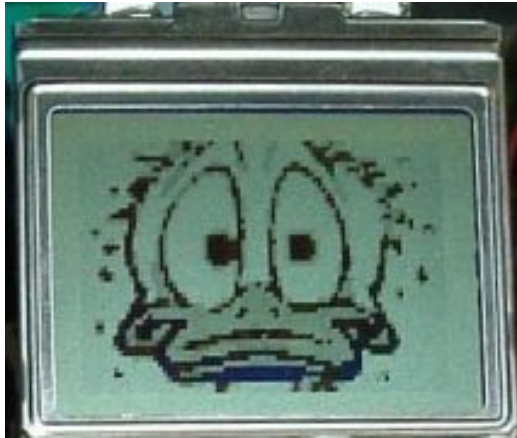
PORTFOLIO

Jukka Jylänki

When I don't write code at work, I most often write code at home. This is a sampling of the different projects I have developed.

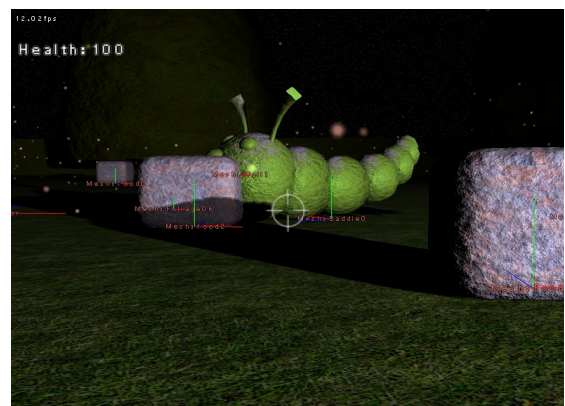


Old pictures of projects from the DOS era: Different framebuffer-based demo effects, a worm game, a 3D function graph plotter, and a planetary simulator. I started programming somewhere around 1997.



I can understand spec sheets for low-level hardware devices, and write programs to utilize them. I have also programmed Polar heart rate monitors and NMEA-based GPS devices over a Bluetooth serial port data link.

I have a strong grasp of the Minimax algorithm, along with Alpha-Beta heuristics, iterative deepening and transposition tables, and can develop and maintain an implementation that performs game tree searches. In the picture is a Direct3D 7-based chess game I developed in 2004, which includes a Chess AI that explores about 500K game nodes per second on a single core. I am also familiar with Monte Carlo techniques in the context of Computer Go.



In 2007, I wrote a demo game for an University course to showcase my game engine then-in-development. It included a Direct3D9 renderer with particle systems, normal mapping, shadow mapping and bitmap-based font rendering.

I am familiar with the implementation details of various computational algorithms. I understand the Big-O notation, and can manipulate it with formal rigor. I have experience with implementing data structures e.g. for priority queues and search trees, and have no problems with running mathematical proofs with induction, or understanding the difference between normal and tail-free recursion.

I am comfortable with implementing computer search methods, such as the A* algorithm for pathfinding. The image on the side shows the A* search applied to solve the sliding puzzle.



I am comfortable with parallel programming, and am familiar with parallel constructs such as mutexes, semaphores, critical sections, as well as low-level synchronization primitives such as atomic increments and compare-and-exchange operations. I understand the concepts of wait-free and lock-free.



In 2009, I took part in one of “Al Zimmermann's Programming Contents” on combinatorial optimization, and implemented a massively distributed software to solve a hard problem on discrete integer optimization.

Point Packing

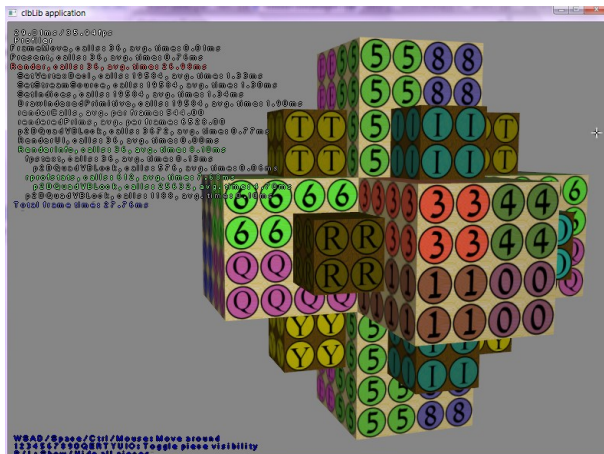
Ends: 10 Oct 2009 16:00
Now: 24 Jul 2009 22:14

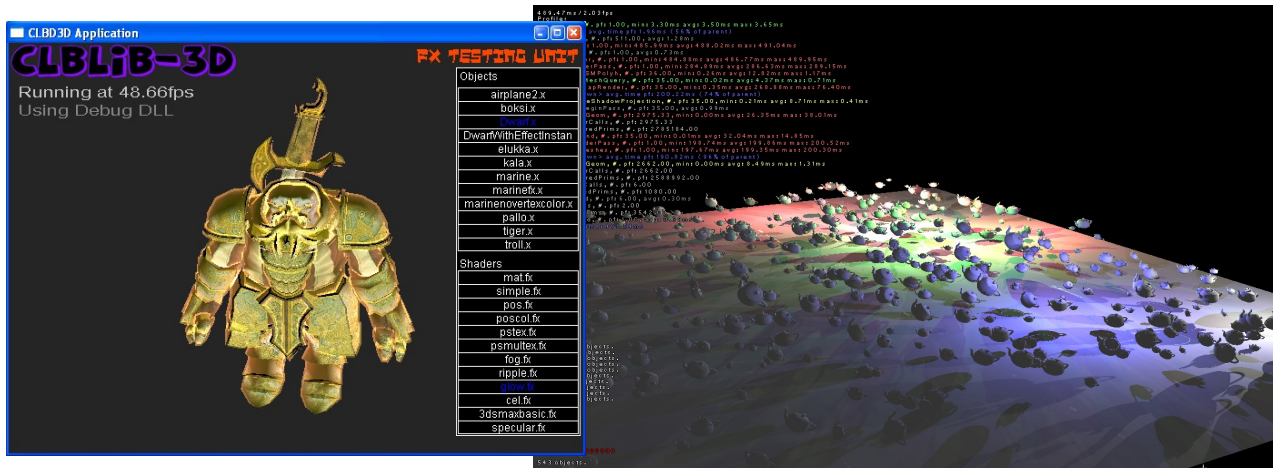
[Description](#) [Submit an Entry](#) [Standings](#)

I led the contest for three months, but eventually finished in the fourth place. At the best time, I had over 300 computing cores distributed over the internet searching over the solution space.

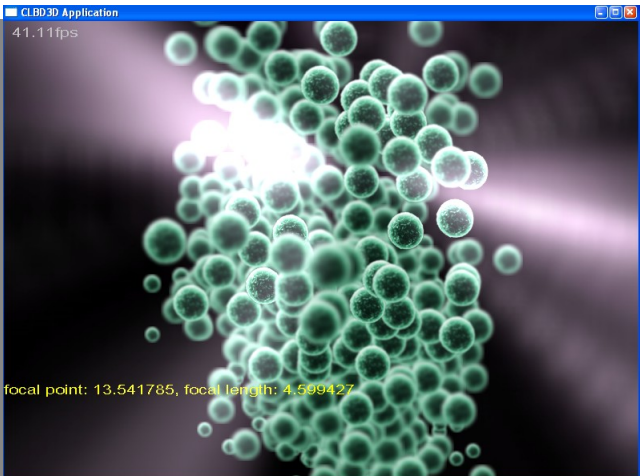
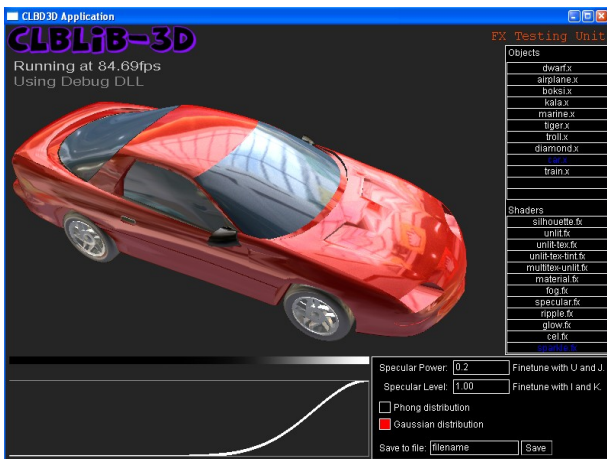
Rank	Score	Contestant		Last Improvement
1	24.98	Jukka Jylänki	Oulu, Oulu, Finland	24 Jul 2009 22:05
2	24.66	Garr Godfrey	Seattle, Washington, United States	24 Jul 2009 00:59
3	24.30	Ivan Kazmenko	Saint-Petersburg, Russia	24 Jul 2009 12:38
4	24.07	Jim Gillogly	Maui, Hawaii, United States	24 Jul 2009 18:41
5	24.06	Wes Sampson	La Jolla, California, United States	24 Jul 2009 05:59
6	23.94	James Dow Allen	Uthai Thani, Thailand	22 Jul 2009 05:42
7	23.91	Wladimir Leite	Sao Paulo, Brazil	22 Jul 2009 12:40
8	23.85	Mark Mammel	Ellicott City, Maryland, United States	24 Jul 2009 20:39
9	23.57	Giuliano Bertoletti	Parma, Italy	24 Jul 2009 20:07
10	23.53	Rémi Coulom	Lille, France	21 Jul 2009 13:40
11	23.40	Patrick Demichel	Grenoble, France	22 Jul 2009 20:12

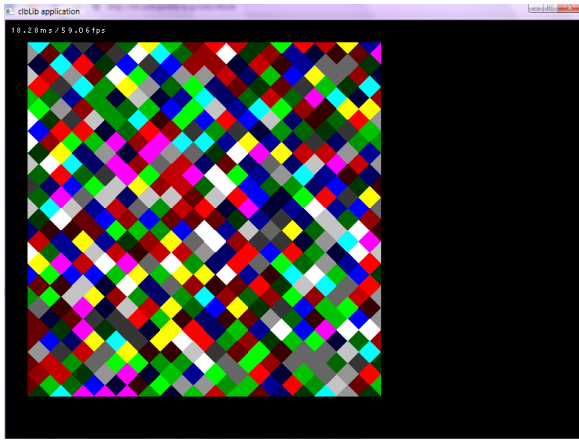
I took apart my friend's 18 piece burr puzzle (pirunnyrkki), and had to write a computer program with a backtracking solver to put it back together, since my friend had no knowledge of how to assemble it.





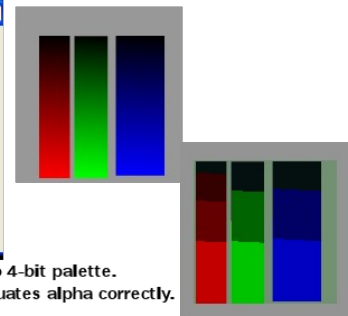
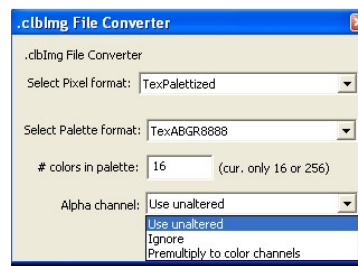
I am familiar with GPUs, and I understand how to implement lighting equations in shaders, with effects like specular lighting, reflection mapping, tangent-space light calculations, normal mapping and cel-shading (toon rendering). I can implement rendering pipelines for framebuffer effects like glow, bloom or HDR.



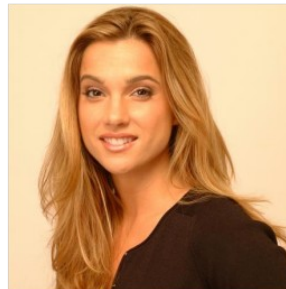


I have written a solver for [the Eternity 2 puzzle](#) (and can safely conclude that it is impossible)..

... implemented Median Cut (a true-color to palettized image quantizer)...



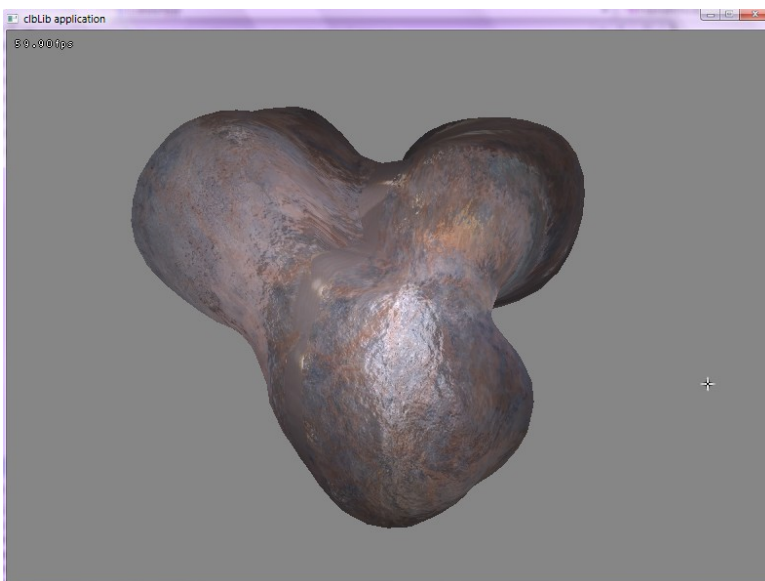
quantized to 4-bit palette.
The algorithm evaluates alpha correctly.



original



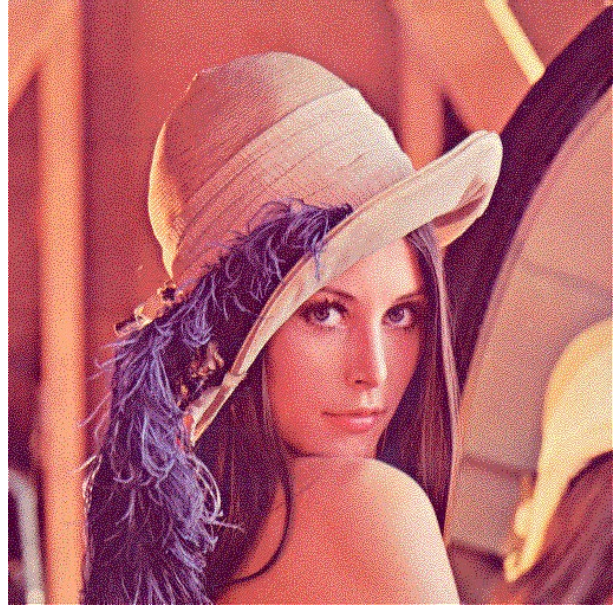
quantized to 8-bit palette with median cut



... coded real-time Marching Blobs (an isosurface to polygonal mesh -converter)...



True-color



RGB222 (2 bits per color channel)

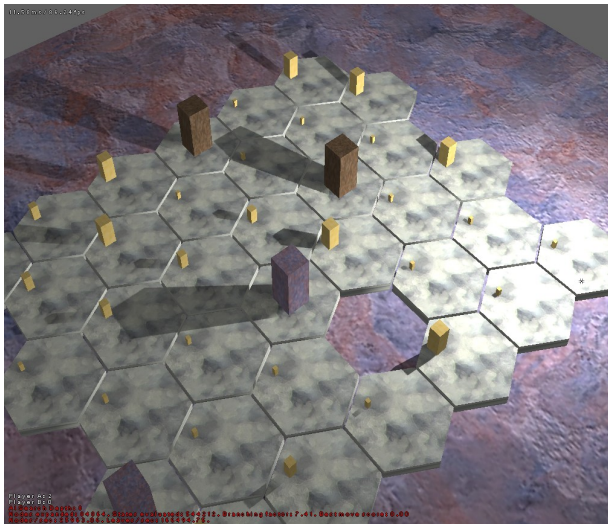
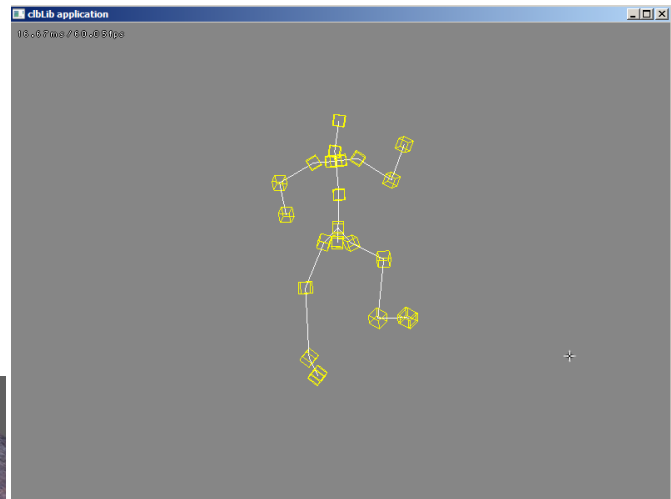
... written a perception-aware dithering color quantizer...

The screenshot shows the BetMiner application window. The main area contains a table with the following columns: Game Time, Type, Home, Away, Home Odds, Away Odds, Money Return %, Bet Home On, Bet Away On, and Record Age. The table lists various sports events, including NFL and MLB games, with associated odds and betting options. A log window at the bottom displays error messages and status updates, such as 'Error fetching Pinnacle Sports MLB System Exception: Failed to parse site URL!' and 'Fetched Pinnacle Sports. Found 14 records.'

Game Time	Type	Home	Away	Home Odds	Away Odds	Money Return %	Bet Home On	Bet Away On	Record Age
8/10/2008 4:00:00 AM (n 3h 26m...)	NFL RL +3.5	Buffalo Bills	Washington Redskins	2.22	1.952381	107.293	ehorsex (SBR)	Carbet (SBR)	34s
8/10/2008 4:00:00 AM (n 3h 26m...)	NFL ML	Buffalo Bills	Washington Redskins	3.13	1.574713	107.161	Pinnacle Sports (SBR)	Matchbook (SBR)	34s
8/10/2008 4:05:00 AM (n 3h 31m...)	MLB RL -1.5	Boston Red Sox	Chicago White Sox	2.25	1.909091	106.0606	5 Dimes (SBR)	BetUS	36s
8/9/2008 10:05:00 PM (n 2h 31m...)	MLB RL +1.5	Cleveland Indians	Toronto Blue Jays	2.05	2.05	105	BetUS	Last Palmas (SBR)	36s
8/10/2008 4:05:00 AM (n 3h 31m...)	MLB ML	Boston Red Sox	Chicago White Sox	1.8	2.37	104.0506	5 Dimes (SBR)	Pinnacle Sports (Maddu...	36s
8/10/2008 4:10:00 AM (n 3h 36m...)	MLB ML	Minnesota Twins	Kansas City Royals	1.934579	2.15	103.4775	Skybook (Maddux)	5 Dimes (SBR)	36s
8/10/2008 4:30:00 AM (n 3h 56m...)	NFL RL +2.5	Tampa Bay Buccaneers	Miami Dolphins	1.952381	2.11	102.7082	Carbet (SBR)	ehorsex (SBR)	34s
8/10/2008 4:05:00 AM (n 3h 31m...)	MLB RL +1.5	Washington Nationals	Milwaukee Brewers	2.15	1.917431	102.5603	BetUS	Pinnacle Sports (SBR)	36s
8/10/2008 12:55:00 AM (n 5h 21...)	MLB ML	New York Yankees	Los Angeles Angels	2.51	1.704225	102.5251	5 Dimes (SBR)	Jazz (SBR)	36s
8/10/2008 4:10:00 AM (n 3h 36m...)	MLB ML	Florida Marlins	New York Mets	2.11	1.943396	102.2355	5 Dimes (SBR)	ehorsex (SBR)	36s
8/10/2008 12:55:00 AM (n 5h 21...)	MLB ML	St Louis Cardinals	Chicago Cubs	2.8	1.588235	102.1008	5 Dimes (SBR)	Pinnacle Sports (Maddu...	36s
8/10/2008 4:10:00 AM (n 3h 36m...)	MLB RL -1.5	Minnesota Twins	Kansas City Royals	2.52	1.689655	101.9157	ehorsex (SBR)	Bet Jamaica (SBR)	36s
9/7/2008 10:00:00 PM (n 23d 3h)	NFL RL +7	Houston Texans	Pittsburgh Steelers	1.943396	2.1	101.7969	IASBET (SBR)	5 Dimes (SBR)	34s
8/10/2008 12:55:00 AM (n 5h 21...)	MLB RL +1.5	New York Yankees	Los Angeles Angels	1.740741	2.4	101.5432	BetUS	Pinnacle Sports (SBR)	36s
8/10/2008 4:05:00 AM (n 3h 31m...)	MLB RL +1.5	Oakland Athletics	Detroit Tigers	1.952381	2.08	101.3736	BetUS	Pinnacle Sports (SBR)	36s
9/8/2008 1:15:00 AM (n 29d 5h)	NFL RL -3	Dallas Cowboys	Cleveland Browns	1.869655	2.18	101.1967	betphoenix (SBR)	Pinnacle Sports (SBR)	34s
8/10/2008 5:00:00 AM (n 9h 26m...)	NFL ML	Denver Broncos	Houston Texans	2.49	1.689655	101.1079	ehorsex (SBR)	Waager Street (SBR)	34s
8/10/2008 4:05:00 AM (n 3h 31m...)	MLB ML	Texas Rangers	Baltimore Orioles	2.07	1.952381	100.9202	betphoenix (SBR)	CARIB (Maddux)	36s
8/10/2008 4:30:00 AM (n 3h 56m...)	NFL RL +4.5	Indianapolis Colts	Carolina Panthers	1.917431	2.11	100.8696	IASBET (SBR)	ehorsex (SBR)	34s
8/9/2008 10:05:00 PM (n 2h 31m...)	MLB ML	Cleveland Indians	Toronto Blue Jays	3.1	1.485437	100.6264	5 Dimes (SBR)	BetJamaica (Maddux)	36s
8/10/2008 5:10:00 AM (n 3h 36m...)	MLB RL -1.5	Minnesota Twins	Kansas City Royals	1.934579	2.15	103.4775	BetUS	Pinnacle Sports (SBR)	36s

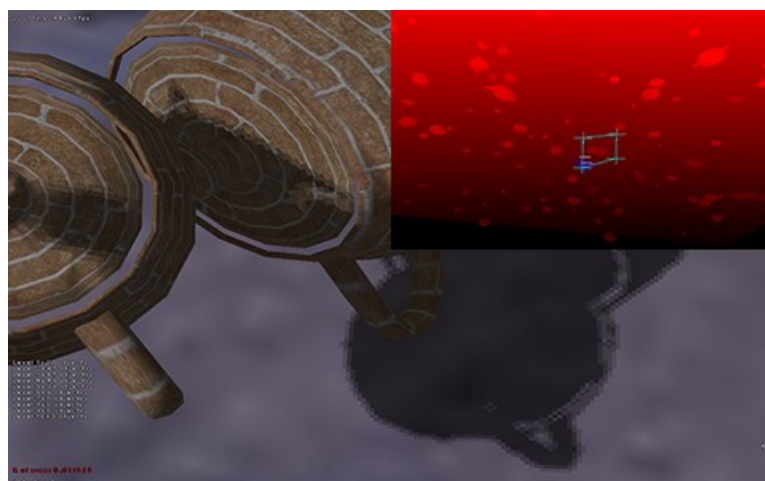
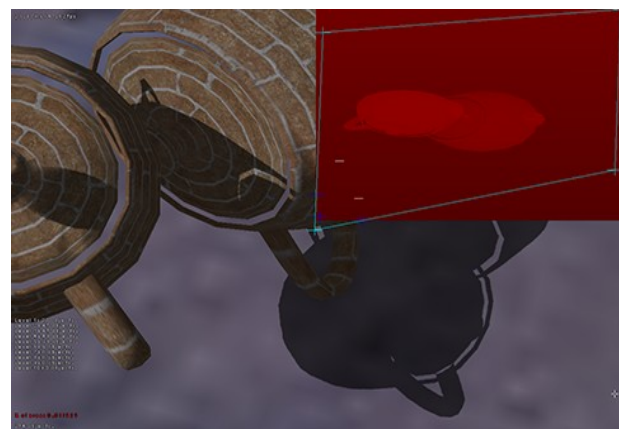
... an automated sports bet arbitrager ...

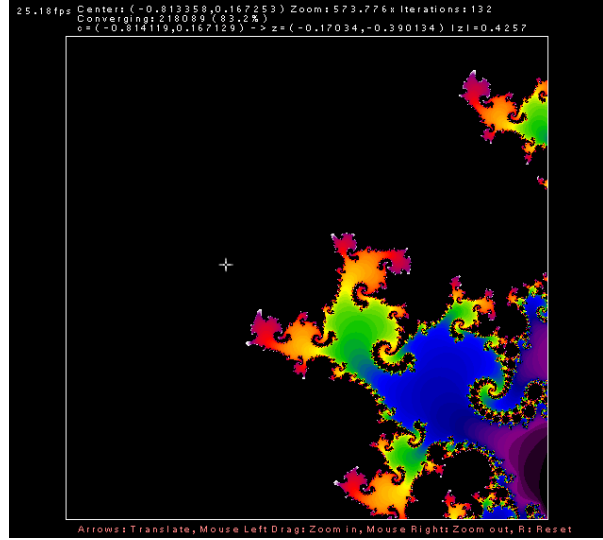
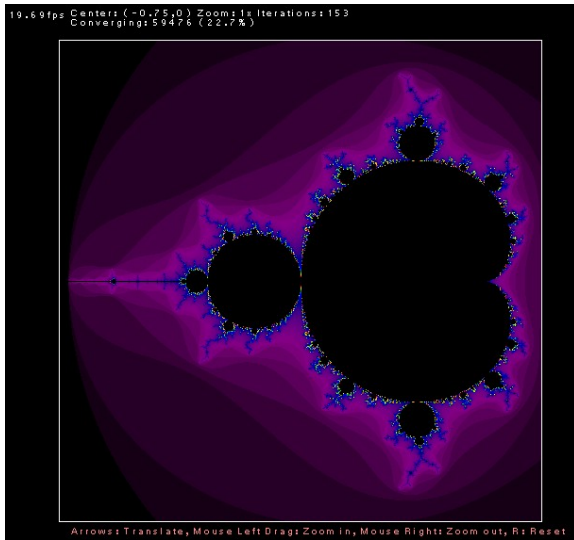
... a Cyclic Coordinate Descent, and a Jacobian Transpose -based IK solver...



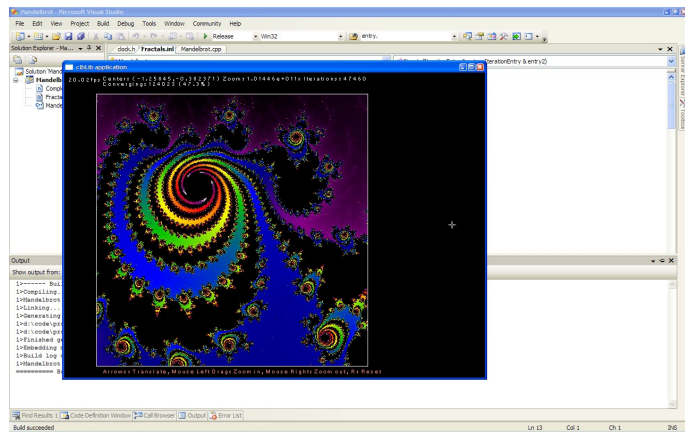
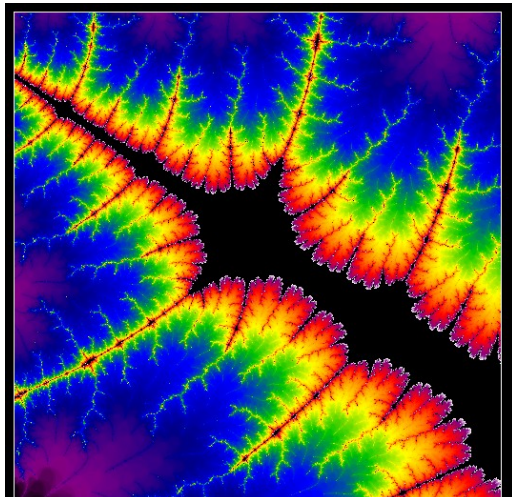
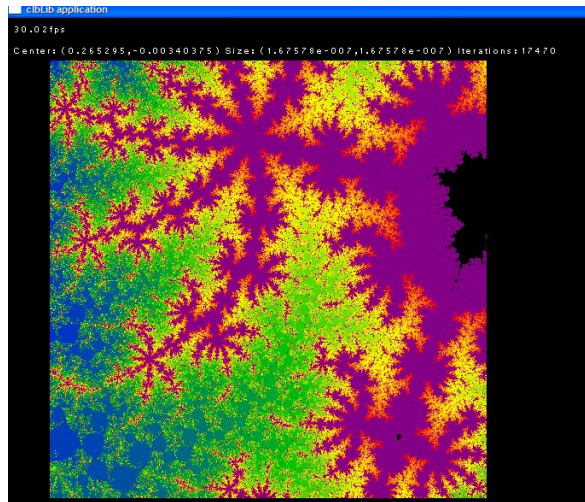
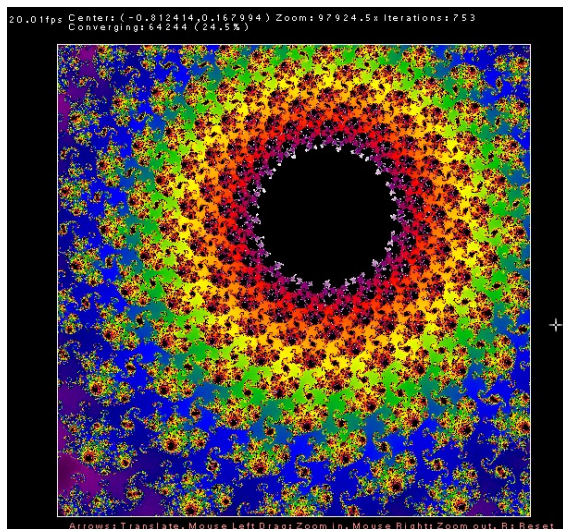
... a clone of the "Hey, That's My Fish!" board game with a Minimax AI ...

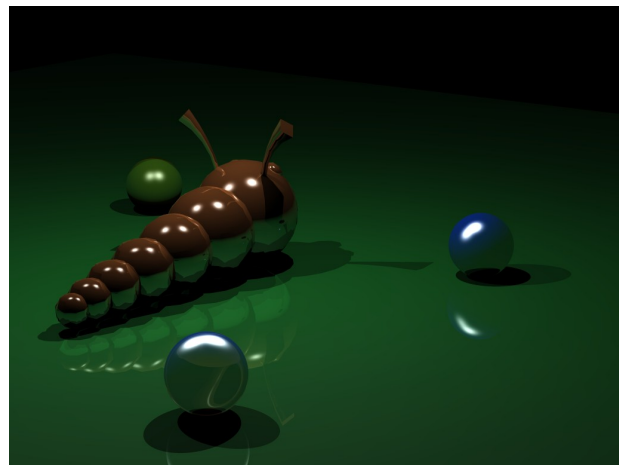
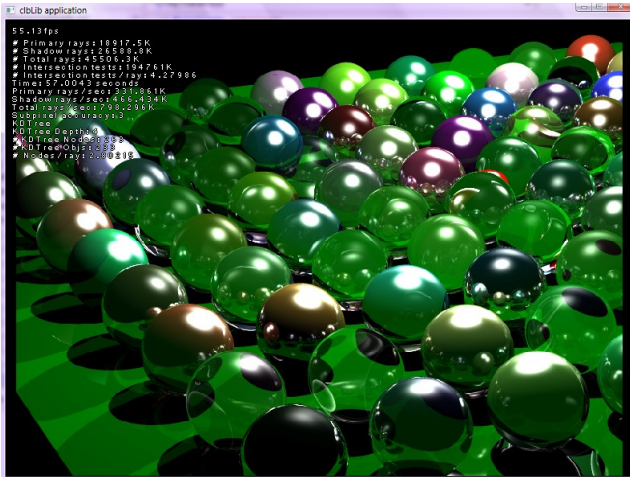
... and implemented methods for tight shadow caster frustum fitting...



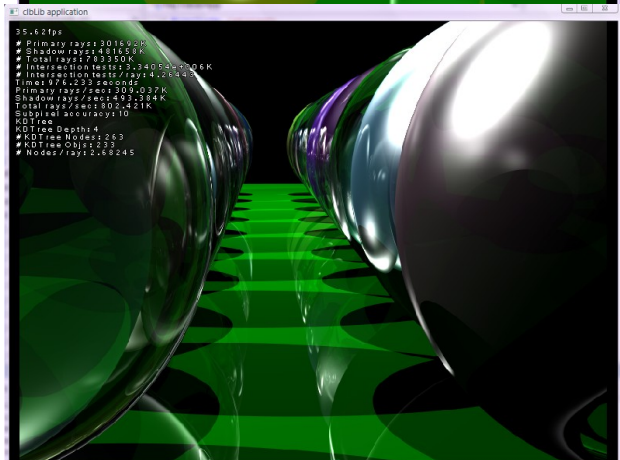
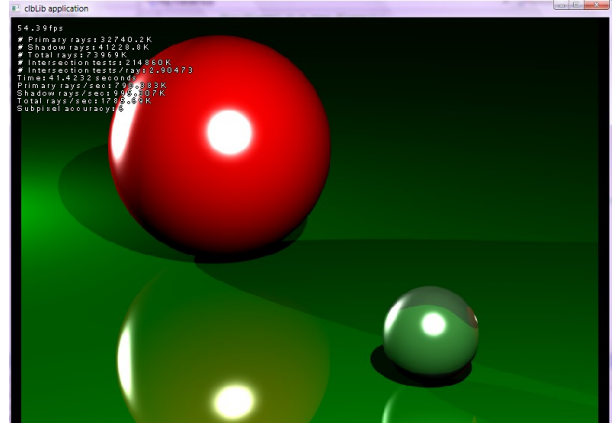
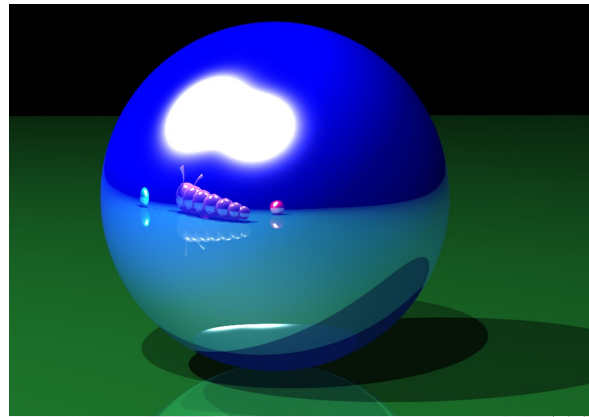


... developed a real-time SSE2-optimized Mandelbrot and Julia fractal viewer...





... and tried my hands at writing a real-time Raytracer, with kD-trees, and SSE optimizations. Performs at about 1M primary rays/sec on a dual-core laptop.



I wrote a paper on two-dimensional right-oriented rectangular bin packing. It was supposed to be my topic for my master's thesis, but sadly it was rejected. The algorithms in my paper are now used as a basis for several bin packers around the web:

- [freetype-gl](#)
- [SpriteMapper](#)
- [Bitmap Font Generator](#)
- [Urho3D Rendering Engine](#)
- [ps_scripts](#)

and even in **two** commercial software packages:

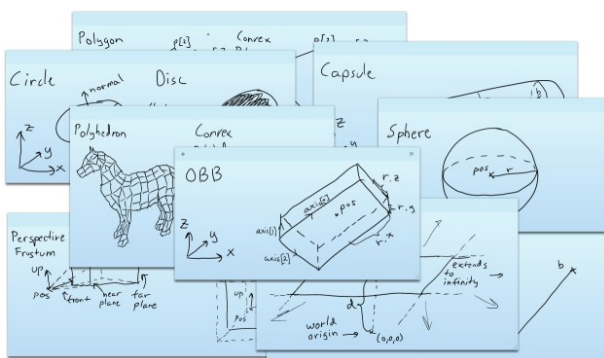
[Zwoptex](#) and [Texture Packer Pro](#).

A series of blog posts and the original paper is available on my website: [“Even More Rectangle Bin Packing”](#).



I am the creator of the open source kNet networking library, which is a low-level network transport layer for streaming messages e.g. in games. It is written in C++, can be configured to run on top of TCP or UDP, and works on Windows, Linux and Mac.

- [kNet home at Bitbucket](#).
- doxygen-generated [kNet documentation pages](#).



Also, I am the author of [MathGeoLib](#), an open source C++ library for matrix-vector math and primitive geometric object manipulation. The code is hosted at github repository [uij/MathGeoLib](#).



Most recently, I have been working on an Asteroids-like game for the Tegra2 tablets, with Android NDK (C++), GLES2 and a strict 60fps-no-hiccups target.



And if it happens that I am not doing programming, I most often play Go at a local club. I hold an European Go Federation rank of 3 kyu, and I was the champion of the Lightning tournament at the London Open Go Congress 2010.

What would you rather see me do?
Let me know.