

[Home](#) * [Engines](#) * **Senpai**



[Katsushika Hokusai](#), The Great Wave off Kanagawa ^[4]

Senpai, (Japanese: 先輩) an [UCI](#) compliant [open source chess engine](#) by [Fabien Letouzey](#), written from scratch in [C++11](#) and distributed under the [GNU General Public License version 3](#). Senpai 1.0 was precisely published ten years after the release of [Fruit 1.0](#) on March 17, 2014 ^[1]. It comes with one source file, senpai_10.cpp, structured by namespaces, further with [executables](#) for various platforms and operating systems, such as [Linux](#), [Mac OS](#), [Windows](#) and [Android](#) ^[2]. Senpai **2.0** released in November 2017 was a complete rewrite with a consistent codebase for multiple games such as [Draughts](#), [Chess960](#), [Shogi](#), and [Othello](#) ^[3].

Table of Contents

[Description](#)

[Board Representation](#)

[Search](#)

[Evaluation](#)

[Etymology](#)

[See also](#)

[Forum Posts](#)

[External Links](#)

[Chess engine](#)

[Misc](#)[References](#)[What links here?](#)

Description

Board Representation

Senpai is a [bitboard](#) engine and [maps](#) consecutive bits to squares along a [file](#) (a1,a2,...,a8,b1,...h8). With the option to implement [magic bitboards](#) later, Senpai so far uses the [Blockers and Beyond](#) loop approach to determine attack-sets for all pieces except pawns, while Senpai **2.0** features [PEXT bitboards](#) for [BMI2](#) platforms. [BitScan](#) aka [trailing zero count](#), and [population count](#) use [GCC](#) builtins ^[5] if available for the target architecture, and otherwise rely on [De Bruijn multiplication](#) and [SWAR-popcount](#). In Senpai **2.0** the [copy/make](#) approach is used, customary in games with fewer [piece types](#) than chess.



Senpai's [Little-Endian File-Rank Mapping](#) ^[6]

Search

Senpai applies a [parallel search](#) with one master and a pool of helper [threads](#), following the [Young Brothers Wait Concept](#). The serial search is [PVS alpha-beta](#) with [transposition table](#) inside an [iterative deepening](#) framework with [aspiration windows](#). Beside the obligatory [Null move pruning](#) and [LMR](#), Senpai further uses [late move pruning](#) and more aggressive [futility pruning](#) the last few plies. Senpai **2.0** further applies [restricted singular extensions](#) and additional [reduction/pruning](#) of "losing" moves ([SEE](#)

Evaluation

Compared to Fruit's [evaluation](#), Senpai has a more precise [mobility](#) considering safety and [center weights](#), and evaluates tactical moves. Senpai **2.0** considers a [tempo](#) and [space](#), and uses a scoring by [logistic regression](#).

Etymology

Senpai is a Japanese term applied to the mentor system in wide use in [Japanese culture](#), roughly equivalent to the Western concept of a [mentorship](#). In [Japanese martial arts](#), the term Senpai generally refers to senior level students who hold a [black belt](#) ^[7]. Use in English may carry humorous or affectionate connotations. This is possibly due to (assumed) reference to modern [Japanese media](#), or possibly a [lexical gap](#) ^[8].

See also

- [Chess-64](#)
- [Fruit](#)
- [Kōhai](#) ^[9] ^[10]

Forum Posts

- [Senpai 1.0 \(new engine\)](#) by [Fabien Letouzey](#), [CCC](#), March 17, 2014
- [First blitz impressions: Senpai 1.0 et al](#) by [Mike Scheidl](#), [CCC](#), March 18, 2014
- [C++11 threads seem to get shafted for cycles](#) by [User923005](#), [OpenChess Forum](#), March 18, 2014
» [C++](#), [Parallel Search](#), [Thread](#)
- [Kohai 1.0 Released - a Senpai Derivative](#) by [Michael B](#), [CCC](#), June 06, 2016
- [Senpai 2.0](#) by [Fabien Letouzey](#), [CCC](#), November 10, 2017

External Links

Chess engine

- [Senpai Chess Engine - Computer Chess Programming](#) hosted by [Steve Maughan](#)
- [Frank's Chess Page, Senpai](#) by [Fabian Letouzey](#) hosted by [Frank Quisinsky](#)
- [Senpai 1.0 64-bit 4CPU](#) in [CCRL 40/40](#)

Misc

- [Senpai and kōhai - Wikipedia](#)
- [senpai - Wiktionary](#)
- [\[\[\[- Wiktionary](#)
- [Sensei - Wikipedia](#)
- [Hiromi The Trio Project](#) – [Dançando no Paraíso](#), [YouTube](#) Video
[Hiromi Uehara](#), [Anthony Jackson](#), [Steve Smith](#)

References

1. [^ Senpai 1.0 \(new engine\)](#) by [Fabien Letouzey](#), [CCC](#), March 17, 2014
2. [^ Senpai Chess Engine - Computer Chess Programming](#) hosted by [Steve Maughan](#)
3. [^ Senpai 2.0](#) by [Fabien Letouzey](#), [CCC](#), November 10, 2017
4. [^ The Great Wave off Kanagawa](#), [Katsushika Hokusai](#), c. 1829–32, the first print in Hokusai's series [Thirty-six Views of Mount Fuji](#), current location: [Library of Congress](#), see [Culture of Japan](#)
5. [^ builtin_ctzll](#), [builtin_popcountll](#), [Other Builtins - Using the GNU Compiler Collection \(GCC\)](#)
6. [^ Bibob](#) image
7. [^ Senpai and kōhai - Wikipedia](#)
8. [^ senpai - Wiktionary](#)
9. [^ Kohai 1.0 Released - a Senpai Derivative](#) by [Michael B](#), [CCC](#), June 06, 2016
10. [^ GitHub - MichaelB7/Kohai-Chess: UCI Chess Engine, a derivative of Senpai 1.0](#)

What links here?

| Page | Date Edited |
|--------------------------------------|--------------|
| Blockers and Beyond | Mar 21, 2014 |
| Chess-64 | Mar 21, 2014 |
| C++ | Oct 24, 2017 |
| Donna | Aug 17, 2017 |
| Engine releases | Apr 23, 2018 |
| Engines | Mar 10, 2018 |
| Fabien Letouzey | Feb 5, 2018 |
| Fruit | Sep 27, 2016 |
| Fruit Reloaded | Dec 8, 2017 |
| Gavon | Apr 30, 2018 |
| IGWT III | May 15, 2017 |
| IGWT IV | May 17, 2017 |
| Late Move Reductions | Sep 25, 2017 |
| Michael Byrne | Jun 23, 2017 |
| Open Source Engines | Jul 14, 2015 |
| Parallel Search | Dec 30, 2017 |
| Ryan Benitez | May 16, 2015 |
| Senpai | Nov 10, 2017 |
| Space | Jan 18, 2018 |
| TCEC Season 11 | Apr 18, 2018 |
| TCEC Season 7 | Jan 23, 2015 |
| Thread | Apr 22, 2018 |
| Xiphos | Apr 22, 2018 |

[Up one level](#)