Chessnut chess board driver
by Graham O'Neill

1. Installation

1.1 Windows

The Chessnut board will first try to connect using the USB cable and if that fails it will use BluetoothLE, providing your computer has hardware that allows this. But the BluetoothLE in my driver currently only works in Windows 10 build 10.0.15063.0 (also known as version 1703) or later. This is from 2017 so any update since then will be OK.

For BluetoothLE you will need the Microsoft Visual C++ Redistributable; the x86 version for Arena/LucasChess/Shredder and the x64 version for Fritz/ChessBase. The SetupNUT program will install these automatically or you can download them from Microsoft's website (under "Other Tools, Frameworks, and Redistributables"):
https://visualstudio.microsoft.com/downloads/
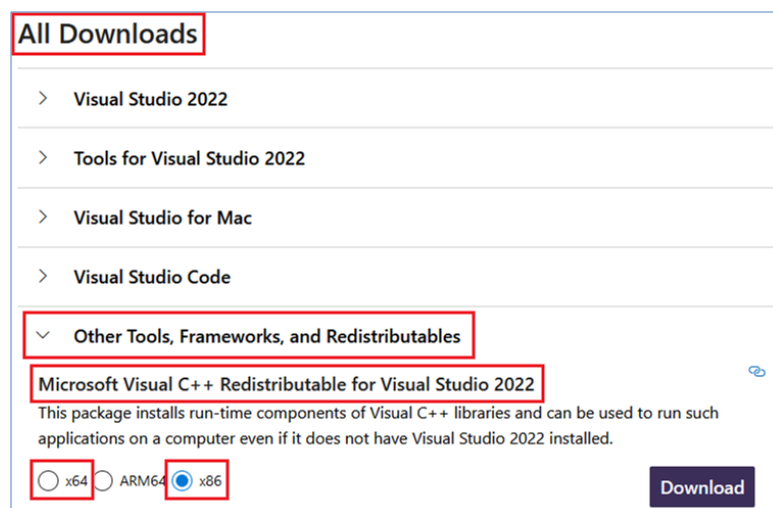
For Fritz and ChessBase the driver is 64 bit, which means it will only run in Fritz version 15 and above, and ChessBase 13 and above.

Download and run the setupNUT.exe program and it will lead you through installing the files (NUT_DLL.dll and gon-NUT64.dll) for the required programs. The setup program doesn't install for LucasChess as the drivers are already included in that program's download.

For Arena, ChessBase, Fritz and Shredder the setup program will also install programs to allow you to select which board to use if you have multiple boards. For example, for Arena this is called "Arena eBoard" and will show you the screen:
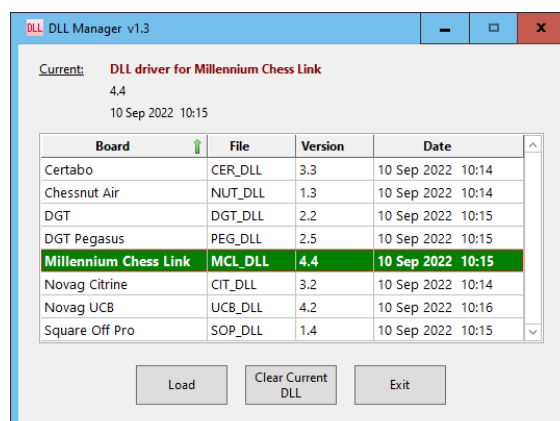
Which boards are listed depends on which drivers you have installed. The top of the screen shows which driver is currently selected (Millennium Chess Link in the above picture). In the list you can choose a different driver and then click *Load* to select it as the current driver. The option to *Clear Current Driver* allows you to revert to the DGT Rabbit Plugin if you have that installed for your DGT board. You do not need to install Rabbit for my drivers.

1.2 Linux

My program uses Pascal and Qt5 which might not work on your PC initially. If you find that the driver doesn't load at all install the Pascal/Qt5 support library by running:

Ubuntu/Debian: `sudo apt install libqt5pas1`
Fedora/Mageia: `sudo dnf install qt5pas`

For USB support you will also need to load the HIDAPI support library:

Ubuntu/Debian: `sudo apt install libhidapi-dev`
Fedora/Mageia: `sudo dnf install hidapi-devel`

And for BluetoothLE support you need to load:

Ubuntu/Debian: `sudo apt install libdbus-1-dev`
Fedora/Mageia: `sudo dnf install dbus-devel`

The only GUI that currently uses my driver is LucasChess and that already has it installed. If you want to reload it then you will need the libnut.so file. You do not need the NUT_DLL.dll file.

GUI	File name	Probable Location
LucasChess	libnut.so	/home/yourname/LucasChessR2/bin/OS/linux/DigitalBoards

You will also have to install a UDEV rule to allow access to the board. You should create a file in your /etc/udev/rules.d folder called, say, *69-chessnut.rules* that includes one line:

```
ACTION=="add", SUBSYSTEM=="usb", ATTRS{idVendor}=="2d80",
ATTRS{idProduct}=="8002", GROUP="plugdev", TAG+="uaccess"
```

You might need to change the product id for your board (use *lsusb* to check for yours) and you might not need the *GROUP=="plugdev"* part. Note that the Linux UCI engines package on my web page includes this file if you want to avoid retyping the rule.

2. General information

The Chessnut board can use BluetoothLE but **does not need pairing** to your computer. Provided the installation has been done correctly the board should connect with no problems once the driver is started by the GUI, but I have found some apps don't close the board when they finish. If you have been using another program or app before trying to use my driver turn the board's power off then on again to ensure it is no longer linked to that app.

When trying to connect to the board using BluetoothLE **remember to turn on Bluetooth** by pressing the power button briefly. You should see the blue light flashing on the board.

The driver screen cannot be closed using the normal close window button as that would leave the GUI without the response it is expecting. Normally it will close automatically when you complete the required action but if you need to force it to close (perhaps the driver keeps failing to talk to the board) then you need to do this by deactivating the board in the GUI.

The first time you access my DLL file you will be prompted to set some configuration details to tell my driver how to connect to and use the board.

Use BluetoothLE
    Not all PCs can use the BluetoothLE connection, either because they don't have Bluetooth hardware installed or the Windows is too old. To prevent my driver from trying to attempt a BLE connection you can turn this option off. The board will then only connect using USB.
    Note that if this was originally turned off and you then enable it again you might need to restart my driver for BLE to work.

Debounce
    The board sends a new position when it detects that a piece has been moved. But if you slide a piece then sometimes the board thinks it has a new position before the piece has finished moving. By setting the debounce value to something other than zero it will allow a short delay to ensure that the move is complete. The larger you make the value the longer and safer the wait, but also the slower the board will respond. The number entered is the millisecond wait and the value can be between 0 (no wait) and 1000 (1 second). A value of 125 seems to be adequate.

LED Display
    This specifies when the LEDs on the board will be displayed. Normally they show for your moves and the computers, but the response will be slightly faster if you only show the LEDs when the computer moves. You can also turn off the LEDs completely, for example if you are using the board for a human vs. human game and just want the GUI to record the moves.

Show possible moves
    This option is useful for people learning chess. When you pick up a piece the board will show you all the squares that the piece can be moved to.

LED flash (Moves, Captures)
    The default is to have the LEDs on constantly when displaying the computer's move and flashing to highlight captures. You can change this so that the LEDs will flash when moves are displayed if that's what you prefer.

The configuration data will be stored in a file called NUT_DLL.INI which will be in the same folder as the DLL file, unless that is in the "Program Files" directory in which case it will be your C:\Users folder. You can edit this file manually but must use a text editor like Notepad rather than a word processor like Word. There is an extra option in the file:

BLEnoSearch=false
    This option, if set to "true", will force the driver to only connect to the last used board. This is useful if you have a room with multiple computers each with their own board. You first match each computer to its board by performing a full search when only those two devices are turned on. You then change all of the INI files to have "true" on this option. Now if a computer loses its connection it won't run a full scan and mistakenly link to a board that is allocated to a different computer.

2.2 Setting up starting positions

You can set up a starting position using the board. See the notes below for any special steps required for each GUI, but in general the following is the procedure to use.

On the board remove both kings to put my driver into Setup mode. If there aren't any pieces on the board, put one on and take it off again. Now put the pieces where you want them on the board. The last piece you put on the board should be the king of the colour to move next.

It is important that you make sure the driver knows which way the pieces move: is white or black playing from nearest you? The indicators above and below the board show which way

around it is currently set to. For example, in this screen the white king is about to be placed on g1 (as it is white's move next) but you can see that the indicators are wrong as they show the black pieces should be nearest you:


One way to correct this is to use the Rotate Board button on the screen. But you can also do it using the board by placing one king on an adjacent square to the other king. In this case, if you placed the white king on f6, g6 or h6 the driver will see that the white king is closest to you and will swap the indicators. You could swap them back (to being wrong) by placing the white king on f8 (after temporarily moving the black rook), g8 or h8 since then the black king would be closest. Since having the kings adjacent is illegal the driver won't leave Setup mode until you then move the white king to its correct g1 square.


3. Use with Arena

3.1 Playing an engine

In *Engines > Manage* select the engine you want to play against and in *Levels* set the time control to be used. Select *File > New* to start a new game.

Connect the board to your computer, set up the pieces and activate the board using *Extras > DGT - Chessboard*:
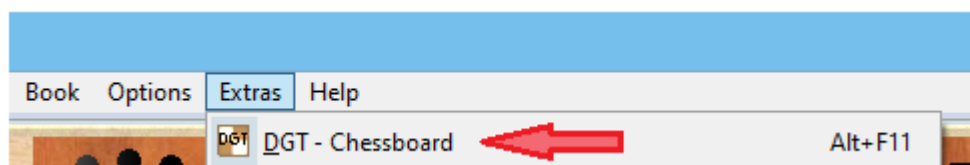
The first time you do this you must go to the *Options* tab of the screen that appears and set the details as shown here:
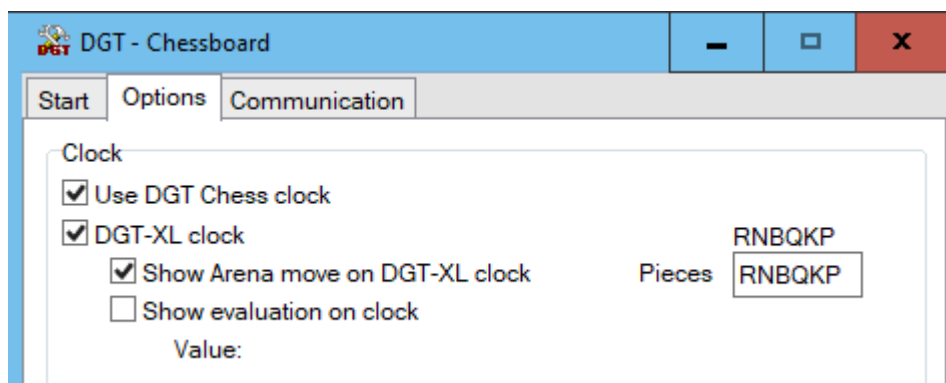
Set up the configuration details in my driver if required.

You can now make the first move as white, or click *Game > Move Now!* to make the computer play the first move. After that make moves on the board and they will appear on the Arena screen.

If you want to play a new game use *File > New* again.

3.2 Different starting positions

You can start a game (or analysis) from a specific position but you must do it by setting the position up using the board.

Select the engine(s) you want to use and activate the board as normal. You can click 'Skip' on my driver's New Game screen as you are going to set up a new position anyway. Select *Position > Set-up a Position*.

On the board remove both kings to put my driver into Setup mode and follow the instructions given in *General Information* above.

In the Arena Setup screen make sure the side to move and other indicators are correct and click *OK*. You can now make the first move or make the computer move or start the analysis as normal.

3.3 Take back moves

If you want to take back a move wait until it is your turn to play and then take back the moves you want on the board. The screen in Arena will automatically be updated. When you then make your amended move Arena will ask if this is a new variation or if the old moves should be overwritten.

3.4 Analysing a game

You can either use the *Position > Set-up a Position* option above to setup the pieces or you can make many moves manually and use this to either get to the starting position you want or analyse a game. You can also use this method to make Arena record the moves in a human vs. human game.

Having selected the engine and started a new game click on *Position > Analyze Now!* (or click the *Analyze* button in the Moves window). This will start the engine analyzing the position (unless an opening book is selected, in which case nothing will happen until you are out of book) and you can makes moves on the board for both white and black.

If you now want to play the engine from the current position turn off analyze mode. You can now make the next move or click *Game > Move Now!* to make the engine move.
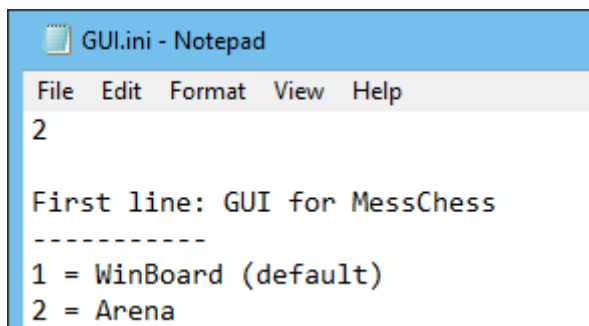
3.5 Replaying a game

You can play through the moves of a saved game but unfortunately Arena doesn't send the move information to the board, so you need to follow the moves on the screen too. But you can still add and analyse variations. Get the board ready for a new game, load the PGN file you want and put Arena into Analysis mode. You can now go through the moves using the right-arrow key while making the moves on the board.

4. Use with CB-Emu (Arena)

CB-Emu is a program by Franz Huber that allows you to play against old chess computers on your PC, using ROM emulations of their processors.

The Setup installation for my driver will load the files into the appropriate folder (<path>\CB-Emu\MessChess\Arena) and you can then use your eBoard by running the Arena.exe program from that folder.

You can also run Arena directly from the MessChess.exe program but to do this you need to edit a file in the CB-Emu\MessChess folder. MessChess defaults to using Winboard rather than Arena, so change this by editing GUI.INI using a text editor (like Notepad), not a word processor (like Word). Change the first line from 1 to 2:

4.1 Playing an engine

This is exactly the same as playing with Arena, described above. Because the emulations sometimes work quite slowly make sure you wait for the computer's move to be shown on the board before you move the pieces.

4.2 Different starting positions

Although it isn't possible to send a new position from the board to the emulation directly, there is a trick to getting this to work. Remove the kings from the board and set up the position as normal and you should see the position you want in Arena. Then in Arena select *Position > Copy FEN to clipboard* and then select *Position > Get FEN from clipboard*. After that you can play on from that position.

4.3 Take back moves

The emulations don't allow take back moves, but the same trick mentioned above can be used here too. Take back the moves on the board and then use *Position > Copy FEN to clipboard* and *Position > Get FEN from clipboard* to send the new position to the emulation. Note that this will start a new game from that position so if you want to save the move history you should use *PGN > Save current game* first.

5. Use with Fritz and ChessBase

5.1 Playing an engine

Having set up the game details (engine, time etc) you can activate the board from the Board tab. For example, in the Easy Game menu:
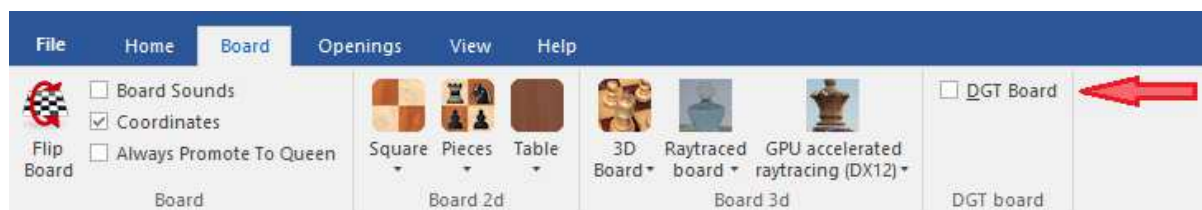
For PlayChess the option to enable the DGT board is on the *Server Settings* screen.

The driver will then load and attempt to connect to the board. Once connected you can make the first move or make the engine move using the *Move Now* button.

5.2 Different starting positions

The Fritz and ChessBase programs are written expecting the board to be a DGT, which means they expect the board to have piece recognition. You can set up the position using the board: remove both kings to put my driver into Setup mode and follow the instructions given in *General Information* above.

You can also start the board during a game or after using *Home > Setup Position*. When the board connects you will see the New Game screen. Set the board up with the pieces in the position of the game and then press the *Read* button. The driver will now load the position from the board into the screen. If the screen matches the position in Fritz check which side is shown as moving next and click *OK* to continue the game.

5.3 Take back moves

You can take back moves by waiting until it is you turn to move and then taking back the computer's last move and then your own move. The LEDs on the board will lead you through the sequence of moves. When you want to enter your replacement move just make it on the board. Fritz automatically adds this move as a new variation so you will need to right click on the variation and select *Promote variation* to make it the main line.

5.4 Analysing a game

To analyse a game or position put Fritz into Infinite Analysis mode and then either setup the position as above or make a sequence of moves from the starting position. You can also use this method to make Fritz record the moves in a human vs. human game.

If you now want to play the engine from the current position turn off analyze mode. You can now make the next move or click *Move Now* to make the engine move.

5.5 Replaying games

You can also play through the moves of a saved game. Start a new game, connect the board and get it ready for white's first move. Put the engine into Analysis mode (or switch it off completely) and then load the game (for example using *File > Open > Open Database*). You will see the moves in the game panel. You can now play through the game using the right-arrow key, with the board's LEDs showing the moves. You can also arrow through a set of moves and then make them all on the board.

It is possible to enter variations using the board but I have found this to be very unreliable. It seems to be safer to enter variation moves using the mouse on the screen while also playing the moves on the board. To return to the main line click on the move before your variation and my driver will prompt you to replace the pieces (this step doesn't appear to work at all using the original DGT Rabbit plugin so it looks like ChessBase never programmed this into their software). You can then continue playing through the game or enter another variation.

You can jump to a future point in the game but then you won't be able to use the board to take moves back before that point.

6. Use with LucasChess

In order to use my driver in LucasChess you need to tell the GUI that you have an electronic board. This is done through the *Options > Configuration* screen. Go to the *Boards* tab and select Chessnut for *Digital board*. (In the old LucasChess turn on *Enable DGT board*).

When using my board I prefer not to have the tutor popup on the screen so in the *Engines Configuration* I normally go to the *Tutor* tab and turn on *Disabled at the beginning of the game*.

6.1 Playing an engine

Use the *Play* option to select an engine to play against. This will show you a screen where you can select the opponent, choose the colour to play, set the time controls, specify a starting position and so on. Once you have completed this click the *Accept* button.

If you didn't activate the board using the option on the *Play* screen you can now enable it using the button on the menu bar:

Set up the configuration details in my driver if required, and then play the moves on the board and they will appear on the screen in LucasChess.

To start a new game use the *Cancel* button and then *Play* again, or use *Adjourn* to save a game for continuation later.

You can deactivate and activate the board again at any time.

6.2 Different starting positions

There are two places where you can set up special positions. One is when using *Play against an engine* (on the *Initial moves* tab) and the other is in *Tools > Create your own game > Utilities > Change starting position > Edit starting position*. Both will display a screen asking for the new position.

Activate the board and then remove both kings to put my driver into Setup mode. Follow the instructions given in *General Information* above. Before replacing the kings you should make sure that the castling and en passant indicators are set how you want.

6.3 Take back moves

You can take back moves by waiting until it is you turn to move and then taking back the computer's last move and then your own move. The LEDs on the board will lead you through the sequence of moves. When you want to enter your replacement move just make it on the board.

6.4 Analysing a game

You can play through your own game by using the *Tools > Create your own game* option. Enter the moves you want, including taking back moves. To analyse a move double click on it in the move list panel. You can also use this method to make LucasChess record the moves in a human vs. human game.

To enter a variation right-click on the move and use the *Append variation* button to display the variation screen. For this screen you cannot use the board though and must enter the moves using the mouse.

6.5 Replaying games

You can also play through the moves of a saved game. Start a new game and get the board ready for white's first move. Load the game using *Tools > PGN > Load PGN file* and you will see the moves in the game panel. Move to the beginning of the game and enable the board. You can now play through the game using the right-arrow key, with the board's LEDs showing the moves. You can also arrow through a set of moves and then make them all on the board.

If you want to enter a variation just make a different move from the one in the file and play through the moves you want. To return to the main line click on the move before your variation and my driver will prompt you to replace the pieces. You can then continue playing through the game.

You can jump to a future point in the game but then you won't be able to use the board to take moves back before that point.

6.6 Training with a book

The option *Train > Opening > Training with a book* allows you to practise your opening repertoire. Load the opening book (a polyglot file with .bin extension) and enable the board. You can then make the moves from the book, and if you get a move wrong then the board will highlight your error. Use the *Reinit* button to start again from the beginning.

7. Use with Shredder

7.1 Playing an engine

When you select *File > New Game* you can select the strength of the opponent or you can use *Levels* to set the strength and time controls.

To activate the board use *Mode > External Board > DGT Board*:
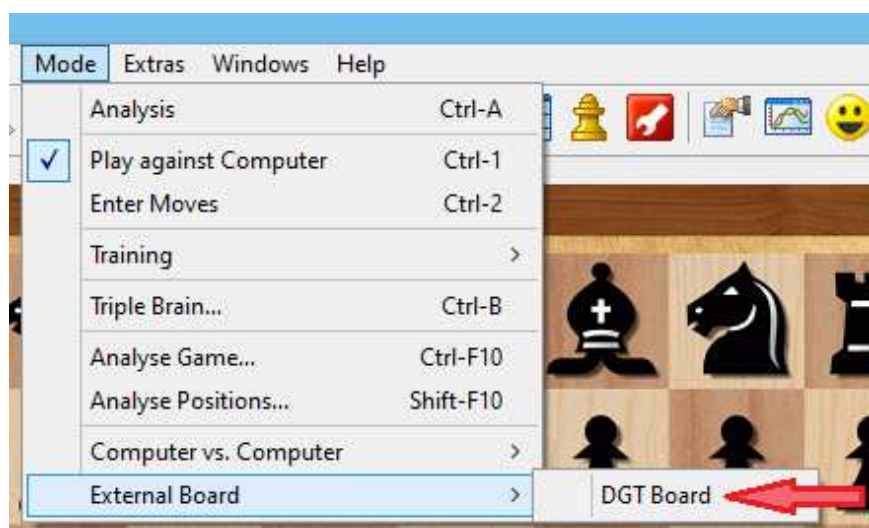
Set up the configuration details in my driver if required, and then play the first move as white. If you want to play black select *Commands > Compute / Switch Sides* and the computer will make its move.

To start a new game either select *File > New Game* or return all the pieces to the starting position on the board.

As with the other GUIs it is a good idea to deactivate the board before quitting the GUI.

7.2 Different starting positions

There are two ways to set up a position to start playing from. Shredder only sends and receives piece positions not more detailed game information, so if your position includes restricted castling rights even though the king and rooks are in the correct positions then you should use the Edit Position method.

Edit position
    You can use *File > Edit Position* (or the *Edit Position* button) to set up a new starting position. Make sure the board is activated first as the new position is sent to the board when you click OK. You should see the 'New Position' screen in my driver. Then you must also check that the correct side to move is indicated on my screen. If not use the button on the screen to change it:

Using the board
    On the board remove both kings to put my driver into Setup mode and follow the instructions given in *General Information* above.

7.3 Take back moves

If you want to take back a move wait until it is your turn to play and then take back the moves you want on the board. The screen in Shredder will automatically be updated. When you then make your amended move Shredder will ask if this is a new variation or if the old moves should be overwritten.

Note that with my driver when you take back a move the Shredder clock is also rewound to the correct time. This doesn't happen if you play with Shredder on your screen and use the Take Back button.

7.4 Analysing a game

You can use the *Mode > Analysis* option to allow you to make multiple moves on the board with the engine analysing the positions. You can also make take back moves and create new variations, or if you want to continue playing against the engine from the current position use *Mode > Play against Computer*.

7.5 Replaying a game

You can play through the moves of a saved game but unfortunately Shredder doesn't send the move information to the board, so you need to follow the moves on the screen too. But you can still add and analyse variations. Get the board ready for a new game, load the PGN file you want using *File > Load Game* and put Shredder into Analysis mode. You can now go through the moves using the right-arrow key while making the moves on the board.

To enter a variation just make a different move to the one in the game. Unfortunately, to return to the main line you need to manually take back the moves in the variation before you can then continue the game.

8. Use as a UCI or Winboard engine

For GUIs that don't support the DLL version of my driver I have also created an engine version. This can be used in an engine vs engine game to allow you to use your board for playing games. Some of the disadvantages of playing like this are:

- ♟ You are not allowed to take back moves in engine matches
- ♟ You can't play "rated" games
- ♟ Opening book options might be limited
- ♟ Time control options are often limited (it isn't always possible to give one engine more time than the other)

The engine supports both the Winboard and UCI protocols.

My DLL driver and Winboard engine both use an INI file to store the settings, which gave me a choice for the UCI engine. I decided to keep it the same as the other two, so the configuration of the driver in UCI mode is controlled by the *Config* tab of my screen rather than the UCI engine configuration in the GUI.

8.1 Installation

My Setup program will ask you where to install the engine file. I recommend that you create a main folder for holding any of my eBoard engines that you want to load and that when you "install" them into each GUI that you link to them from that folder. If you load them separately into each GUI you will need to manually copy the files again each time I issue an update. It also means that the eBoard will use the same INI file settings across all of the GUIs you use.

The process of installing the engine into the GUI depends on each GUI, but in general you will need to give the engine a name and identify where the EXE file is.

8.2 Playing an engine

How you create an engine vs engine match also depends on how the GUI works. You might find that some GUIs also start the engine during the match setup in which case my driver screen will appear quite early.

Also, some GUIs don't close the engine when an engine match is finished so you might need to either start a different match or use the "Close engine" option in the GUI to close my driver screen.

9. Use with SCIDvsPC

Although SCIDvsPC uses the UCI engine version of my driver it has been amended to allow for take back moves and so on. It is used by adding it as a secondary Analysis engine rather than the main engine in a computer vs computer match.

9.1 Installation

Having installed the driver file using the Setup program (probably to a common folder for all GUIs to share) you must then install it as an engine in SCIDvsPC. Go to *Tools > Analysis engines*:
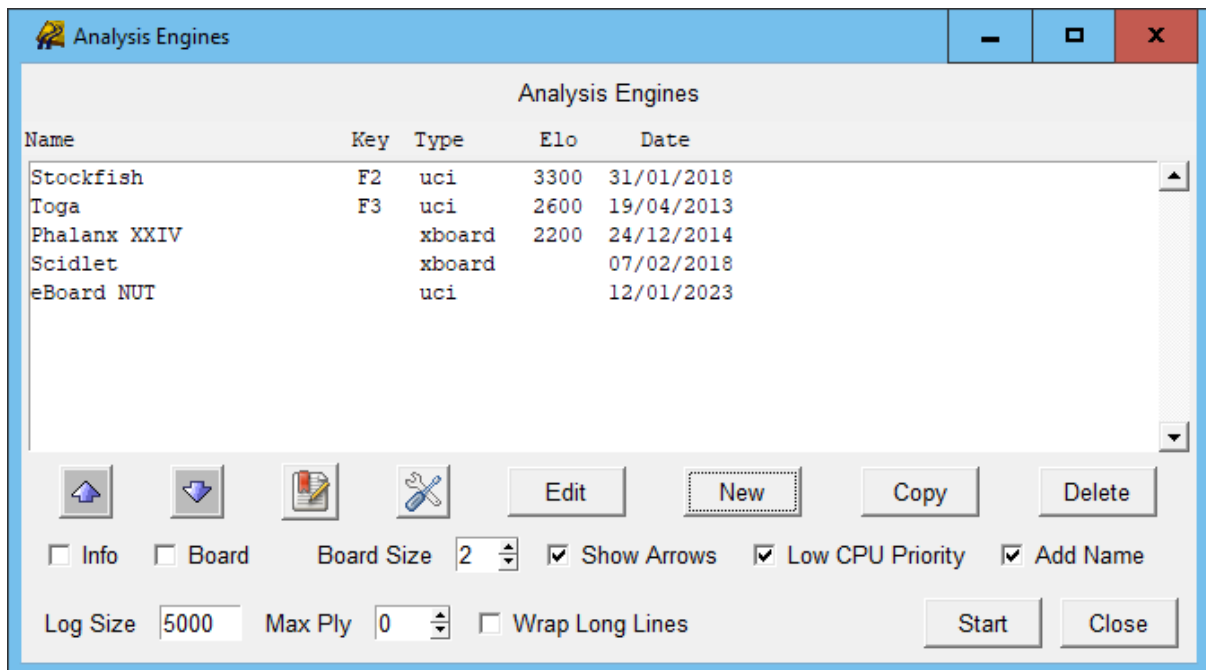
Use the *New* button to add an engine. Give it a name, select the engine file and make sure it is set to use UCI as the protocol:
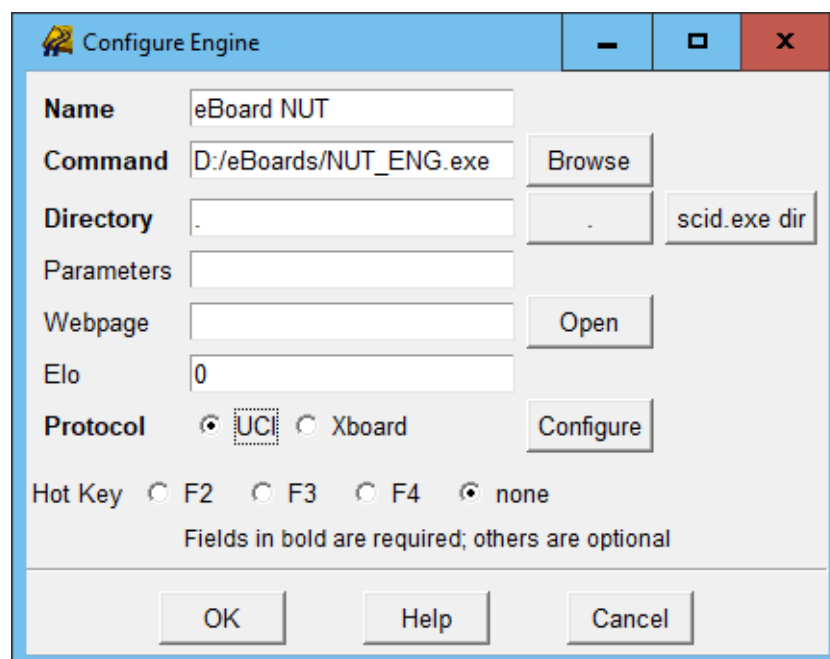
Click *Ok* when done.

9.2 Playing an engine

Before starting a game go into the Analysis engines screen (*Tools > Analysis engines*), select the eBoard you want and click *Start*. The driver will load and connect to your board.

Now you can start a normal game using *Play > Computer UCI engine* or *Play > Internet (FICS)*. To play black use the *Flip board* button. Moves made on the eBoard will automatically be made on the screen so that the engine can reply.

You can take back moves during a game. Wait until it is your turn to move then take back the computer's move and your own. When you have finished taking back moves click on the *Resume* button to continue playing.

You can also enter a game or record the moves of a human vs human game by using *Game > New game* and entering the moves on the eBoard.

10. Legal stuff

This software is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.