Notes on exercising the models

There are three models - Combustion Engine, Sudoku and Typing - that you can play with. You run these models by clicking on the appropriate icons on the desktop. You may need to be patient when loading a model, or waiting for a response to pressing a button!

1. The Combustion Engine

There are buttons that enable you to start / restart the engine and to change gear and a slider to operate the accelerator. In this way, you can:

- study the engine mechanism and the way in which the opening and closing of valves is synchronised with piston motion;
- experiment with the gears, making appropriate use of the accelerator to make smooth changes;
- observe the relationship between engine revs and car speed.

You will find that it is possible to "crash" the model by "abusing" the engine - for example, by making an inappropriate gear change, such as putting the car in fifth gear when it is travelling too slowly. A message appears in the (black) tkeden output window when the engine stalls or blows up. You can see the spreadsheet-style qualities of the model if you switch off the engine and move the piston in the engine cylinder by typing into the tkeden input window a definition of the form:

```
%eden
_piston_compression = 0.5;
```

(You can assign any other number between 0 and 1.)

2. Sudoku

The Sudoku model brings up an interface with buttons labelled "Show possible digits", "Colour Sudoku", "Reset colours", "Reset puzzle" and "Whiten digit". Clicking "Show possible digits" will bring up an extra panel on the display which shows the digits that can plausibly be placed in a cell when the mouse is over it. You can use this to assist Sudoku solution. If you then press the "Colour Sudoku" button, the background colour of each cell will be set up so as to reflect the possibilities for that cell. A different [dark] colour is assigned to each of the digits 1 to 9, and the background of a cell for which the possible digits are (say) 1, 2 and 9 will be a blend of the colours assigned to 1, 2 and 9. There is a slider interface through which you can change the basic colours assigned to the digits 1 to 9. You can experiment with this interface to see how it the use of colour assists Sudoku solving. The "Reset colours" button will restore colours assigned to 1 to 9 to their original values.

3. Typing

This model in effect creates a personal record of your typing style from which in principle it may be possible to identify you in essentially the same way as a fingerprint might. The initial screen shows a table in which the first 8 rows give profiles of typists based on the the average duration associated with typing each character on the keyboard. To create your own profile, you can type one or more of the sample sentences in the top right hand panel of the display.

Though you will not see the sentence you are typing, you will see a barchart style display representing your typing style building up in the "User Model: Keystroke Durations" panel. You can save this record (by default into row 10) via a "Save User Model" button on a separate display interface panel. If you then press the "Reset User Model" and retype the sample you will be able to compare how well your typing style matches the styles previously recorded by inspecting the values in the 'Dist' column.

Acknowledgements

Sed Sidbury created the Combustion Engine and Matthew Carter the Typing model (Sed and Matthew are current 4th year MEng CS students). The Sudoku model is the work of Karl King (MSc 2007) and Antony Harfield (PhD 2008). The EDEN interpreter has been maintained by Ashley Ward (PhD 2004).