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Tuning analog VLSI chips with a mouse click

Matthias Oster

A flexible interface allows easy integration between neuromorphic chips and computer in/out boards.

Assuming we use a computerized I/O board like the sensor-control interface[1] for an analogVLSI chip, what are the advantages compared to twisting a potentiometer for tweaking the bias voltages of an aVLSI chip? To facilitate the tuning and characterization of the chips, we have written software that encapsulates all the low-level functionality of a computerized I/O board in the MATLAB environment. This includes a graphical user interface like the one shown in Figure 1, which allows setting bias voltages with a single mouse click, by moving a slider, or by pressing a button. Complete tuning sets can be saved and restored for later experiments.

The user interface is automatically created based on information stored in a database that defines the pinout of chips and boards in an easy-to-use and versatile text language (XML) that makes it simple to include new chip/board definitions. The database allows access to the biases directly by name, making scripts easier: for example, sweeping a bias obtains measurement curves for characterization. In the more advanced case, the bias parameters are automatically optimized to achieve the best performance: that is, tuning aVLSI chips *without* even a single mouse click.

The interface to the underlying hardware is kept simple so that the user interface can easily be adapted to a variety of I/O boards. Currently it is used by researchers in three different projects inside and outside the Institute of Neuroinformatics and on two types of board.

The database and user interface software are available online.[2]

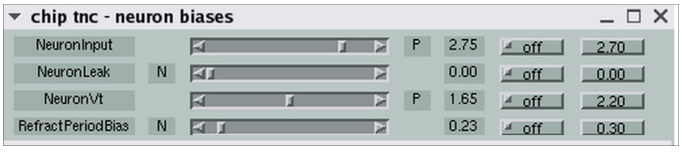

Figure 1. *The graphical user interface for analog VLSI tuning.*

Author Information

Matthias Oster
Institute of Neuroinformatics
Uni/ETH Zurich
Switzerland

References

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2. http://www.ini.ethz.ch/~mao/ChipDatabase/