WinVLSI: A Freeware PC-based CAD for student practices

Analog Microelectronics Design Teaching for Electronic Engineering

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The aim of this work is to supply a freeware PC-based CAD environment for the design of full-custom VLSI microelectronic circuits from schematic capture to foundry database for educational purposes.There are two problems related with CAD laboratories for microelectronic design education: (i) the high cost of the required hardware and the high cost of annual license maintenance for the available microelectronic CADs (ii) the time consuming training of both the CAD software and the UNIX system. Usually students are more familiar using a PC-environment than a UNIX-environment and this is directly related with the efficiency on time used for doing the practical work.In order to overrule this problem a freeware PC-based CAD environment is being used for the design of analogue integrated circuits during two courses for the electronic engineering studies

WinVLSI

WinVLSI *is based on two main freeware tools:*

LASI6 *from Dr.David E.Boyce includes schematic and layout edition, Design Rule Checker (DRC), macroextraction, Electrical Rule Checker (ERC), SPICE netlister and Layout Versus Schematic (LVS), as well as final data codification for foundry submission. LASI 6.06.* http : // members.aol.com/lasicad/index.htm.

WinSpice3 *from Mike Smith is a Win32 port for Berkeley SPICE3F4, which can perform both electrical simulation and graphical post processing. WinSpice3.0.7.* http : //www.willingham2.freeserve.co.uk/winspice.html

WinVLSI current target technology for educational purposes is:

*2.5micron CMOS double-polySi double-metal process (***CMOS-CNM25***) of the Centro Nacional de Microelectrónica.* http://si.cnm.es/imb/

WinVLSI

The resulting CAD system covers all design stages in a down-top approach and supplies the necessary technological information at each step for the final target VLSI process. Http://www.cnm.es/~pserra/winvlsi/winvlsi.htm

Advantages

- Free distribution
- PC-Windows compatible
- Easy of use
- Illusttrative
- Not hardware heavy consuming

Limitations

- Simple DRC techniques
- No full device extraction
- SPICE only modelling
- SPICE3 syntax limited

RESULTS ON THE PRACTICAL STUDENTS WORK

Practical work: Full-custom design of a simple CMOS operational amplifier.Predefined specifications plus optimisation of one of the specifications.Schematic, W/L determination, electrical simulation, layout and post-layout simulation

Available time to complete the OPAMP: 15 hours of laboratory work.

Example: Optimization of the GBW of a simple OTA Miller