

A New User Interface for the MIT Microelectronics WebLab

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Since its inception four years ago, the MIT Microelectronics WebLab, or WebLab for short, has given more than 500 students around the world remote access to expensive microelectronics device characterization instruments. The system lets users carry out experiments and view results through a Java applet user interface. Students located anywhere in the world, equipped with only a web browser on a PC, can characterize microelectronics devices connected to an Agilent 4155B semiconductor parameter analyzer located at MIT.

When the development of WebLab first began, we made a natural decision to model its user interface after the Agilent 4155B's own control panel. The user interface is a Java applet that comprises of rows of text fields through which the user can specify a measurement setup for execution. This user interface has great educational value in that it allows the user to closely emulate through WebLab the experience of physically operating an Agilent 4155B. However, WebLab has potential to do more than emulating an instrument. We can use the capabilities of the highly programmable applet layer to offer the user a better educational experience than the Agilent 4155B by itself. One major advantage the applet offers is its superior graphical capabilities over the display panel of the Agilent 4155B. WebLab's next release will exploit these capabilities and introduce a new user interface that is more graphical, interactive, and space-efficient.

The original user interface consists of two large frames: a *measurement specification* frame for the user to specify measurements and a *measurement results* frame to display the graph of the measurement results. Text fields that receive user input occupy most of the space on both frames. In the new user interface, the text fields in the *measurement specification* frame are replaced by an intuitive graphical representation of the setup, and the axis setup text fields in the *measurement results* frame are replaced by small buttons next to the axes.

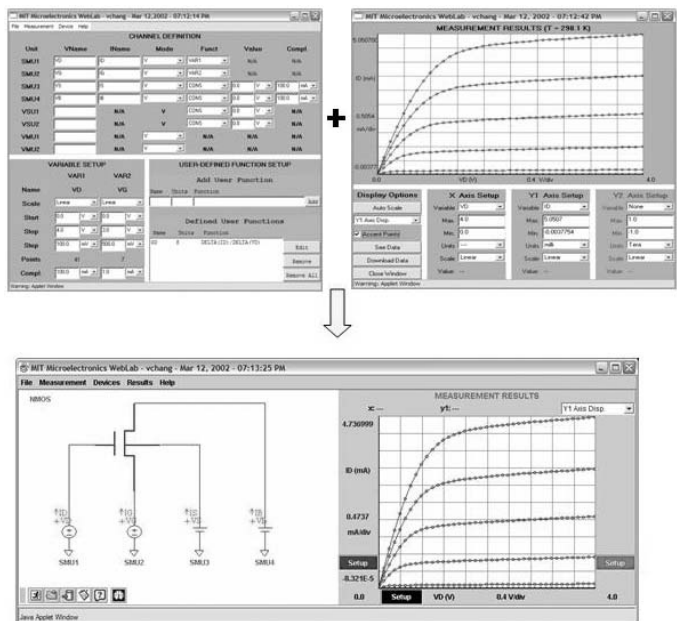


Fig. 1: The transition from the old WebLab user interface to the new one.

Our new graphical representation of the setup is the most significant enhancement in the new user interface. The microelectronics device under test and each of the channels are represented by icons, instead of text fields. Each port's icon indicates the port's role in the setup (constant or variable, voltage or current, source or monitor) and the names of its associated voltage and current. Drawn wires link the ports with the terminals on the device under test according to the setup in the lab. The resulting image is a circuit-like illustration that instantly conveys the device setup being measured (see Figure 1). This representation is much more intuitive to students than the original text-based display.

The new user interface hides all of the text fields by default. Interactivity is added to its components, so that the user can access the text fields by clicking on a port icon or an axis button. The mouse click launches a dialog box that contains the appropriate text fields to receive user specification. An interactive, user-directed display of the text fields reduces the clutter of unnecessary information on the user interface. The contents of both frames have been condensed significantly, such that they can be merged into one frame. This merged frame utilizes the user's screen space more efficiently and eliminates for the user the trouble of toggling between two frames.

Figure 1 shows the transition from the original WebLab user interface to the new one. The new user interface looks sharper and smaller. Most importantly, the graphical display of the measurement setup will help the students understand the meaning behind the measurements they define. This adds educational value to WebLab that extends beyond the capabilities of a physical laboratory.

WebLab's new graphical interface is scheduled for release in Spring 2002 (check in <http://weblab.mit.edu>).
