LTX Today

News for LTX Customers

September 1995
Volume 10, Issue 3

Product news
LTX conducts parallel testing of telecom devices at ITC

By Ken Lanier, Market Manager
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LTX will demonstrate the Synchro II Reduced Footprint test system at this year's International Test Conference. The System will perform multi-site testing of mixed signal telecom ICs.

At this year's International Test Conference (ITC) in Washington, D.C., LTX will be demonstrating the means to perform extremely cost-effective testing of mixed signal devices.

At the show, the Synchro II Reduced Footprint test system will perform quad-site testing of mixed-signal telecom ICs. The Synchro II is part of a family of testers that include the Synchro PAC low-cost, production-focused test systems which are targeted towards high-volume testing of Telecom, RF, Smart Power and Converter ICs, and the Synchro Plus Test System which is focused on high performance mixed signal device markets.

LTX has been implementing multisite testing of analog circuits for a number of years. These devices take advantage of the Synchro's per-pin analog resources which are able to perform source, measure, and limit-comparison functions on a per-pin basis using local processors. In addition, the Synchro's multisite datalogger has been used to automatically sort results into DLOG records for each site, as well as manage tester resources and keep track of pass/fail information and binning for active and inactive devices.

In addition to per-pin analog and digital resources, the Synchro now includes per-pin DSP capability which has been applied to multisite applications. The Synchro DSP pin options allow users to perform parallel DSP sourcing and measurement for AC tests of telecom, video, and multimedia ICs. Each DSP pin contains an on-board DSP processor to perform immediate processing of sampled DSP data in place, eliminating the tester overhead associated with data transfers to a central array processor.

Like all other per-pin resources, the DSP pin offers the advantage of added processing power with each pin that's added to the tester, avoiding an overloading of central tester resources when the number of resources in the tester is doubled or quadrupled to perform multisite testing. This approach helps maintain optimum efficiency as compared to a single site test time.

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Community outreach
Working together: LTX and the EagleEyes project
By Julie Nardone, LTX Corporation

For the past several months, an LTX employee has been involved with the EagleEyes Project at Boston College. EagleEyes is an eye-controlled multimedia system that enables severely disabled children and young adults to operate a computer.

Introduction
Eric Kushnirck, one of LTX’s many talented engineers, has been involved in an innovative project called EagleEyes at Boston College’s Campus School for the Developmentally Disabled. EagleEyes is an exciting new technology developed by professors at Boston College that enables severely handicapped children and young adults who are physically unable to operate a conventional keyboard or mouse, to control the cursor on a computer screen by moving their eyes and head. The eye-controlled multimedia system has been chronicled in Discover magazine, the Los Angeles Times, The Times of London, and on the BBC and the Disney Channel.

Eric was introduced to the EagleEyes project by John Polutchko, an LTX employee whose nephew, Michael Nash, was enrolled in the program. James Gips, an EagleEyes developer and a Boston College computer science professor, wanted to miniaturize the cumbersome hardware that operated EagleEyes so it could travel on a wheelchair and be used with a notebook computer. After several encouraging conversations with John, Jim believed the expertise he sought could be found at LTX Corporation. LTX management gave a “thumbs up” for LTX involvement in the EagleEyes project, and the proposal was eventually funneled down to Eric, who enthusiastically volunteered to work with Jim on the miniaturization of the hardware.

The system
Before Eric could begin the miniaturization process, he needed to understand the EagleEyes System. Although there are several ways to sense eye movements, the EagleEyes system measures the EOG or Electrocorticographic signal by attaching electrodes above and below the student’s right eye, on either side of each eye, and to one ear. The leads from the five electrodes are connected to two amplifiers, which amplify the signals that come out of the electrodes to 1-2 volts. The amplifier outputs are then connected to an analog-to-digital converter on a data acquisition board in a Macintosh Quadra 840 AV computer. The amplification is necessary for the data acquisition board to recognize the signal.

As described by Gips, Olivieri, and McHugh (1995) in their report Eye Controlled Multimedia, the difference between the voltages of the electrodes above and below the eye indicates the vertical position of the eye relative to the head. The difference between the voltages of the electrodes to the left and right of the eyes indicates the horizontal position of the eye relative to the head.

A software program translates the vertical and horizontal signals into cursor coordinates on the screen. Students move the cursor around by moving their eyes only, their head only, or by moving their eyes and head.

Condensing the box
One of the problems confronting Eric in his creation of the prototype box was selecting the proper filtering for the signal before it was sent on to the data acquisition board. The response of the filter is important in de-

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EagleEyes

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terminating how the system "feels" to the user. The original prototype had a filter with selectable cutoff frequencies from 20 Hz to 140 Hz, but it caused problems when the user looked to the extreme right or left, or up or down.

So Eric created a second, even smaller prototype box with a fixed 25 Hz filter optimized for pulse response and a 60 Hz notch filter to remove additional noise induced by nearby AC electrical wiring. Even with all this filtering, Eric condensed the racks of amplifier equipment into a tiny 5.5" X 2.75" X 1.25" box.

Future capabilities

At present, Eric is working on an additional component for the EagleEyes system: an interface between the analog electronics box and the Macintosh. The interface, when completed, will connect directly into the Apple desktop bus. In the interim, a data acquisition component manufactured by National Industries connects the analog box and the Macintosh computer.

Once the interface is complete, the students will have access to all software programs available for the Macintosh. For the most part, the students are limited to software programs/games written by the EagleEyes developers and their undergraduate students: Eye paint, a program the equivalent of finger-painting with the eyes; a letter-based program where students can select letters to spell out messages (Figure 1); "Eye Like Movies" which allows the student to select a Disney movie clip such as Beauty and the Beast or Aladdin by eye control; Eye Venture, students solve a task by looking, listening and solving several puzzles; and eye controlled voice and video, students look at a group of squares, select a square, and are confronted with another group of squares from which to make a selection. Individual disabled users may have these squares customized.

The impact

The EagleEyes system has had a tremendous impact on the students who use it. For most of their lives these students have been unable to participate in everyday activities. With the help of the EagleEyes system, severely handicapped children and young adults can participate in and contribute to their environment. Michael Nash now has the means to communicate his thoughts, needs, and feelings. According to Michael's mother, "Michael's personality has completely changed since he started using the EagleEyes system. He cooperates with us now, his frustration and stress levels have gone down, he's more responsive, and he now looks people in the eye instead of turning away."

The EagleEyes system also serves as an evaluation tool. Michael's teacher, Maureen, has begun to assess Michael's level of cognitive development and learning. He can now count, spell words, and answer questions on screen. In the fall, Michael will attend public school for the first time. The EagleEyes system has paved a future pathway for Michael that was previously unthinkable. As Michael's father said, "This is just the beginning."

Eric has enjoyed working on the EagleEyes project and hopes to have the reconfigured EagleEyes system up and running within the next several months. The EagleEyes staff is grateful for the work Eric has done and considers him a "miracle worker." Eric's involvement with the EagleEyes project is another example of LTX's ongoing commitment to serve the community.

For further information on the EagleEyes project, contact Jim Gips at 617-552-3981.

We have a new format

LTX Today has a new design and an expanded content. More applications notes are planned for the next issue. If you'd like an article written about an interesting feature of your company, or have a specific applications question you'd like answered, please let me know.

I'd also welcome any comments you may have about the new format of LTX Today.

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