The Last Byte

Is This a System?

Scott Davidson

■ **THERE ARE MANY** areas of design and test for which we have widely known solutions, often involving published algorithms and standards. Take Automatic Test Program Generation (ATPG), for instance. You can read about ATPG algorithms in textbooks, the literature is widely available, and most IC test engineers use commercially available ATPG tools.

However, not all areas of test are in this good shape. Consider system test. There is not much research in this area, and conferences do not get many system test paper submissions. But when I started a test conference at a company I worked for, I found to my surprise that half the papers submitted were on system test.

Why did I get so many system test submissions? The main reason was that, unlike ATPG, system test is very much product specific. Gates are gates, no matter who designs and manufactures them, but my company's system test strategies would not be very useful to any company that is not making similar products, and possibly not even then.

The market reflects this. You can purchase tools for digital IC test, and few, if any, companies make their own any more. We tried to find companies that made system test tools to exhibit at our internal test conference and found only one. This company manufactured hardware to allow certain faults to be inserted into circuit boards to check if the system test could detect them. I know someone who did the same thing in 1960 at Bell Labs, in perhaps a less automated way. In any case, you can't purchase a lot of products to simplify your system test challenge.

Academic research in system test suffers from a lack of test cases, a lack of commonality across test cases and how they are described, and even a lack of the most basic tools for describing systems. I have seen papers on formalisms for describing time during system test. Interesting work, but I'm unaware of much progress in this area lately.

The conferences that I'm involved in have used all the usual tricks to try to build interest in system test. When I was program chair of ITC, I made system test part of the theme of the conference. We have had panels, invited papers, a keynote address, and even a workshop. I learned a lot from these things. For instance, it turns out that being able to plug the components of your stereo together and have everything work is very difficult. But there still hasn't been much progress in finding generic ways of generating and evaluating system tests.

Perhaps system test is not amenable to the type of clean solution we have found in digital test. Is there a type of system for which solutions have been found, and what are they?

I submit that we are intimately involved with such a system—the human body. We have a set of interacting components that are interconnected using a variety of methods. Our bodies have evolved in an *ad hoc* way, and, though we have developed techniques to test our body systems, they are not algorithmic. We will examine what our bodies have to tell us about system test in the next issue of *IEEE Design&Test*. ■

■ Direct questions and comments about this department to Scott Davidson; Davidson.scott687@gmail.com.

Copublished by the IEEE CEDA, IEEE CASS, IEEE SSCS, and TTTC **IEEE Design&Test**