ARTICLE SUMMARIES

A Tale of Three Disciplines ... and a Revolution

pp. 30-36

Jesse H. Poore

Despite years of hard work and dedicated champions, software engineering's educational and industrial constituents have not only failed to converge, the gap between them continues to grow.

Some disciplines, like circuit and genetic engineering, seem to evolve from theory to practice relatively responsibly. Software engineering, on the other hand, while not yet at the guillotine, has suffered a decided lack of direction. It may be time to storm the gates. It is never too late for a revolution, and circuit and genetic engineering provide two worthy role models.

The End of Science Revisited

pp. 37-46

John Horgan

Scientists need a certain degree of faith to bolster their confidence in the arduous quest for truth; lacking such faith, science would not have come so far so fast. But when researchers reflexively deny any evidence and arguments that challenge their faith, they violate the scientific spirit.

Although we have grown up in a period of explosive scientific and technological progress, reflected by such measures as Moore's law, science—especially pure science—might be entering an era of diminishing returns. Science itself tells us that there are limits to our knowledge.

2003 Technology Roadmap for Semiconductors

pp. 47-56

Don Edenfeld, Andrew B. Kahng, Mike Rodgers, and Yervant Zorian

Today, microprocessor advances abound: general-purpose digital microprocessors for personal computers have been joined by mixed-signal systems for wireless communication and embedded applications. Battery-powered mobile devices are replacing wall-plugged servers. SoC and system-in-package designs are supplanting in-house, single-source chip designs.

Software today can account for 80 percent of an embedded system's development cost, test cost has increased exponentially relative to manufacturing cost, and verification engineers outnumber design engineers on microprocessor project teams. Overcoming the many existing design technology gaps will thus require a concerted effort by the entire industry.

NASA's Reliable Software Mission

pp. 59-68

Patrick Regan and Scott Hamilton

Both predictable and unpredictable hazards await the spacecraft, robots, and scientific instruments that humans dispatch to explore our solar system. The toughest hazard may be the known presence of unknown bugs in even rigorously tested software.

By exploring new technologies and approaches to develop provably reliable software within tough constraints, NASA has a chance to advance the state of the art, contributing to computer science as well as software engineering. In addition, any successful spin-off that improves reliability while cutting development time and costs could, in principle, generate savings for US industry equal to the nation's budget for space exploration.

IT Employment Prospects in 2004: A Mixed Bag

pp. 69-77

Fred Niederman

Since 1999—when US business magazine cover stories described IT positions going unfilled and extensive congressional lobbying to increase quotas for overseas workers to fill them—the US IT job market has changed drastically, losing more than a million jobs. For US workers, this change raises two different but complementary questions. First, what are the prospects for the global IT workforce in the near and longer term? Second, how will IT jobs be distributed among competing labor markets around the world?

DakNet: Rethinking Connectivity in Developing Nations

pp. 78-83

Alex (Sandy) Pentland, Richard Fletcher, and Amir Hasson

What is the basis for a progressive, market-driven migration from e-governance to universal broadband connectivity that local users will pay for?

DakNet, an ad hoc network that uses wireless technology to provide asynchronous digital connectivity, is evidence that the marriage of wireless and asynchronous service may indeed be the beginning of a road to universal broadband connectivity. DakNet has been successfully deployed in remote parts of both India and Cambodia at a cost two orders of magnitude less than that of traditional landline solutions.

Combining Optical Holograms with Interactive Computer Graphics

pp. 85-91

Oliver Bimber

Holograms can reconstruct complete optical wavefronts, capturing images that have a three-dimensional appearance and can be observed from different perspectives. Museum exhibits often use optical hologram technology because it permits presentation of 3D objects with almost no loss in visual quality. Optical holograms are static, however, and lack interactivity. Combining 3D computer graphical elements with stereoscopic presentation techniques provides an alternative that allows interactivity.