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Introduction (p. 6) “The structure of direct digital control systems is becoming more decentralized: modern industrial control systems are using distributed microprocessor systems, connected via bus systems, allowing us to achieve the benefits of direct digital control without the disadvantages of centralized control.”

Control Software (p. 20) “This article surveys techniques in the field of control software and design, noting particularly the need for clear specifications and engineering methods. It provides the basis for predicting the general direction of improvements in control system design allowed by the developments in computer technology and artificial intelligence.”

Process Control (p. 27) “We concentrate on one area of the CAE [computer-aided engineering] spectrum—real-time process control. We explain why computer science input is important in developing truly integrated CAE systems for this area, illustrate some possible new software tools, and introduce our approaches to solving the problems encountered in providing these tools.”

Control Programming (p. 37) “This article outlines the requirements of suitable programming languages for distributed industrial process control, starting with an investigation of the features of distributed systems. In the context of these features, a general concept of the required language elements is discussed, and an example of a modern real-time programming language that fulfills some of these requirements is given as a basis for a higher-level multi-computer real-time programming language.”

Control Safety (p. 48) “Many attempts to improve the safety of computer-controlled, complex, time-critical devices or physical processes have concentrated on making the computer systems ultrareliable. However, high reliability, while necessary, is not sufficient to ensure safety. This distinction is explored in this article and a preliminary model, or definition, of software safety is proposed along with some general approaches to building safe software-controlled systems.”

A Programming Schema (p. 59) “The software treated in this article is application software for large systems such as process control, factory automation, traffic control, electric power dispatch control, and nuclear power station control.”

Early Handheld (p. 94) “Hewlett-Packard has introduced the HP71B, a handheld computer optimized for numeric computation and calculation and featuring enhanced Basic and a calculation mode. To perform repetitive calculations, users can either write programs in Basic or use existing application packages. For one-time calculations, the unit has the Calc mode, which switches its function to that of an advanced calculator.”

Screen Marketing (p. 102) “An interactive videodisc program featuring touchscreen technology—reportedly the first application of its kind in medical marketing—was introduced by Miles Pharmaceuticals at the annual meeting of the American Heart Association held in November.”

Education (p. 104) “A four-year model program in computer science and engineering has been completed by the Model Program Committee and approved in November 1983 by the Educational Activities Board and the Governing Board.”

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Copyright (p. 14) “Digital technologies enable exact duplication of commercial intellectual property, permitting original-quality reproductions. However, this works for both authorized and unauthorized users. Meanwhile, vendors can use the Internet to sell intellectual property, but individuals can also use it to improperly download and distribute content.”

Online Shopping (p. 18) “Shopbot technology has advanced and now lets consumers compare products based not only...
on price, but also on features, user reviews, delivery options, warranty information, and so on."

**Y2K Over** (p. 22) “The rollover to 1 January 2000 occurred with few reported Y2K-related computer failures, and only scattered problems have surfaced since. Many technology experts say this is a victory for Y2K remediation efforts. However, some observers question whether exaggeration of Y2K risks caused organizations around the world to over-spend on remediation.”

**Programming Contractors** (p. 28) “SCEs [software capability evaluations] are widely used to determine an organization’s Capability Maturity Model rating, but their results can be misleading. The authors reveal how certain practices distort results and waste time and money, through intentional contractor vagueness and detail, inappropriate sample projects, and staff coaching. They go on to suggest ways to improve the process.”

**Parallelism** (p. 37) “The authors developed the Explicitly Parallel Instruction Computing (EPIC) style of architecture to enable higher levels of instruction-level parallelism without unacceptable hardware complexity. They focus on the broader concept of EPIC as embodied by HPL-PD (formerly known as HPL PlayDoh) architecture, which encompasses a large space of possible EPIC instruction set architectures.”

**Introduction** (p. 46) “It is too early to predict where, how, and in which form reliable biometric services will eventually be delivered. But it is certain that there is no way around biometrics-based identification if we insist on positive, reliable, and irrefutable identification.”

**Using Faces** (p. 50) “In this article, the authors discuss face recognition technology, how it works, problems to be overcome, current technologies, and future developments and possible applications.”

**Biometric Testing** (p. 56) “The authors designed this article to provide sufficient information to know what questions to ask when evaluating a biometric system, and to assist in determining whether performance levels meet the requirements of an application.”

**Multimodal Identification** (p. 64) “Dialog Communication Systems developed BioID, a multimodal identification system that uses three different features—face, voice, and lip movement—to identify people.”

**Iris Identification** (p. 70) “We have designed and implemented an iris biometric system that can function as an extremely reliable means for personal electronic identification. Further, our system solves problems associated with public-use devices such as automated teller machines, where habituated use is not the norm.”

**Citizen Identification** (p. 76) “Voters in the US expect the government to deliver more services to an increasing population in a more efficient, cost-effective, and fraud-free manner, while limiting the size and scope of the governmental infrastructure. Encouraged or mandated by federal legislation, governmental agencies at all levels have turned to technology in an attempt to meet these competing requirements.”

**Mobile Agents** (p. 82) “Our case study, which focuses on a Web-based information-retrieval application, helps show that the mobility of application components and the distribution area’s breadth imply coordination problems different from those concerning traditional distributed applications.”

**The Computer Society** (p. 92) “With plans for the inaugural student Computer Society International Design Competition, continued enhancements to publications and conferences, groundwork for a software engineering certification program, and a flagship conference event, the Computer Society is looking ahead to an active and successful 2000.”

**The Need for Speed** (p. 124) “People aren’t buying today’s fastest CPUs to accelerate their office applications—they’re using them to kick computer games into overdrive.”

**Internet Pricing** (p. 128) “In part one of this two-part column, we review some of the current approaches and basic challenges to pricing Internet services.”

**Biometric Standards** (p. 130) “Tracing the lineage of the current effort toward a biometric application programming interface standard provides insight into its architecture, components, functions, and data.”

**Consumer Targets** (p. 136) “These examples underscore the importance of mobility and the location-based consumerism that will dominate the coming decade. The next big thing will target consumers based on where they are.”

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