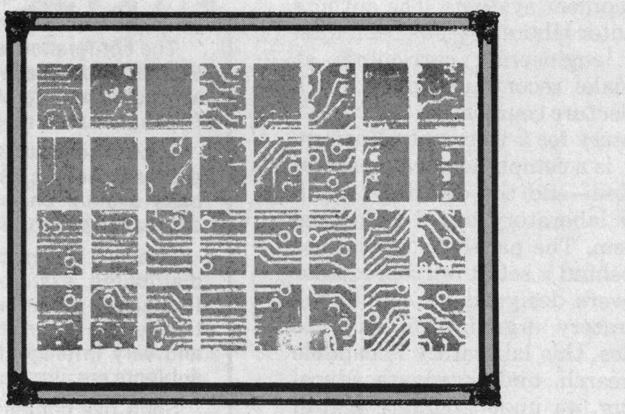


Microprocessors and Education

Guest Editor's Introduction
J. T. Cain
University of Pittsburgh

The papers for this special issue of *Computer* were selected to be representative of those presented at the DISE Workshop on Microprocessors and Education held at Colorado State University, August 16-18, 1976. The workshop was sponsored by the DISE Committee (*Di*gital *S*ystems *E*ducation Committee—a project supported by the National Science Foundation) along with the Departments of Electrical Engineering and Computer Science of Colorado State University. The workshop was intended to provide a forum both for the academic and industrial communities. For educators it was an opportunity to exchange ideas on how microporcessors should be integrated into the curriculum and to discuss microprocessor hardware, software, and system problems associated with the educational environment. For industry it was a chance to present its views on what skills will be required of graduating engineers, to provide an insight into the problems and design decisions encountered in designing and fabricating devices and systems, and to provide educators with a forecast of future developments in the industry.

The lead-off session of the workshop was a panel session entitled "Views of the Microelectronics Industry," chaired by Adam Osborne of Osborne and Associates with panelists William Baker of National Semiconductor Corporation, J. E. Bass of Rockwell International, and William Davidow of Intel Corporation. These gentlemen reached two major conslusions. First, microprocessors will not only have a significant impact on all fields of engineering and the sciences, but will also have a significant impact on society as a whole. There are already 20,000-50,000 hobbyists using microcomputers, and microcomputers will soon be as commonplace in the home as fractional horsepower motors are today, Second — and more directly related to the workshop theme — the future will see a need for two distinct groups of engineers: a small elite group of people who will design microprocessors or microcomputers, and a second, much larger group of people who will design microprocessor-based systems for specific applications.

The first paper in this issue, "A Modular, Unified Microprocessor System (MUMS)" by Michael Faiman, R. W. Catlin, and A. C. Weaver, presents a unique approach to efficiently incorporating microprocessor systems into a university environment. A major feature of this approach is that it minimizes both the hardware and software problems resulting from the diversity of microprocessors currently available and the increasing number of new processors being released.

The second paper, "A Microprocessor Chip Designed with the User in Mind" by William Wickes, was drawn from a session on "Microprocessor Chip Design." It gives an excellent exposition of the real world considerations and design tradeoffs behind the design of a microprocessor chip.

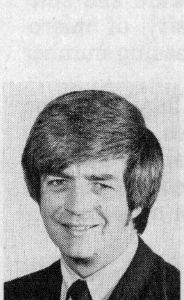
The third paper, by G. R. Johnson and R. A. Mueller, was taken from the session on "Microprocessor Software." "The Automated Generation of Cross-System Software for Microcomputers" describes the GEN software system developed by the authors. The system is designed so that a user with limited architecture and programming backgrounds can generate an assembler and simulator for an arbitrary microcomputer system. As a result it gives an educator a very powerful tool to cope with the ever increasing number of microcomputer systems on the market.

"Microcomputers in the Computer Engineering Curriculum," by John F. Wakerly and Edward J. McCluskey, was one of several presentations dealing with the impact of microprocessors on the curriculum. This paper presents a comprehensive discussion of all aspects of microcomputers including microprocessor organizations, system organization, software, circuit technology, debugging aids, peripherals, and development systems. The authors also show how a microcomputer laboratory has been integrated into the computer engineering curriculum at Stanford University and make recommendations for a sequence of microcomputer lecture courses.

"A Microprocessor Laboratory for a University Environment," by Bernard J. Carey, is a comprehensive presentation of the philosophy behind—and the detailed organization of—a microprocessor laboratory based on a dual PDP-11 minicomputer system. The paper also describes and presents the rationale behind a set of microprocessor functional modules which were designed for use in the laboratory. With the laboratory organization and the developed functional modules, this laboratory is capable of supporting graduate research, undergraduate education in computer engineering, an undergraduate digital control systems course, and other courses within the electrical engineering program.

The final paper selected from the workshop is "Teaching Microcomputer Interfacing to Non-Electrical Engineers," by Peter R. Rony and David G. Larsen. This paper addresses the fact that microprocessors—and digital systems in general—will impact all fields of engineering and the sciences as well as electrical and computer engineering programs. Rony and Larsen present the philosophy and organization of a series of digital systems lecture and laboratory courses which they have successfully taught to students from a variety of disciplines including chemical and mechanical engineering, chemistry, computer science, psychology, biology, biochemistry, engineering science and mechanics, and geology.

The success of the workshop is due to the efforts of many people. In particular I would like to thank the members of the workshop organizing committee: T. A. Brubaker, Colorado State University; Yaohan Chu, University of Maryland; R. G. Hoelzeman, University of Pittsburgh; G. G. Langdon, IBM Research; F. T. Lynch, National Semiconductor Corporation; Adam Osborne, Osborne and Associates; and R. P. Voith, University of Toledo. ■



J. T. Cain is an assistant professor of electrical engineering at the University of Pittsburgh. He has been a co-project director of the NSF-supported DISE Project; a member of the IEEE Computer Society's Education Committee, Model Curriculum Subcommittee, and Evaluation Subcommittee; student relations chairman for the IEEE Systems, Man & Cybernetics Society; and editor of the the Model Curriculum Subcommittee Report on recommended curricula in computer science and engineering.

Dr. Cain received the BS, MS, and PhD degrees in electrical engineering from the University of Pittsburgh in 1964, 1966, and 1970, respectively.

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Selected conference papers will be published in the *ACM Transactions on Database Systems* (TODS).

Requests for information regarding travel support and recommendations for panel or tutorial sessions or other suggestions should be directed to the Conference Chairman, Prof. Stuart Madnick, Room E53-333, M.I.T. Sloan School of Management, 50 Memorial Drive, Cambridge, MA 02139, U.S.A.

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