PERSPECTIVES
IN COMPUTING

IBM

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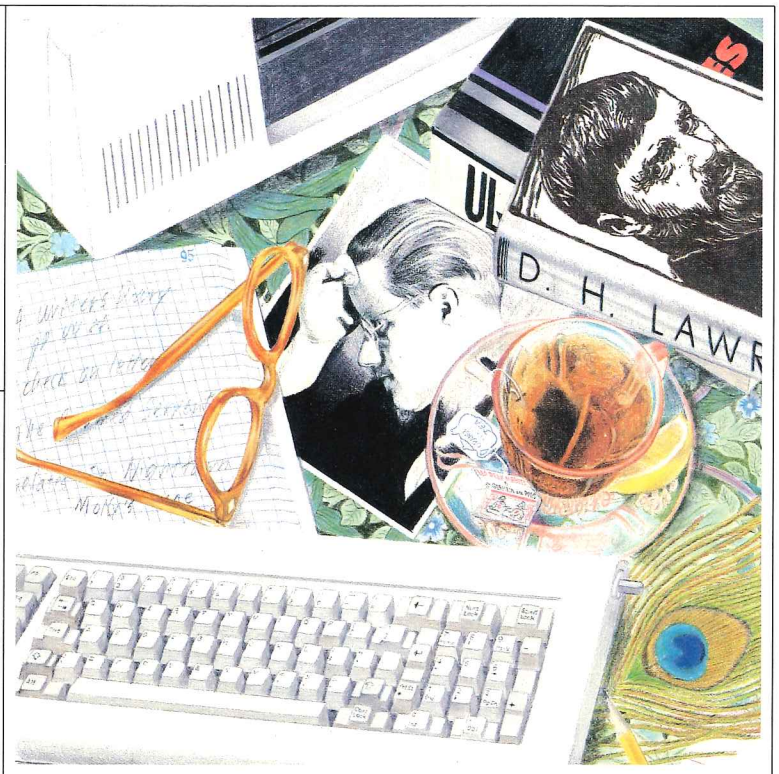

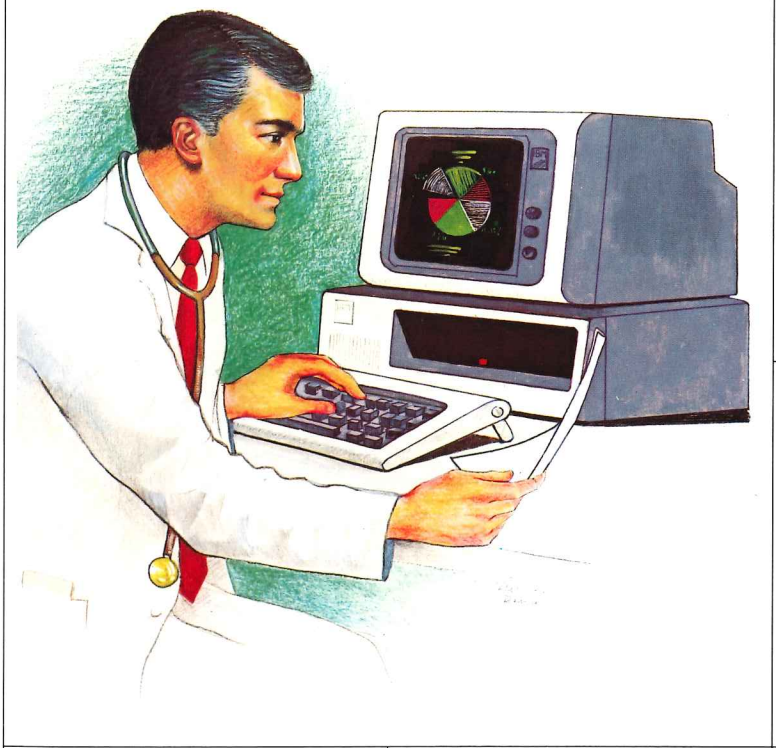

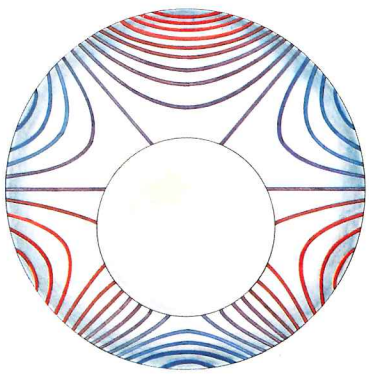

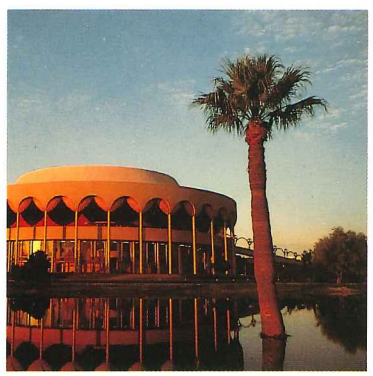

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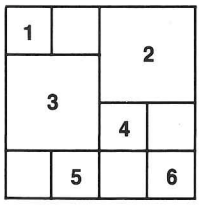

Cover: **1** Amy Huelsman; **2** Cheryl Peterson; **3** Nicole Denay; **4** Hannah Berman; **5** Elizabeth Feeney; **6** University of Arizona. ***Page*** **4, 6, 8, 9, 12, 13, 14, 15, 17, 18** Elizabeth Feeney; **21, 23, 27, 28** Cheryl Peterson; **33, 37** Nicole Denay; **40, 41, 42, 46** Hannah Berman; **50, 52** Amy Huelsman; **55** University of Arizona; **57** John O'Donnell, Westgroup Photo-technical Services, Inc.

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Perspectives in Computing deals principally with computer applications involving IBM products and services, but our editorial policy is to emphasize the problem-solving techniques used in those applications, rather than details of computer hardware or software. We hope our readers will find the techniques applicable in their own fields of interest.

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PERSPECTIVES IN COMPUTING

Foreword

The reduced-gravity environment of space offers new and useful opportunities for scientific research. That is the message of the opening article in this issue, entitled "Of drops and bubbles—the technology of space processing." The author, Shankar Subramanian of Clarkson University, defines space processing as "working with materials and conducting experiments aboard spacecraft in near free fall." He describes research in the containerless processing of glass and the role of computer modeling in designing experiments and interpreting the results. Because "certain technologically useful glass compositions are difficult or impossible to make in a container," Subramanian is experimenting with molten drops of glass held in place and manipulated with the aid of acoustic fields. Specifically, he is investigating ways of eliminating bubbles with the aid of thermal gradients.

In "A new environment for literary analysis," John Smith of the University of North Carolina discusses a text retrieval and analysis system called ARRAS. "Humanists ask questions that require consideration of very large quantities of information," Smith observes. "Consequently, many are discovering that the computer is a powerful colleague. It can help them find their way through thousands of pages of text quickly and easily. It can help them make comparisons, trace similarities, plot differences. It can help them record their thoughts and communicate those thoughts to others." Concluding that "the computer...can be an instrument of perception and cognition, a fine as well as powerful lens for the mind," Smith points out that with ARRAS, scholars "may be able to answer as well as ask questions that, without the help of the computer, would forever remain speculations."

At the University of Heidelberg, Maria Blohmke and Günther Heim are investigating the use of a new computer-based procedure for detecting cancer in apparently healthy persons without the use of X-rays. Their article "Thermoregulation diagnostics—the soft way to early detection of cancer?" describes a pilot study in which an infrared detector measured changes in skin temperature related to pathological conditions, specifically breast tumors in women. "The dynamic process of temperature regulation is impaired by pathological processes," the authors explain. Statistical analysis of the thermic measurements produces a "SCORE value," which "allows the doctor to effect a rapid classification of the patients he examines." The SCORE value "can be calculated from the temperature data using a personal computer connected directly to the infrared detector."

A program that "seeks to refine a model for effective use of microcomputers at the secondary school level" is the subject of "A program for teaching the teachers," by Hugh Cline and Jana Anderson of the Educational Testing Service (ETS) in Princeton, New Jersey. Supported by IBM and administered by ETS, the program has trained teachers and administrators from secondary schools throughout the United States in a variety of educational applications of the personal computer. These trainees, in turn, have returned to their schools to show their colleagues how personal computers can aid in preparing students for today's technological world.

In the final article, "Assessing the reliability of complex systems—an interactive approach," André Poucet and Paul De Meester of Leuven University discuss a computer program that provides for automatic fault tree analysis of large, complex systems such as those found in the aerospace and chemical industries. "Fault tree analysis," explain the authors, "is a deductive form of system analysis which, starting from an assumed undesired (failed) system state, searches all possible faults that might lead to that state." Their program, called CAFTS (for Computer-Aided Fault Tree Synthesis), features interactive computer graphics and automatic calls to data bases. "The interactive approach" write Poucet and De Meester, "...provides a natural, engineering-oriented environment for modeling complex systems, and it reduces arbitrariness and errors."

Donald T. Sanders
Editor

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The matrix at right is provided as a scanning aid for readers who want to know at a glance whether their fields of interest are touched upon in this issue of *Perspectives in Computing*. Full color indicates an article's main emphasis; lighter tint indicates secondary emphasis.