Society's need for computer technology is growing at an unprecedented rate. Basic and applied research at ISI is advancing to meet this need, with new projects and changes to the overall research profile reflecting areas of increasing importance. ISI's outstanding staff and facilities, combined with its history of flexibility and continued growth, make it an excellent environment for achieving new successes. We welcome this opportunity to provide a brief view of ISI.

Keith Uncapher

Information Sciences Institute is in its tenth year of operation as a center for computer science research. ISI’s major goal is to generate and develop new ideas in computer science and to distribute those ideas to the community at large. The Institute combines the activities of its individual projects within a single research environment for its staff members: research is currently concentrated in the areas of artificial intelligence, software system specification, communications and networks, computing environments, and VLSI. Projects share computing facilities including new generation personal computers, large time-shared machines, and ARPANET service through one of the country’s largest network nodes.

As one of three major research institutes administered by the University of Southern California, ISI has programmatic autonomy within the university structure. This gives ISI the freedom to identify and engage in significant research programs of its own choice. The Institute maintains a working relationship with USC's School of Engineering, particularly the Departments of Computer Science and Electrical Engineering. ISI benefits from interaction with faculty of USC and other local universities and provides opportunities for research and Ph.D. thesis supervision to graduate students from these universities.
The ISI Environment

ISI's 130 staff members (70 professionals) are organized into the dozen or so individual projects that make up the Institute's interdisciplinary research environment. Project members have significant responsibility for the conduct of their projects and the direction of their research. ISI encourages researcher visibility in the information processing community at large, including publication of research and participation in professional conferences. Performance of professional staff members is gauged in part by their creative influence on the research community outside ISI and their success in identifying new interesting areas of research.

The Institute provides a facilities-rich environment. Each staff member has a terminal for access to shared computing resources; in addition, individual projects provide dedicated personal machines and special hardware dictated by their research needs. Resources also include the Institute's library, hardware development laboratory, and an unusually high level of project and administrative support. University of Southern California facilities are available to all staff members.

ISI overlooks the Pacific Ocean from Marina del Rey, a suburban recreational community containing the world's largest man-made small boat harbor. Twenty minutes from downtown Los Angeles and USC, the Marina is far from the smog in the midst of some of the most desirable living areas in the Los Angeles basin. The full diversity of Los Angeles' ethnic, cultural, and recreational activities are within easy reach.

Tenth Anniversary

In May 1982, ISI celebrates its tenth anniversary. We are commemorating the event with a two-day seminar to look to the next ten years in the information sciences. Each of the following speakers will present his personal perspective of opportunities, goals, and responsibilities:

Michael Dertouzos, Director, Laboratories for Computer Science, MIT;
Edward Feigenbaum, Professor, Stanford University;
Robert Kahn, Director, Information Processing Techniques Office, DARPA;
Robert Lucky, Director, Electronic and Computer Systems Research, Bell Laboratories;
Steven Lukaski, Chief Scientist, Federal Communications Commission;
Allen Newell, University Professor, Carnegie-Mellon University;
Lawrence Roberts, President, Subscriber Network Products, GTE TELEDENET Communications;
Ivan Sutherland, President, Sutherland, Sproull & Associates, Inc.
The field of artificial intelligence is beginning to have major impact on how computers are used to solve problems. ISI projects are investigating fundamental problems in the representation and use of knowledge by computers as well as the experimental application of AI technology to real-world problems. Current activity is focused in the following areas:

Inference
- Control of reasoning processes that must deal with large amounts of knowledge
- Tradeoffs between detailed knowledge representation and sophisticated control structure
- Plausible inference and the representation of uncertain knowledge

Knowledge base design
- Consistent representation of various kinds of knowledge
- Maintenance of large knowledge bases
- Acquisition of domain-specific knowledge

Expert systems
- Architectures for expert systems
- Modeling of expert knowledge for delivery to nonexperts

Natural language
- Generation of English text
- Adaptation of parsers to new domains of discourse
- Informal specifications

Several projects contribute their individual viewpoints to this ongoing research. The Consul project is examining the use of knowledge-based inference to provide a domain-independent cooperative interface to a set of interactive services. The Control of Expert Systems project is using the Hearsay-III domain-independent architecture to develop better ways of providing the flexible control needed in expert systems. SAFE investigates the use of built-in process-description knowledge and dynamically acquired domain knowledge to produce formal program specifications from informal descriptions. The Knowledge Delivery project is applying the results of basic linguistic research to the problem of constructing multiparagraph English text.
Communication among computers has become an important part of computer science research, not only as a topic itself, but also in support of other areas. ISI is working to improve computer communications through the development of networks and network protocols ranging from office environments to international networks.

Applications
Advanced applications systems use integrated multimedia data for interactive conferencing, briefing aids, and computer mail. The user should be given choices among media including text, voice, graphics, facsimile, and video.

Environments
The communication environment is an interconnected system of networks of many different types, including long-haul (ARPANET), satellite (SATNET, WBNET), radio (PRNETs), and local (LCSNET, ETHERNET). A user and his computation processes should be able to access facilities across this entire environment.

The Internet Concepts project is working in the areas of protocol design, application, and verification. The Wideband Communication project is working in the areas of speech and video digital communication using a broadcast packet satellite network. The Command and Control Graphics project is working on device-independent color graphics to support command and control systems. The Information Processing Center supports a variety of computer communication facilities and programs; the New Computing Facility project will provide the framework for the next generation of these.

ISI's interest in computing environments spans the full range of interactive facilities, from the maintenance of a large service-oriented ARPANET node to experiments with a coherent environment for providing natural language interaction with the user. The collective goal of ISI projects pursuing research in this area is a deeper understanding of three aspects of cooperative interaction in computing environments:

Cooperation among services
Unification of diverse hardware (including a variety of personal machines) and system software facilities into a single computing environment that is coherent from a user software viewpoint.

Cooperation among users and services
Creation of a single interface to all services in the environment that interacts naturally with the users (understanding requests and providing help).

Cooperation among users
Support for group efforts in program development, document preparation, and other office and administrative interactions, i.e., a systemwide information management facility.

The Information Processing Center provides stable, continuous support facilities. The New Computing Facility project is planning for near- and far-term advances to support the needs of ISI's research community. Consul is attempting to provide a uniform, friendly user interface, using knowledge-based inference; the emerging Information Management and CUE projects are investigating other aspects of the uniform interface problem. Command and Control Graphics concentrates particularly on graphical interfaces. The Wideband Communication and Internetwork Concepts efforts deal with how to link computers effectively. The Interisp project is developing an easily portable version of the language and its support system.
RESEARCH

William Mark, David Wilczynski, Thomas Lipkos, and Bill Swartout

Current interactive systems must be made more habitable for a wide variety of users, especially those having little experience with computing. We are currently building the Consul system to explore methods for allowing natural interaction—natural-language requests, explanation of system facilities, user-understandable error handling—between a user and a set of online services (for text manipulation, message handling, etc.). Consul works by mapping user requests into appropriate system actions as dictated by a detailed model of system capabilities and requirements. This model is based on built-in service-independent knowledge, but is tailored to individual services via a dialogue-driven knowledge acquisition process. As each piece of a new service is built and added to Consul, the system engages in a dialogue with the service builder to determine how the piece fits into its model of the service so far and of interactive systems in general. Our research therefore includes not only modeling and mapping methods that generalize across services, but also a programming environment for service builders that integrates their services into Consul's knowledge base.

Current Projects

Cooperative Interactive Systems (Consul)

Bob Balzer, Don Cohen, Lee Erman, Martin Feather, Neil Goldman, Jack Mostow, Bill Swartout, Dave Wile, and Steve Fickas

This project comprises three interrelated efforts working to facilitate the creation, testing, and optimized implementation of program specifications. The first effort, called Specification Acquisition From Experts (SAFE), is directed at helping people create unambiguous, consistent, and complete formal program specifications through informal description. While end users are quite capable of providing informal process-oriented descriptions of the task being automated, formalisms of any kind provide major impediments. The informal descriptions are characterized by partial, rather than complete, constructs. The system uses a knowledge base of program well-formedness rules to disambiguate and complete the informal natural language descriptions. An early version of the system has successfully converted several small informal specifications into formal specifications. Attention is now focused on handling large specifications through incremental formalization; this new implementation uses Hearstay-II as its base.

The second effort seeks to ensure that a formal specification matches the user's intent, by systematically investigating its behavior through symbolic execution. The tasks here include the design of a formal abstract specification.
Control of Expert Systems

Lee Erman and Jeff Barnett

Expert, knowledge-based systems for particular problem domains (e.g., medical diagnosis, chemical analysis, and traffic control) are becoming increasingly important, both as practical tools and as a major area of AI research. This project is concerned with the architecture of such systems and, in particular, with their control—the division and allocation of resources during the execution of the expert system. An expert system often requires soft control—a flexibility of interaction among the various pieces of domain knowledge that allows for opportunistic allocating resources to activities most likely to make efficient progress. The solution to this problem itself requires the application of knowledge, both general-purpose (e.g., "A faster technique is preferred to a slower one") and domain-specific (e.g., "for a medical consultation system: "An external test is preferred to an invasive one"). The conceptual and operational framework for this project is Hearsay-III, a system we have developed for building and experimenting with expert systems.

William Mann, Yasutomo Fukumachi, Steve Klein, and Christian Matthiessen

Knowledge Delivery in Multiparagraph Text

This project is developing new methods for autonomous text composition by machine, with the focus on generation of fluent English. The text generator, called Penman, is being developed to explore generation in multiple knowledge domains, including description of programs and program operations. Penman will seek to deliver knowledge (in English) from inside a system that was not originally designed to have a knowledge delivery component.

Penman contains a large systemic generative grammar of English. This grammar system extends the framework of M. A. K. Halliday with new semantic components and methods for interacting with a knowledge representation external to the grammar.

Vittal Kini, Dave Martin, and Allen Stoughton

Formal Semantics

The Formal Semantics project is carrying out research into methods for the validation and use of formal semantic definitions of programming languages. The Ada Formal Semantic Definition (FSD), written by the French group at INRIA, is being used as a vehicle for this research. A program which interprets the Ada FSD will be used as a tool to validate the FSD. The interpreter with the FSD installed within it will comprise a semantic-checker which takes Ada programs as input and either indicates where and why a program does not conform to the language semantics or else provides as output the denotations of the program. In the course of constructing the semantic-checker, the FSD will need to be parsed and type-checked, thus ensuring that syntactic and other minor errors in the FSD are revealed. It is expected that the semantic-checker will be employed in two phases. In the first phase, Ada programs, with known and well-understood intent, will be used as test case inputs. This phase will exercise the FSD, help to uncover deeper and less obvious errors in it, and instill confidence in its correctness. In the second phase, the checker may be used in answering detailed questions of interpretation of the language semantics. In addition to benefiting the definition of Ada directly, the project will provide insights into improving the state of the art in defining the formal semantics of practical programming languages.
New Computing Facility

Dan Lynch, Danny Cohen, Joel Goldberger, Jim Koda, Jon Postel, and Craig Rogers

This effort will provide significantly improved computing facilities for researchers at ISI, as well as for remote and mobile users. Previous facilities have been almost exclusively large time-shared mainframes with individual file systems. The major goal of this project is to give each researcher a powerful, dedicated personal machine upon which he or she can perform most research and administrative computing. Only when the size of the task significantly exceeds the capabilities of the personal machine will the researcher resort to a large central server. There will be a single common file system, high-speed communication among all the computers, and common servers for other specialized tasks such as printing and external communication. Another goal is to allow new machines to be integrated into the facility with minimal effort. A key issue currently under consideration is the selection of a user interface suitable for the needs of ISI’s research community.

Internetwork Concepts

Jon Postel, Danny Cohen, Greg Finn, Alan Katz, Paul Mockapetis, David Smallberg, and Carl Sunshine

Many packet-switched computer communication networks now exist; this project is investigating ways to interconnect them usefully. The project has three task areas: the formal analysis of protocols, the design and prototype implementation of internetwork applications, and the design of protocols and development of new communication concepts.

The protocol analysis area is focusing on the correctness (in the program verification sense) of the Transmission Control Protocol (TCP). TCP is the host-to-host reliable data stream protocol developed for the internet environment. Several program and protocol analysis tools are being explored.

The protocol applications area is focusing on computer mail. Two distinct systems are being developed: a text multinetworl mail system for use in the short term, and a multimedia mail system for use in the long term. Other applications will be explored in later stages of the project.

The protocol design and concepts area is focusing on the host-to-host and gateway level protocols, particularly the Internet Protocol (IP), a datagram protocol which is universal in the internet environment. There are many design issues to be resolved—for example, very mobile hosts, controlled routing, access control, fault isolation, and resource allocation.
Wideband Communication

Steve Casner, Bill Brackenridge, Danny Cohen, Randy Cole, and Ian Merritt

After several years of research with relatively low bandwidth packet networks, ISI is participating in a Wideband Communication Program (initiated by ARPA and the Defense Communications Agency) to investigate packet switching on a high-bandwidth satellite network. One goal of this project is to develop the technology required to support future packet-speech systems with thousands of voice channels, beginning with an experimental facility that can be accessed by a much broader user community than that of the first demonstration systems. This will help determine the feasibility of realizing the economies of integrated voice/data packet transmission. A second goal is to explore new modes of packet communication made possible by the increase in bandwidth of the satellite network over that of previous packet networks and to investigate how the added bandwidth can benefit old modes of communication. We are building systems for transmission of narrowband packet video, multiple channels of packet speech, graphics, text, and bulk data.

Command and Control Graphics

Richard Bisbey, Ben Britt, Dennis Hollingworth, and Pamela Finkel

The Command and Control Graphics project is developing a distributable, display-device-independent vector graphics system for use in a command and control environment. The user communicates with the system via a device-independent graphics language whose primitives are mapped to internal graphics protocols from which device-specific graphics orders are generated. The project is also developing graphics command and control application programs, including a Situation Display (naval force information displayed on a geographic background) and a Briefing Aid system that demonstrate the use of the graphics system. The software is currently in use at the Naval Ocean Systems Center as part of the Navy's Advanced Command and Control Architectural Testbed, as well as at sites connected by the ARPANET and the secure subnet.

VLSI Implementation System

Danny Cohen, Yehuda Afek, Ron Ayres, David Booth, Victor Brown, Joel Goldberg, Lee Richardson, Earden Smith, and Vance Tyree

The VLSI project is focused on research in the design methodology of VLSI circuits at various levels and on the development of the tools needed for providing fast turnaround fabrication service to the ARPA VLSI research community. Research is progressing in the automatic generation of chips from purely functional (non-geometric/algorithms) specification. Two distinct approaches and their integration are being pursued. First, we are working on a silicon compiler, called Bristle Blocks, which produces a limited class of chips, namely microprocessors, with remarkably efficient designs, competitive with manual designs. Second, we are pursuing a silicon compiler, RELAY, which accepts the specification of arbitrary synchronous circuits in terms of hierarchically described synchronous logic equations. We note that the choice of appropriate specification language is of fundamental importance and that the target medium (silicon) has a character quite different from that of software.

We are also developing the concepts involved in managing useful libraries for popular subdesigns ('procedures'). Unlike software libraries, useful silicon libraries require many implementations of the same function. The geometric alternatives presented in multiple implementations provide the possibility that people will find a design that fits nicely within the geometric constraints imposed by other parts of their design.

ISI is also developing and maintaining MOSIS, which supports the fast turnaround fabrication requirements of the ARPA VLSI research community. MOSIS handles many of the issues of information processing, geometric manipulations, quality control (by wafer probing and device testing), and general management. In addition to the management-oriented tasks, the MOSIS team is working on the development of standard acceptance tests and other facilities required for developing the interfaces needed to support the separation of the design from the fabrication process.

Dan Lynch, Ray Bates, Dave Oyer, Andrea Ignatowski, Steve Saunders, and Don Voreck

Interlisp-VAX Implementation

This project is implementing and will maintain a fully compatible, portable, large-address-space Interlisp. The first version is implemented in C under UNIX and VMS for the VAX computer and was released in March 1982.
In addition to its ongoing research efforts, ISI is in the process of exploring new research directions that will likely develop into full-fledged projects. Exploratory work is currently under way in the areas of integrated interactive system design and information management.

Tom Kaczmarek et al.

The Consistent Underlying Environment (CUE) project will examine the problem of constructing interactive systems whose various services (e.g., electronic mail, online appointment calendar, word processors) can be used in an integrated way to perform user tasks. For example, the task of sending a message to all the attendees of a particular meeting is quite difficult in current interactive systems, in which the mail and calendar services are totally separate subsystems. The goal of the CUE project is to create a methodology in which all of the services in the machine can be built into and accessed within a single interactive environment.

Bob Balzer, Dave Dyer, Michael Fehling, and Steve Saunders

The aim of this new project is to build a support environment that facilitates the creation, integration, and evolution of computational services required by a community of interacting users. This environment will be based on uniform mechanisms for defining and instantiating information structures, building and modifying relationships among them, searching for those that satisfy predicates, establishing and maintaining consistency among objects, building services through event-based agents, and examining the behavior of such services. A key objective of this project is to develop techniques which allow such an environment to operate at sufficient speed to be practical. The uniformity of the mechanisms on which the environment is based, and the simplicity of the underlying computation model (constrained objects), should enable users to comprehend and modify services created by others. This hypothesis will be tested by building the environment and a kernel set of services, and then extending them.
Available and reliable computing power is a basic necessity for performing research in this field. ISI's research computing facilities currently comprise advanced personal computers (Xerox Dollphins, Symbolics LISP Machines, Three Rivers Perqs), Digital KL-10s, VAX 11/780s, PDP-11 minicomputers, and specialized devices for research in areas such as graphics, speech, and emulation. ISI's computing environment is currently undergoing major revision in response to changing research needs. The goal is to provide each user with a substantial increase in address space and computer cycles (both personal and time-shared) and advanced terminals for office and home use.

The hardware development lab is responsible for constructing any special equipment required for ISI research. The lab contains machine shop and electronics tools, including an online prom-burning facility and a prototype printed circuit board fabrication capability (currently under development). Past projects have included video recording systems, ARPANET and Ethernet interfaces, and equipment for digital transmission of speech and video. State-of-the-art prototype products have also been delivered to several universities and government facilities; lab developments have directly influenced new products at Hewlett-Packard and Digital.

Staffed by a full-time technical librarian, ISI's library features an extensive collection of books and current technical reports, subscriptions to more than one hundred technical journals, and online access to several bibliographic databases. The up-to-date collection covers the full range of computer science, with special depth in those areas of particular concern to ISI's researchers. The publications department has two full-time editors to assist in the preparation of proposals, articles, and conference presentations, and to publish and distribute technical reports and manuals. Additional services range from answering questions about document-preparation systems to completely rewriting the transcript of a conference talk into an appropriate form for publication. A full-time graphics designer provides expertise in designing and producing visual materials to supplement text and oral presentations. The graphics department also provides photographic, layout, and drafting support for project research.
STAFF

Keith Uncapher, Executive Director
Thomas O. Ellis, Deputy Director
Robert Blechen, Institute Administrator

Ronald Ayres
B.A., Mathematics, California Institute of Technology, 1974
Ph.D., Computer Science, California Institute of Technology, 1979
Language processing, software and hardware compilers, recognizing
fundamental properties of information as they relate formal and informal
beings

Robert Balzer
B.S., Electrical Engineering, Carnegie-Mellon University, 1964
M.S., Computer Science, Carnegie-Mellon University, 1965
Ph.D., Computer Science, Carnegie-Mellon University, 1966
Transformation-based programming, formal specification, expert sys-
tems, design, informal language

Jeffrey A. Barnett
Methods of plausible reasoning, control structures for AI systems, rep-
resentations of knowledge, theory and development of programming
languages, theory of distributed evaluation, combinatorics

Raymond L. Bates
A.B., Mathematics, University of Southern California, 1973
M.S., Computer Science, University of Southern California, 1980
Specification and verification methods, software production technology,
programming languages

Richard L. Bisbey
A.B., Mathematics, University of California, Los Angeles, 1967
M.S., Information Systems, University of California, Los Angeles, 1968
Graphics

William A. Brackenridge
Wideband communication

Research Staff
Ben Britt
B.S., Electrical Engineering, University of Southern California, 1975
M.S., Computer Science, University of Southern California, 1976
Graphics

Stephen L. Cusmer
B.A., Mathematics, Occidental College, 1973
M.S., Computer Science, University of Southern California, 1976
Real-time multiprocess system design, network protocols, voice and
video bandwidth compression, restricted domain programming

Danny Cohen
B.Sc., Mathematics, Technion, Israel Institute of Technology, 1963
Ph.D., Mathematics/Computer-Science, Harvard University, 1969
VLSI, machine architecture, real-time communication, computer commu-
nication protocols, computer image generation, cockpit information,
fight simulation

Don Cohen
B.S., Mathematics, Carnegie-Mellon University, 1973
Ph.D., Computer Science, Carnegie-Mellon University, 1980
Reasoning, learning, specification languages

E. R. (Randy) Cole
Professional Engineer, Mathematics, Colorado School of Mines, 1967
Ph.D., Electrical Engineering (Computer Science), University of Utah, 1973
Speech processing, image processing, fast signal-processing comput-
ers, computer graphics

Alvin S. Cooperband
A.B., Biochemistry, Harvard University, 1956
M.A., Psychology, University of California, Los Angeles, 1968
Human-machine interaction, user interfaces, personal computing

David Dyer
B.A., Mathematics, Immaculate Heart College, 1975
User interfaces, very large databases

Thomas O. Ellis
B.S., Engineering, University of California, Los Angeles, 1951
M.S., Engineering, University of California, Los Angeles, 1953
Human-machine communication, hardware systems architecture

Lee D. Emran
B.S., Mathematics, University of Michigan, 1966
M.S., Computer Science, Stanford University, 1968
Ph.D., Computer Science, Stanford University, 1974
Architectures for and control of knowledge-based systems, human/
machine expert systems, informal specification, distributed artificial intel-
ligence, speech-understanding systems

Martin S. Feather
B.A., Mathematics and Computer Science, Cambridge University, 1975
M.A., Mathematics and Computer Science, Cambridge University, 1976
Ph.D., Computer Science and Artificial Intelligence, University of Edinburgh,
1979
Methodologies for program development and maintenance, computer-
assisted program implementation, program specification, program trans-
formation

Michael R. Fehling
B.S., Mathematics and Psychology, University of Illinois, 1968
Ph.D., Cognitive Psychology, Stanford University, 1973
Learning and knowledge representation, computational linguistics,
software psychology

Gregory G. Finn
B.S., Physics, Brandeis University, 1973
M.S., Computer Science, University of Southern California, 1977
Computer networking, multimedia message systems

Yasutomo Fukumachi
B.A., English Literature, Ritsumeikan University, Kyoto, 1973
M.A., Linguistics, University of California, Los Angeles, 1980
Natural language processing, linguistics, semantics
Louis Gallenson
BSEE, Electronics, University of California, Berkeley, 1951
1) recall networks, system architecture, terminals, CPU I/O devices, emula-
tions and microprogrammable CPUs

Joel Goldberg
B.S., Chemistry, California Institute of Technology, 1967
M.S., Computer Science, University of Wisconsin, 1969
Emulation and emulation support systems, graphics, distributed comput-
tations

Joel Goldberger
User interfaces, personal computing, distributed networks, office automa-
tion

Neil M. Goldman
B.S., Mathematics, Stanford University, 1969
M.S., Computer Science, Stanford University, 1971
Ph.D., Computer Science, Stanford University, 1973
Formal specification languages, computer aids for program and specifi-
cation synthesis, computer generation of natural language

Dennis Hollingworth
B.A., Mathematics, University of California, Riverside, 1967
Graphics

Andrea Ignatowski
B.S., Computer Science, University of Southern California, 1982 (expected)
Artificial intelligence, knowledge representation, software engineering

Thomas S. Kaczmarek
B.S., Mathematics, University of Wisconsin-Whitewater, 1968
MSEE, Computer and Information Sciences, University of Pennsylvania, 1973
Ph.D., Computer and Information Sciences, University of Pennsylvania, 1977
Knowledge representation, user interface, speech, graphics

Vital Kini
B. Tech., Electrical Engineering (Electronics), Indian Institute of Technology,
Bombay, 1973
M.S., Electrical Engineering (Computer Engineering), Carnegie-Mellon Uni-
versity, 1973
Program verification, programming language semantics, hardware reliabil-
ity, hardware design automation

Steve Klein
B.S., Engineering, California Institute of Technology, 1976
Natural-language generation and understanding, knowledge representa-
tion, VLSI design systems, hardware representation systems

Jimmie T. Koda
B.A., Mathematics, University of Southern California, 1975
Distributed systems, networks, databases

Thomas A. Liptis
B.S., Computer Science, University of Southern California, 1978
Ph.D., Information and Computer Science, University of California, Irvine (in progress)
Automated explanation of expert systems, knowledge representation and modeling in expert systems

Daniel C. Lynch
B.S., Mathematics, Loyola University, Los Angeles, 1963
M.A., Mathematics, University of California, Los Angeles, 1965
Operating system performance analysis and tuning, computer networking, management of advanced computing environments

William C. Mann
B.S., Electrical Engineering, Lehigh University, 1956
M.S., Engineering Administration, George Washington University, 1963
Ph.D., Computer Science, Carnegie-Mellon University, 1973
Natural language processing, artificial intelligence, knowledge representation, linguistics, natural inference
William S. Mark  
S.B., Computer Science, Massachusetts Institute of Technology, 1974  
S.M., Computer Science, Massachusetts Institute of Technology, 1974  
Ph.D., Computer Science, Massachusetts Institute of Technology, 1976  
Representation of inferential knowledge, expert systems

David F. Martin  
(Professor of Engineering and Applied Sciences, UCLA)  
B.S., Engineering, University of California, Los Angeles, 1960  
M.S., Engineering, University of California, Los Angeles, 1962  
Ph.D., Engineering, University of California, Los Angeles, 1966  
Semantics of computation, semantics of programming languages, correctness proofs of programming systems implementation

Ian H. Merritt  
Communications, information systems, telephony and radiotelephony, human behavior

James Moore  
S.B., Mathematics, Massachusetts Institute of Technology, 1964  
Ph.D., Computer Science, Carnegie-Mellon University, 1971  
Natural language, AI/knowledge engineering

David (Jack) McStow  
Ph.D., Computer Science, Carnegie-Mellon University, 1981  
Heuristic program synthesis, transformational implementation, formalizing AI methods that use domain knowledge, mapping behavioral specifications to programs and VLSI designs

Robert H. Parker  
S.B., Electrical Engineering, Massachusetts Institute of Technology, 1969  
M.Eng., Electrical Engineering, Cornell University, 1970  
Communications, human-machine interaction, hardware design

Jon Postel  
B.S., Engineering, University of California, Los Angeles, 1966  
M.S., Engineering, University of California, Los Angeles, 1968  
Ph.D., Computer Science, University of California, Los Angeles, 1974  
Computer communication protocols, interprocess communication, distributed applications

Leroy C. Richardson  
B.S., Electrical Engineering, Carnegie-Mellon University, 1965  
M.S., Electrical Engineering, Carnegie-Mellon University, 1966  
Ph.D., Electrical Engineering, Carnegie-Mellon University, 1972  
Engineering, applications programming

Craig Mile Rogers  
Computer networking, distributed operating systems, programming environments, real-time programming

Steven E. Saunders  
S.B., Electrical Engineering, Massachusetts Institute of Technology, 1972  
Ph.D., Computer Science, Carnegie-Mellon University, 1979  
Design of pocket-size personal computers and their software, flat-panel displays, digital sound synthesis, customized compact interpretive code, authentication and encryption via public-key system

Barden E. Smith  
B.S., Electrical Engineering, University of Utah, 1979  
VLSI, computer-aided design systems, data communications

Allen Stoughton  
B.S., Mathematics/Computer-Science, University of California, Los Angeles, 1979  
M.S., Computer Science, University of California, Los Angeles, 1981  
Protection models of operating systems, semantics of programming languages

Carl Sunshine  
B.A., Physics, University of Chicago, 1971  
M.S., Computer Science, Stanford University, 1973  
Ph.D., Computer Science, Stanford University, 1975  
Computer networks, communication protocol design and analysis, network interconnection

William Swartout  
B.S., Mathematical Sciences, Stanford University, 1974  
S.M., Computer Science, Massachusetts Institute of Technology, 1977  
Ph.D., Computer Science, Massachusetts Institute of Technology, 1981  
Computer-generated explanations of programs, computer-aided program implementation, knowledge representation, knowledge-based systems
PUBLICATIONS 1980 - 1981


Cohen, Danny: See Karplus and Cohen; Postel et al.; Shoch et al.

Cooperband, A.: See Balzer et al.


Crocker, S. D.: See Overman et al.


Erickson, R. W.: See Lee et al.


Erman, L. D.: See Balzer et al.; Lesser and Erman: Smith and Erman


Feather, M. S.: See Balzer et al.


Fickas, S. F.: See Erman et al.


Gillmann, R. A.: See Barnett et al.

Goldman, N. M.: See Balzer and Goldman.


Kameny, I. M.: See Barnett et al.


Kiri, Y.: See Overman et al.


Lingard, R.: See Wilczynski et al.

London, P. E.: See Balzer et al.; Doyle and London; Erman et al.


Mann, W. C.: See Moore and Mann.


Marcus, L.: See Crocker et al.


Moore, J. A.: See Mann and Moore.


Musser, D. R.: See Erickson and Musser.


Postel, J.: See Cohen and Postel.

Sastry, S.: See Klein and Sastry.


Slotz, R.: See Wiczyński et al.


Sunshine, C.; See DICicco et al.; Bochmann and Sunshine, Postle et al.


Tugender, R.; See Wilczynski et al.

van-Mierop, D.; See Crocker et al.


Wile, D. S.; See Ratner et al.

Williams, C.; See Balzé et al.