

Department of

# Computing & Information Sciences

A newsletter for the  
Department of Computing & Information Sciences  
Kansas State University  
234 Nichols Hall  
Manhattan, KS 66506

*Castle Computing*

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## Greetings from the Department Head



Remember that in 1987 I promised that this newsletter would be an "annual" newsletter. Well, we started out that way with very good intentions; but the pressures of the academic calendar have certainly influenced a deviation from that course. With this second "annual" newslet-

ter I will again make that commitment to get it out each Fall because we want to keep in touch with you alumni and friends. Many good things have happened during the past two years. The faculty has grown in size and quality; the undergraduate population has declined nicely; the graduate population has remained about the same; the equipment base has been expanded; and our research productivity has improved both in quality and quantity.

First, let me talk about the changes in the nature

of the Department. For many years we were a little understood discipline with too few professors (10) to do justice to the many majors (approximately 700) in Computer Science and Information Systems. As a result, research productivity was minimal, computing laboratories were inadequate, and we were in an old building. In the past few years, industrial equipment grants (equipment worth \$3 million over a five year period) have established a very good equipment base, the student/faculty ratio has dropped to a respectable 25:1 (we are finally able to do a good job in advising our students and understanding their

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## **greetings, continued**

overall needs), research publications have tripled, and extramural funding has tripled. Furthermore, we feel very much at home in Nichols Hall and have established ourselves as a major thrust of Kansas State University as listed by the Kansas Board of Regents in the Mission Statement for KSU. All in all, it has been very pleasant.

We are now ready to move forward in facing the challenges of the 90's. Our goals are as follows:

We will strengthen our graduate education and research programs with an increase of faculty in the areas of software engineering, programming languages, data base systems, artificial intelligence, and distributed and parallel computing. As a result, the undergraduate curricula will be improved with the additional faculty expertise and resources.

We will provide integrative computing technologies to other disciplines. That is, we will move to integrate our research into the problem solutions of researchers in areas such as physics,

art, engineering, agriculture, economics, etc. Synergistic effects on all disciplines will result.

We will produce knowledge workers for the 21st century, graduates from many disciplines who can enhance the knowledge of their own fields through the power of computing.

We will contribute to the ability of Kansas and the Nation to be globally competitive through improvements in computing theory and technology.

We will build a strong relationship with our alumni and friends in the hopes of enhancing the future of us all.

In 1990, we will celebrate two decades of service to KSU; we will be planning some activities on campus. If you have ideas on how we can keep you involved in these or other activities in the Department, we welcome your input.

Thank you for your many contributions over the years; but more important, "thank you for being a friend".

## **"Older" Students in the Department**

The age grouping for undergraduate classes generally follows traditional patterns, but the trend of so-called "older students" coming to school is holding true for our department. For example, nineteen is the largest age group for freshmen, twenty for sophomores, twenty-one for juniors, and twenty-three for seniors. The average is higher for each class, however. The average age for freshmen is twenty-two, sophomores twenty-three, juniors twenty-five, and seniors twenty-six. During the 1987-1988 school year, our youngest declared major was seventeen, and the oldest was fifty-nine.

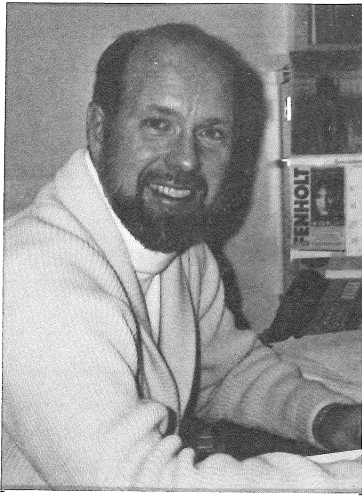
Older students make up a significant percentage of our undergraduates. Older students are defined by the FENIX program as undergraduates twenty-five or older who are starting or returning to school. The FENIX program on campus is de-

signed to provide a support group for those older students. The freshman class has 22% who are twenty-five or older, sophomores 23%, juniors 16%, and seniors 42%, or an overall average of about 26%.

The older students in class generally take their studies very seriously. They may be changing careers, coming back to finish a degree, or perhaps returning to school after not doing well at some earlier time. Studies indicate this age group will become a larger percentage of the undergraduate population as the average age of Americans becomes older and technology forces new work patterns.

For our part, we want to be sure these students have the support and counseling they need to be a success in our program.

## Faculty Profile: Dr. William Hankley



Bill has been a member of the Department since 1972. Before coming to KSU he taught at the University of Utah and did PhD work at Ohio State University (Information Systems and Electrical Engineering) and BS and MS work at Northwestern University (Electrical Engineering). He recalls that he did not have an undergraduate major until he took a programming course at NU (FORTRAN no less), then he found a love of both computing and computing languages. His MS work at NU was on mathematical models of digital control systems. His Phd work at OSU was on image

recognition and a data representation for finger prints. Besides teaching at Utah, he learned about the new area of interactive graphics.

At KSU, many MS and PhD students received admission letters from Dr. Hankley. Bill has worked on the graduate studies committee for over a decade, often serving as chair of that committee. Bill has been active in shaping the graduate curriculum. He started the graduate courses on computer graphics, software engineering, and "programming science", which is about formal specification and verification of programs. He is writing a text about specifications and verification and has just begun using it in the programming science course.

Bill has praises for the CIS Department that there is a harmonious, encouraging spirit, and that the Department delivers a sound education at good economy for the state. He has a goal of teaching that students perceive a view of computing concepts that transcend the short term, job

## Supercomputing in the Department

This fall, we have installed a Scientific Computing Systems SCS-40, a vector computer (super-computer type). It has the capability to execute 40 million instructions per second when the data is represented in vector form. In order to utilize this facility, a researcher describes the solution to a problem in a programming language such as FORTRAN and the compiler for the language converts the program into a form which optimizes the inherent parallelism in vector computations to achieve this high performance. Parallelism in computer programs can be likened to multiple identical assembly lines in a factory. Exactly the same operations must be performed on the items in each of the assembly lines and there is no dependency among the distinct assembly lines. Thus, they can be done in parallel. Problems in molecular modeling, structural and mechanical design and analysis, computational fluid dynamics, simulation and animation, graphics and imaging, scientific visualization, fractal calculations, atomic collisions, mathematics and statisti-

cal modeling, and large data base computations are just a sampling of the types of problems that are amenable to solution only if such computational power is available. Thus a wide spectrum of KSU disciplines can derive benefit from this facility.

The SCS-40 is a Cray X-MP/24 instruction set compatible system which runs the Cray Time-Sharing System (CTSS). A MicroVax II acts as a frontend for the SCS-40 for program preparation. Total data storage in the system is more than one billion bytes (characters). It is available on the KSU campus area network so that any lab or office that has access to the fibre-optic backbone or the data switch can have access to the system.

The installation of this system has been made possible through gifts from Scientific Computing Systems (orchestrated by Frank Carollo) and Xerox Corporation (Bill Spencer - KSU '60). This Computational resource is a significant addition to the research infrastructure of the University.

## Faculty Profile: Dr. Masaaki Mizuno

Dr. Masaaki Mizuno joined the CIS department as an assistant professor in 1987 after completing his Ph.D. in computer science at Iowa State University. "I have been extremely happy here. I like Manhattan, the KSU campus and Nichols Hall. The research environment is very good—in particular, a friendly faculty and staff, excellent students, and expanding computer facilities."

Masaaki is originally from Japan. He received a B.S. and M.S. in Electrical Engineering from Keio University (Japan). "We have good hardware programs in Japan. Most students studying computers have experience in designing and building their own microcomputer systems. Software programs, however,



were not as good (at least when I was a student there)." This made Masaaki decide to come to the U.S. for further study.

He earned an MS in computer science from Pennsylvania State University before entering the Ph.D. program at ISU.

While he was a student at ISU, Masaaki worked

every summer from 1983 to 1986 for several computer companies in Japan. In his work there, he designed a single board Intel 8088 based CP/M-86 machine, an IBM-PC compatible machine, and a Zilog Z80 based controller for a high-speed paper burster. He also worked with a team at an

elevator manufacturer to develop an Intel 8085 based controller for an inverter motor.

He mentioned that his implementation experience in hardware and software, together with his theoretical knowledge he learned at schools is very helpful in teaching and research.

Since joining our faculty, Masaaki has taught undergraduate-level courses in operating systems (CIS 520), graduate-level courses in operating systems (CIS 720), computer networks (CIS 725), and analysis of algorithms (CIS 675). He has also developed a course on the implementation of an operating system (CIS 620), where students read the source code of a working operating system and modify it. He enjoys teaching these courses very much.

Masaaki has journal and conference publications in the areas of computer architecture and operating systems. His research interests include computer security and various aspects of distributed systems. He has developed an information flow control mechanism for modular programming systems. He also works with Dr. David A. Schmidt on theoretical aspects of information flow by applying methodology in programming semantics.

In his research in distributed systems, Masaaki and his students have developed very efficient distributed mutual exclusion algorithms. Currently, his research group is studying concurrency control and recovery issues of transaction based distributed data base systems.

"Because of my engineering background, I tend to emphasize practical aspects of computer science. For good research, however, theory is equally important. A department faculty that is well-balanced in theory and practice really helps my research."

## Nichols Nugget: John Mogusar

John Mogusar, DeSoto, played chess against eight different opponents at the same time during fall 89 registration at Kansas State. Mogusar, a senior in Computer Science, is reorganizing the dormant K-State Chess Club and was playing so many games at

one time to publicize the club. He played about 120 games during the registration period, and lost only 17. He is ranked nationally by the United States Chess Federation.

## Faculty Profile: Dr. Maria Zamfir-Bleyberg



Maria is a native of Romania and received a Diplomate in Mathematics degree (equivalent to an MS in the USA) from the University of Bucharest, Romania. Maria then joined the Department of Mathematics at the University of Bucharest where

she conducted seminars, developing an interest in programming language semantics.

In 1972 she came to the United States as a Fulbright-Hays Scholar to continue her research towards a PhD. After spending one year at UC Irvine, she moved to UCLA to work with Joseph Goguen, an internationally recognized authority in "Initial Algebra Semantics". That was the "turning point" in her research activity. In 1974, Maria returned to Romania and not until 1977 was she able to come back to UCLA in the PhD program.

In 1982, after receiving her PhD, Maria joined the Research and Development Department of the System Development Corporation in Santa Monica, California, where her research activities included the development of a mathematical

model defining the semantics of FDM, a formal specification and verification methodology developed by SDC for complex systems.

In 1984 she returned to UCLA for teaching and research because she missed the stimulation of the academic environment and contact with students. In 1985 Maria attended the first conference on the "Mathematical Foundations of Programming Semantics", which was organized by Austin Melton and Elizabeth Unger in Manhattan. She was impressed by this midwest city, by the pleasant atmosphere and good computing facilities the Computing and Information Sciences Department at KSU offers, and by the high level of research in which many of the faculty were involved. Maria joined the department as an assistant professor in August 1986.

Maria's research activities include three different by interacting areas:

- (i) The use of mathematical models in artificial intelligence applications for the design of knowledge-based systems.
- (ii) The initial algebra semantics approach to software engineering and the theory of computation.
- (iii) Mathematical models of concurrent programming.

She is currently working on an algebraic representation of Petri nets.

## IBM Employees Give Helping Hand to Students

Since 1984 KSU alums who work for IBM have been contributing to the IBM Employees Scholarship Program. We thank each of them for their support of students who may not have had the chance to attend school without a scholarship. As a result of their concern for the future of computing, several students have had an opportunity to pursue a degree in Computer Science and/or Information Systems. We have supported four students who have finished and are out working in

the "real world". In the Fall of 1989, we are providing two students with scholarships from the endowed IBM Employees Scholarship fund. IBM matches their contribution 2 for 1 and the Dean of Arts & Sciences has matched these scholarships with two more. As a result, each \$100 contributed by an IBM Employee generated \$600 of support for student scholarships. Thank you for your support of the "best and brightest" students to attend KSU.

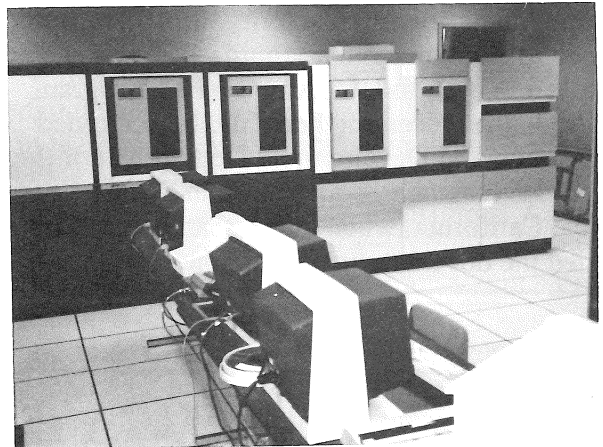
## AT&T Equipment Donations

For several decades these two organizations have had the traditional partnership of the university producing valued employees for industry. However, in 1980 a unique program was started which has further cemented the partnership. A Summer On Campus program in the Computing and Information Sciences Department was initiated for AT&T employees who wanted to pursue a Master of Science degree in Computer Science. These AT&T professionals spend five summers on campus to expand their computing research and development skills. Since AT&T has become a major force in computing and networking, it is important that their employees are trained in the state of the art of computing. Kansas State University also benefits from the program. Because these AT&T students are computing professionals, the faculty, as well as the on-campus graduate students, are continually appraised of the industrial perspective of the state of computing technology. Since 1984, more than 60 M.S. degrees have been granted in this program to AT&T student employees from 18 different AT&T sites across the nation.

This corporate partnership was further enhanced when, in 1986, AT&T awarded computing and networking equipment worth \$300,000 to the Department of Computing and Information Sciences for the support of the undergraduate and graduate software engineering curricula. Six minicomputers and numerous terminals and software were included in the grant. Continuing support was provided in 1987 when AT&T granted Computing and Information Sciences and additional 10 minicomputers, 1 super-minicomputer, 70 personal computers, local area networking, and software to support both research and instruction. These facilities were worth \$1 million and supported the distributed computing research program and expansion of the instructional programs in parallel programming and artificial intelligence. These computing facilities also support the undergraduate instruction program in algorithms, data structures, data base systems, and operating systems. Finally, in 1988 a grant to the Department of Computing and Information Sciences of hardware and software worth \$700,000 brings their support of KSU to \$2 million in three years. These computing facilities are located in Fairchild and Nichols halls; and

they are interconnected by a campus-wide local area network donated by AT&T. This new equipment supports the distributed processing research capability. It also permits us to expand laboratory support for the graduate programs in concurrent programming, software engineering, data base systems, and knowledge engineering. It also supports the beginning programming courses in Computer Science, Information Systems, and Computer Engineering. In all, AT&T has granted KSU 15 minicomputers, 2 super minicomputers, 100 personal computers, several hundred software systems, several local area networks, and a campus-wide local area network. Through this networking facility, faculty and students are able to access national and international research networks, including access to national super computer centers. In addition, AT&T Data Systems in Kansas City provided the support for maintenance of this equipment.

Quality laboratory equipment is a major factor



in providing quality educational programs. This state-of-the-art AT&T equipment is utilized by both graduate and undergraduate students in testing theories that are studied in the classroom. They can experiment with full-scale prototype software systems, thus acquiring "real world" research and development skills. As a result of these computing facilities grants, AT&T has provided laboratories that will be used by several thousand students each year. Industrial support of this kind is essential to a quality educational program. KSU is extremely pleased with its partnership with AT&T.