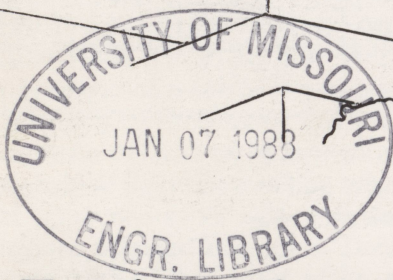
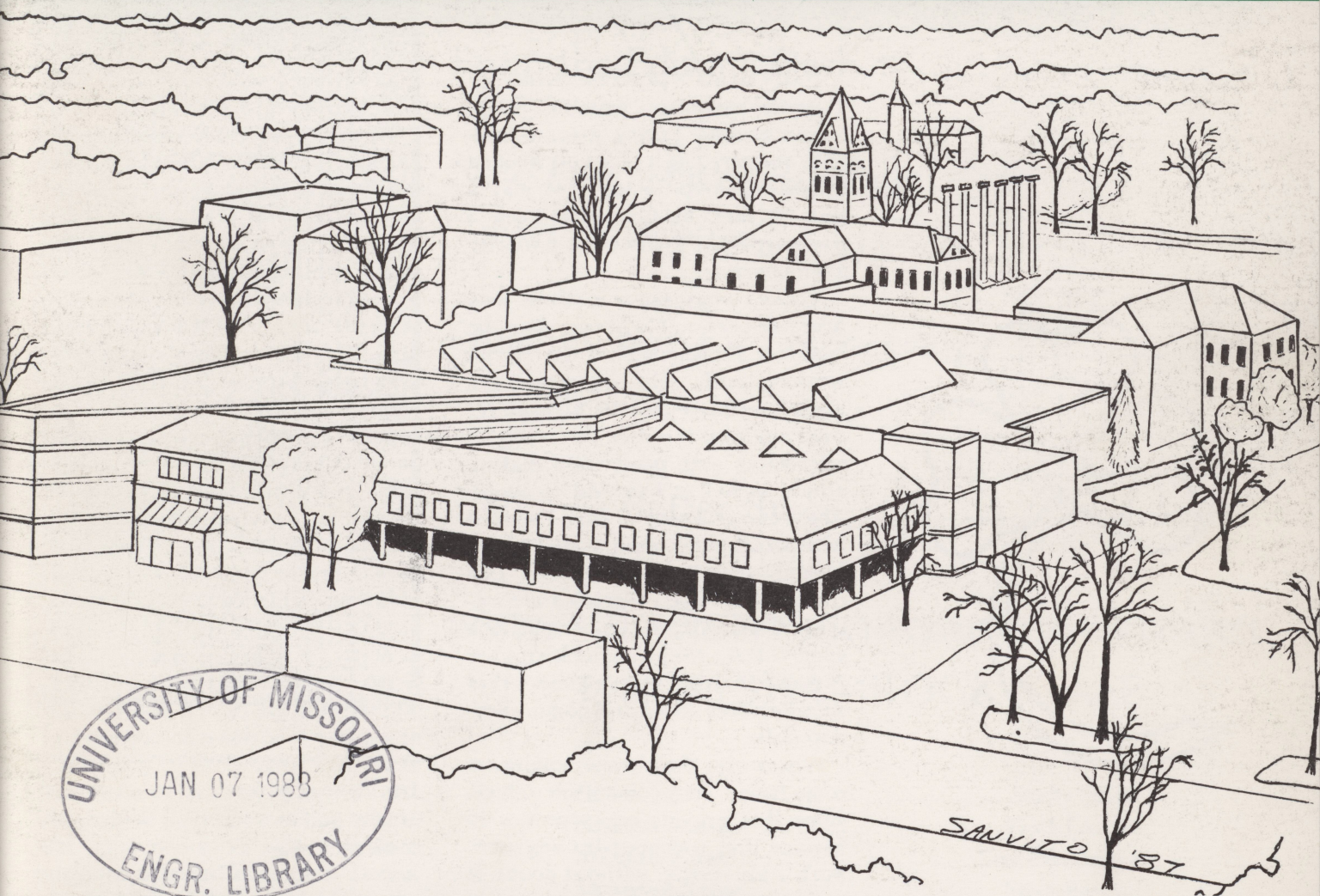


# Missouri Shamrock

The UMC College of Engineering Student Magazine

OCTOBER/NOVEMBER 1987



## Engineering Building Addition

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*from the editor's desk*

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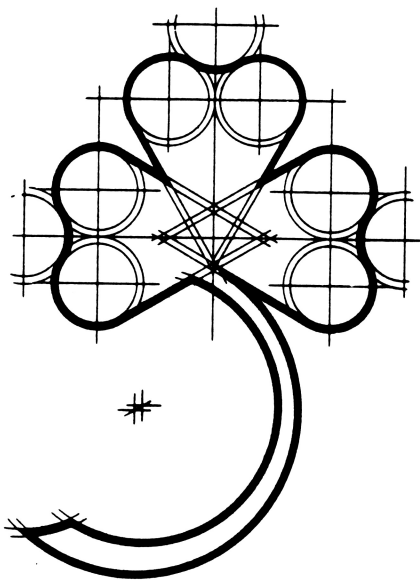
## THE IMPORTANCE OF BEING SOCIAL

Today when a prankster looks for a typical engineer wearing thick-lensed glasses, having greased-back hair, and carrying a slide rule hooked to his belt loop, in order to play a joke on him, he finds that such a stereotype has become the minority in engineering.

Today's engineer is a whole new breed of person. No longer does the engineer remain behind the scenes working with only computers and other inanimate objects. Instead, today's engineer is out in the limelight, interacting with people and making ethical as well as technical decisions. The new engineer is well-rounded with social and communication skills. Indeed, recruiters have seen this change and have responded accordingly. They no longer look for just a good G.P.A.; they now look also for extra-curricular involvement that demonstrates social and communication skills.

Where do these new engineers come from? They come from universities that provide opportunities to become that well-rounded engineer. Such a university, without doubt, is

the University of Missouri-Columbia. Not only does it provide organizations and opportunities within the engineering school with which to get involved; but also, by virtue of the other schools of study within it, it promotes the social atmosphere that provides the opportunity to improve social and communication skills with students outside of the engineering field. This has become very important today because the engineer no longer has to deal only with other engineers in the working world. Now he or she has to deal with others from many different career fields. Therefore the wise engineering student who wants to be well prepared for his future job will take time out of his busy engineering study schedule to get involved with an organization; be it engineering, athletic, Greek, residential, religious, or community; and he or she will not unnecessarily turn down an opportunity to practice social skills by going on a date or to a party. And don't forget to take golf or racketball before you graduate!



Shelly Moats, the editor of the Missouri *Shamrock*, is an electrical engineering junior from Kansas City, Mo. She is a member of IEEE, SWE, and Zeta Tau Alpha social sorority. Shelly's favorite pasttimes include playing volleyball, travelling Europe, and recruiting for the *Shamrock* staff.

Shelly Moats, Editor  
Missouri SHAMROCK

# SHAMROCK

The UMC College of Engineering Magazine

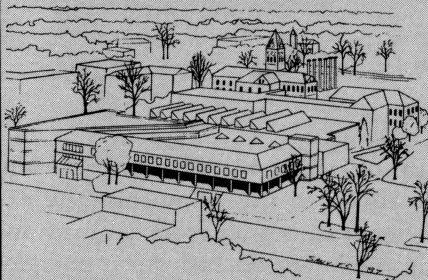
Oct./Nov., 1987

Vol. 81 No. 1

On the Cover

Missouri  
**Shamrock**  
The UMC College of Engineering Student Magazine

OCTOBER/NOVEMBER 1987



Engineering Building Addition

Artist's conception of the new engineering complex.  
See story page 4.

Cover by Steve Sanvito

The Missouri Shamrock is published three times annually (Oct/Nov, Jan/Feb, May/Apr) by the engineering students of the UMC College of Engineering. Opinions stated herein do not necessarily reflect the views of the College of Engineering.

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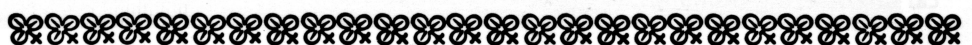
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# NEW ENGINEERING BUILDING: FACT OR FICTION

*by Todd Courtney*

Most people don't realize it, but there is an epidemic running loose on the UMC campus. No, it's not measles, chicken pox, or even AIDS. It goes by the common name of confusion and is caused by the maze of corridors that is contained in the engineering complex. Anyone who has ever attended class in this building knows that it is virtually impossible to find any particular room in less than ten minutes unless you already have an idea of where you are going. But now, after many years of work, the solution is at hand. Dr. John Lysen—director of the Engineering Experiment Station and “coordinator” of the Engineering Lab and Classroom Project, a \$17 million effort to untangle the labyrinth—along with many others, has succeeded in securing funding for the first phase of the construction and renovation plan.

The new complex will be built in two stages. The first stage will consist of the construction of a remote engineering lab, largely for civil engineering, off Highway 63 just south of Columbia. The first stage, also known as priority one, will also include the construction of the new 81,000 square foot building on the parking lot that now stands west of the engineering complex.

In addition to the \$17 million needed for the new building and the renovations, another \$5.6 million will be needed to add a new hydraulics laboratory. This money will also allow renovation of the center sections of the present engineering complex for the industrial engineering department. Furthermore, the money will be used to renovate the Electrical Engineering Building.

Stage two will consist of a renovation of the present engineering complex. Included in the plans is the gutting of the 1892 addition, the section closest to the columns, that currently houses the mechanical engineering office and the dean's office. Long-needed upgrades will make up most of the new structure with a new engineering library at the top of the list. The new library will be nearly three times the area of the current one, allowing for the consolidation of the many books now scattered about the campus. An auditorium will be situated just below the library in the northwest corner of the building, and the dean's office will be moved into the new section, which will also contain new offices for the chemical engineering department.

A computer-aided manufacturing/robotics laboratory is included in the renovation plans for the present mechanical engineering lab, with a vibrations and acoustics lab nearby. Civil engineering has lab and shop areas in the plans, and nuclear engineering will also receive new lab areas.

As previously stated, the 1892 section will be gutted and renovated as

part of stage two. A fourth floor will be added to this wing, but the exterior fronting on Francis Quadrangle will be untouched. After completion, the mechanical engineering department will totally occupy the area.

These are great ideas, but do we have the money? The answer to that is yes and no. The College of Engineering has received \$1.5 million from the state to finalize plans and start construction next year. The University of Missouri has designated the project as its number one construction priority, but the balance of \$15.5 million has yet to be appropriated by the Missouri General Assembly.

If funding comes through for the Engineering Lab and Classroom Project, the new section could be occupied as soon as the summer of 1990, with the renovation of the 1892 wing complete by December 1991. With any luck, the epidemic of confusion will soon be curbed. Not many of the students now in engineering will be able to use the new facilities, but the expansion will undoubtedly raise the overall quality of graduates of the University of Missouri engineering program, a goal to be striven for by the University and the state.

---

Todd Courtney is currently a senior in mechanical engineering with plans to graduate sometime this decade. A member of SAE and ASME, he plans to attend graduate school and then seek a job in the aerospace industry. In his spare time (which is rare) he enjoys catching a few hours of sleep.



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# QUALITY DEAN FOR ENGINEERING AT MIZZOU

by Jeff Dick

The year long search for a dean of the College of Engineering is over. Dr. Anthony L. Hines has accepted the college's top position and has already put in four months of vigorous work. With the new dean comes a positive new outlook for engineering at the University of Missouri-Columbia. Through expanded research and fundraising, Dean Hines plans to bolster Mizzou's budding reputation as a quality engineering school.

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*"No other school in the Big Eight offers the opportunity, tradition, or faculty with which to work with that Missouri does."*

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Dr. Hines comes to Columbia from Oklahoma State University where he was Associate Dean for Engineering Research. A thermal sciences Ph.D., he has also held positions at the University of Wyoming, Georgia Tech, and the Colorado School of Mines.

But why did he choose Missouri? Dean Hines replies, "No other school in the Big Eight offers the opportunity, tradition, or faculty with which to work with that Missouri does."

Dr. Hines withdrew from two dean searches before accepting his position at OSU in 1983. "I wanted to see what a dean actually does administratively before deciding if that was the route I wanted to take," he explains. His experience as associate dean at OSU affirmed his decision to seek the top position. "I enjoyed people and working with them, which is an administrator's primary function."

The new dean also enjoys engineering work itself as much as the people associated with it. "I love the logical problem-solving process of engineering tasks," he comments. This combination of personal and technical affection brings an exciting individual to our campus and equally exciting changes for the engineering program.

"I want to see improvement in the overall quality of engineering at the University of Missouri," Dean Hines states as his primary goal. This will be accomplished by expanding the graduate program and the amount of research done at Mizzou. By intensifying the research base, changes will follow in other aspects of the school. "Instructors who are doing research on the cutting edge of technology are better equipped teachers.

In addition, an engineering school doing timely scientific development gains state and national visibility, which draws quality undergrads to the campus, while feeding even more research into the laboratories."

However, a strong research base must be established before these changes will become evident. This means taking a grossly underfunded program and establishing a firm financial backbone. The College of Engineering grants 13% of UMC's diplomas but receives only 7% of the university budget. The primary financial bolstering will be through the support of the engineering school's 14,000 alumni. "By soliciting contributions from alumni, we can set up more endowed research chairs, graduate research fellowships, and

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*"Teaching is very important, but professors need to do more than just teach."*

---

provide more scholarships for undergrads," Dean Hines outlines.

In addition to alumni support, the

individual department heads have begun to seek more corporate backing. "If we can get a company to say, 'Look at Missouri. They've done good work in the past, let's consider them for this new project,' the program will improve itself," Hines explains. Along with a push for funding and research, the dean is trying to instill another message among the faculty: "Teaching is very important, but professors need to do more than just teach. I am asking all professors to develop a scholarly and creative component as part of their job effort. Such an effort could be manifested through publications, a newly funded research project, or a more creative way to teach an undergraduate course." All of these things will improve the quality of the Mizzou engineering education.

Since taking over on July 1, Dean Hines has been busy presenting these new ideas to the faculty and staff while undergoing orientation to the



Missouri's new Engineering Dean, Dr. Anthony Hines, gets acquainted with his new staff members.

---

*"Oh, I've been over to Brewer to play hoops a few times, and I work out pretty regularly."*

---

new position and university. In addition he is also supervising two graduate students who are doing theses in his specialty, mass transfer.

Along with the new job comes a new town. "My family is thoroughly enjoying Columbia," Dr. Hines comments. His wife Jo Ann, a former school teacher, has been getting the family settled while her husband has

---

been getting things rolling on campus. Their youngest son Mike, a senior at Rockbridge High School, has made an easy transition. The Hines' have another son and three daughters who have already left the nest to pursue their own interests.

Does all this work leave the Dean any free time? "Oh, I've been over to Brewer to play hoops a few times, and I work out pretty regularly," he

says. Also, the coming months are some of the dean's favorites as he is an avid hunter. Don't be surprised to see the guy who is usually wearing a suit and tie beating through the backwoods of Missouri in coveralls searching for an elusive deer. What you won't see is UMC's curators looking for an engineering dean. The new dean has been found after a long, but successful search.

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Jeff Dick is a mechanical engineering major from Jamestown, North Dakota. Yes, there are people in North Dakota. As Copy Editor for the *Shamrock*, Jeff hopes to seek some relief from the numerical maze of engineering problems.

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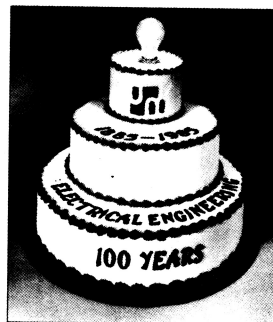
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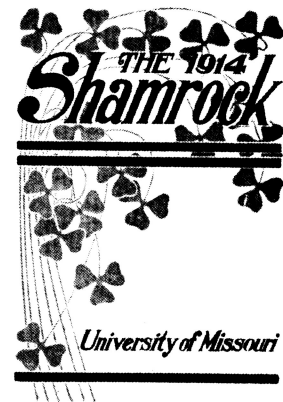
# Help Keep The Tradition Growing . . .



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# FINDING A BETTER BRACE

*by Steven Sanvito*

Engineering students are often told by their professors that the goal of an engineer is to improve the quality of life. Many students find it difficult to keep this far-reaching goal in mind as they face the pressures of their everyday coursework. It is very inspiring, therefore, to find someone putting this goal into practice. One such person is Dr. William L. Carson, professor of mechanical engineering.

For the past four years, Dr. Carson has been researching stabilization techniques for people with fractured spines. In the past, people who suffered with a fractured spine were confined to a body cast for six months. The goal of Dr. Carson's research is to provide a brace which will allow patients to lead more normal lives during their recovery period. Such a brace can reduce a patient's hospital stay to just one week!

Dr. Carson currently has three students working with him. They are Marcia Arendt, Elizabeth Lund, and Bobbie Ridgely. To date, five stabilization devices have been tested and evaluated, and testing is currently in progress on two more devices. These braces are sent by medical companies to Dr. Carson for analysis. He then points out the problems and weaknesses of the devices and often suggests modifications.

The testing of these devices is done on an Instron tensile tester in Dr. Carson's lab. This machine gradually subjects the spine to a specified force. Calf spines are used to simulate human spines. After the spine has been placed in the tester, the brace is secured by screwing it directly on-

to the vertebrae. A specially designed load frame allows the spine to be subjected to five different modes of loading. The five load modes are: axial loading, forward flexion, lateral bending, extension, and torsion. These different modes duplicate the stresses on the patient's spine during normal everyday activities.

Once the spine has been loaded, travelling microscopes are used to measure the relative motion of the vertebrae. This relative motion is described by three linear displacements and three angular displacements. The ideal brace would be one in which all displacements are zero when the maximum load is applied. According to Dr. Carson, "an interactive computer program named SSIE (Spine Stabilization Instrument Evaluation) was developed to accept the coordinate data" of the vertebrae. The program creates a data base of results for each test and calculates the three dimensional linear and angular displacements within the fractured vertebra. "A VHS color video system was used to produce visual records of all tests." These color graphics allow Dr. Carson to "pictorially present the results so they can be easily interpreted."

Despite the high-tech equipment used in his research, Dr. Carson finds that less sophisticated techniques can be very useful. He says that he often secures the braces to wooden blocks which represent vertebrae. He then twists the blocks with his hands to see if any motion takes place. This technique allows him to see if there are any fatal flaws with the brace before placing it in the tensile tester. Also, an electric power drill has been rigged to the tensile tester to produce a torsional force on the spine.

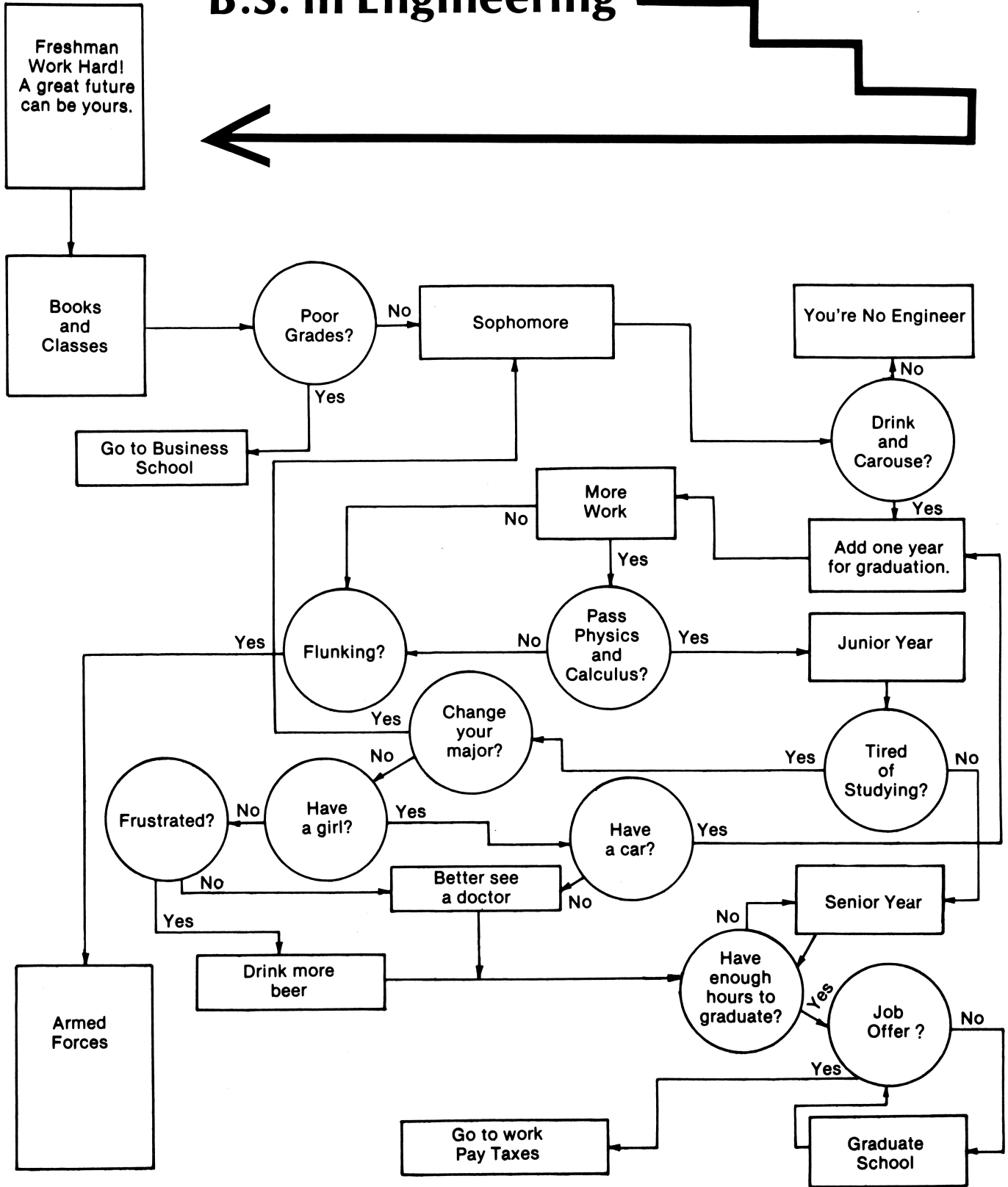
One of the braces which Dr. Carson has tested is the Kaneda Device. The device had been sent to him from Japan by Dr. Kaneda, the designer of the brace. This past summer, Dr. Kaneda traveled to UMC to visit Dr. Carson's lab. Modifications for the brace were suggested by Dr. Carson. He is now testing a device called the Kaneda Device Transfixed.

While no brace has been found to be ideal, several of them provide adequate stability. Many braces are in use today, allowing people to avoid the inconvenience of being confined to a body cast. The research continues, however, to find a more stable brace.

---

A native of St. Louis (Go Cards!!), Steve Sanvito is currently the Managing Editor of the *Shamrock*. Steve plans to graduate this December in mechanical engineering, assuming he lives that long. When he's not hitting the books, Steve would rather be rock climbing. Au revoir, Mizzou!

# B.S. in Engineering



—Reprint from USC Engineer

A Message from Jack Sandridge, P.E., President

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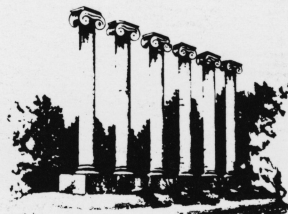
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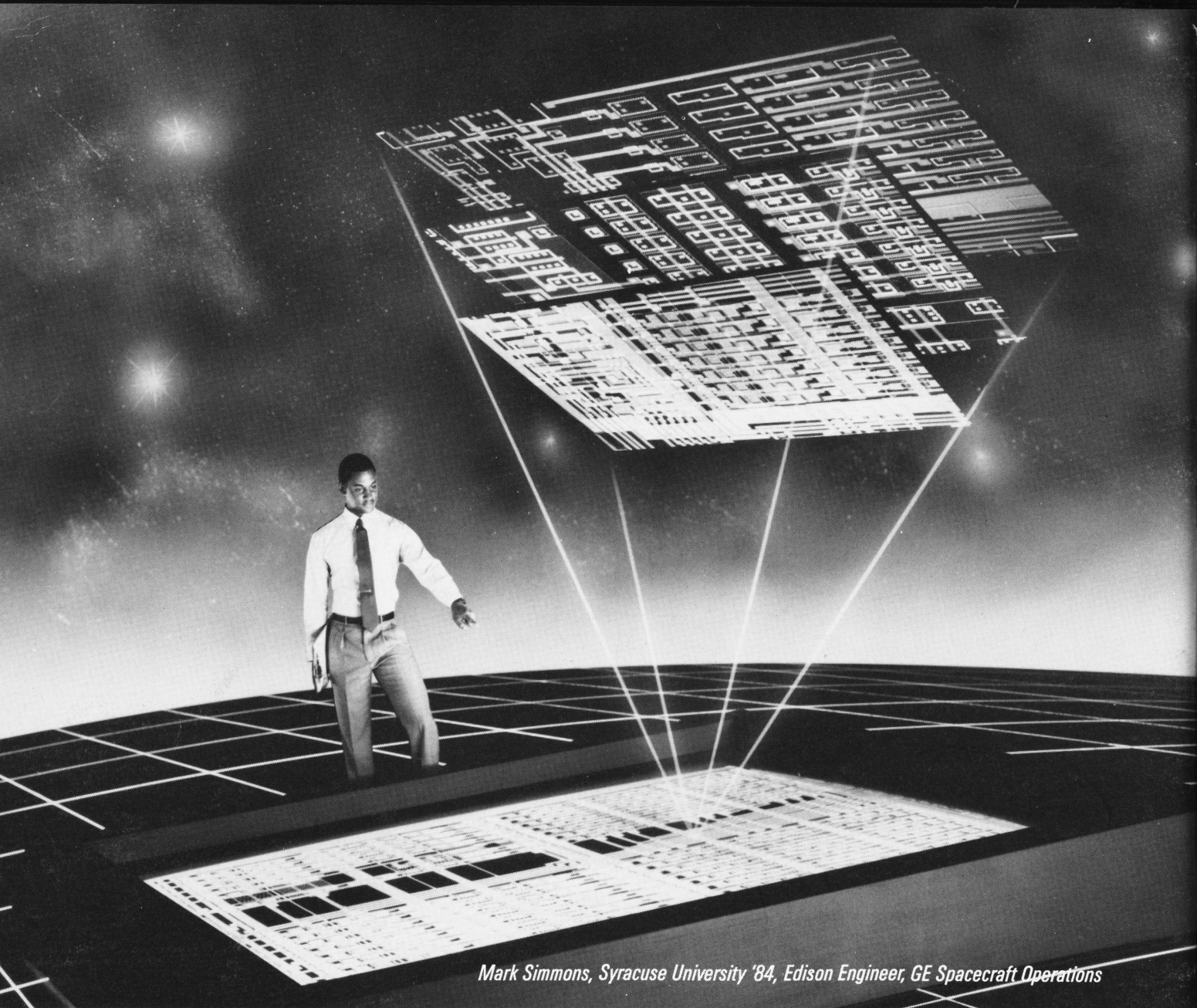
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The UMC College of Engineering Student Magazine

FEBRUARY/MARCH 1988



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# ENGINEERS' WEEK 1988

## UNIVERSITY OF MISSOURI-COLUMBIA

### SCHEDULE OF EVENTS

#### Saturday, February 27

9:00 am

Road Rally (Engineer Parking Lot RC-5)

#### Sunday, February 28

10:30 am

Volleyball Tournament (Rothwell Gym)

#### Monday, February 29

10:40 am

Shillelagh Hunt Begins

1:35 pm

Campus Stunt (Francis Quadrangle)

7:00 pm

Fun & Frolics/King Skits (Middlebush Auditorium)

#### Tuesday, March 1

All Day

S-PAC '88 (Memorial Union)

All Day

Professor-for-a-Day

11:45 am

Luncheon (Memorial Union Room N208)

3:00 pm

Egg Catapult (Engineer Bay Area—0085)

#### Wednesday, March 2

All Day

Professor-for-a-Day

11:45 am

Luncheon (Memorial Union Room N208)

7:00 pm

Beard Contest (Middlebush Auditorium)

7:30 pm

Queen Skits (Middlebush Auditorium)

All Night

Bar Night (Field House)

#### Thursday, March 3

3:30 pm

St. Pat's Bar-B-Que (Sunrise Optimist)

#### Friday, March 4

1:00 pm

Alumni Registration (Engineering Building Lobby)

5:00 pm

Knighting Ceremony (Francis Quadrangle)

-----

Honor Awards (Holidays Inn-Windsor I, II)

6:30 pm

Reception

7:15 pm

Banquet

6:30-9:30 pm

Lab Exhibits (EE & Engineering Buildings)

#### Saturday, March 5

9-11 am

Alumni Registration (Engineering Building Lobby)

9-10 am

Coffee & Donuts (Croft Lounge)

9 am—1 pm

Lab Exhibits (EE & Engineering Buildings)

10 am—12 pm

Engineer Alumni Association Meeting (1035 Engineer)

12:15 pm

Alumni Luncheon (Memorial Union Room N214)

2-4 pm

Green Tea (Chancellor's Residence)

9 pm—1 am

ST. PAT'S BALL (Days Inn)

10:30 pm

Coronation

Questions? Call Brian O'Donnell 474-2811 (St. Pat's Board Chair)

# SHAMROCK

The UMC College of Engineering Magazine

Feb./Mar., 1988

Vol. 81 No. 2

## On the Cover

Missouri  
**Shamrock**  
The UMC College of Engineering Student Magazine

FEBRUARY/MARCH 1988



Shelly Moats, electrical engineering, and Lynn Heisel, mechanical and aerospace engineering, show their spirit for the 1988 Engineers' Week. See Engineers' Week article page 12.

Cover photo by Ed Szczuka

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## SHAMROCK Heritage

"The students get the SHAMROCK;  
The College gets the fame;  
The printer gets the money;  
and the Staff gets the blame."  
—1931 SHAMROCK

Recently, while going through the files and backlog in the Missouri SHAMROCK office, I discovered old SHAMROCK issues dating back as early as 1909. Some staff members and I skimmed through the issues out of curiosity, and we were pleasantly surprised and entertained by the content. To look at these aged issues was like looking into the minds of engineers of old—a trip back in time, if you will. The old issues contained humorous cartoons, poems, sayings, names and pictures of the Knights of St. Patrick grouped in their engineering departments, mind teasers, histories of the Engineering College and the Saint Patrick tradition, coverage of the Saint Patrick Celebration, and much more. As editor, I knew that the SHAMROCK magazine dated back to 1906, and I also knew much of its other history; but to actually see the old issues, to touch them, and to read through them made me and the Staff appreciate its history and tradition all the more.

The SHAMROCK of old is a vener-

able representative and voice of the engineering students at the first university west of the Mississippi River—The University of Missouri-Columbia. (Sorry, Rolla, you're just a "young upstart" on this side of the Mississippi.) The Missouri SHAMROCK of today strives to continue that standard and prestige in a similar manner. By doing this, the Staff and I hope to bring some of the sense of tradition and history appreciation to you while we continue to build upon the SHAMROCK's strong foundation. If you want to be a part of this tradition, join our staff. The Missouri SHAMROCK publication is diverse enough to utilize talents of many types besides that of writing.

Read and enjoy the articles, old and new, within this issue. But while you are reading this magazine, remind yourself that you are not holding just another publication in your hands. You are holding the Missouri SHAMROCK—a piece of your Engineering College career, a piece of the Engineering College heritage, a piece of the Columns.

*Shelly Moats*

Shelly Moats, Editor  
Missouri SHAMROCK



Shelly Moats, the Editor of the Missouri SHAMROCK, is an electrical engineering junior from Kansas City, Missouri. She is a member of IEEE, SWE, and Zeta Tau Alpha social sorority. Shelly's favorite pastimes include travelling Europe and recruiting for the Missouri SHAMROCK Staff; and although Shelly has a hectic schedule, she finds time to do things like compete in the Miss Missouri-U.S.A. Pageant.



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# Engineering Student Council: A NEW BEGINNING?

*by Todd Courtney*

In the Engineering Student Council Constitution, the preamble states that "as a means of promoting student identification with the University of Missouri-Columbia, College of Engineering, . . . there shall be established an elected Engineering Student Council." But if you ask the average engineering student about ESC, he will probably respond that he didn't know such an organization existed. That ignorance is something the new leadership of ESC wants to eliminate, in hopes of providing a better representation of student opinion to the administration.

In the past, ESC has suffered not only from the extreme lack of membership, but also from apathy among its leadership. That is not to say that all members of the Executive Committee were slack in their duties to the students, but many of them were looking more for a resume booster than a chance to make a difference.

Now the situation is looking better, not only for students, but also for the College of Engineering in general. Rob Jones, a senior mechanical engineer, was elected to the presidency of ESC in December in order to finish the term of Kevin Ratliff who graduated. Also elected in December were: John Swope, secretary;

Tim Koenig, treasurer; Brian Heath, publicity director; and Todd Courtney, vice president. As a graphic example of the lack of ESC membership, it should be noted that all five members of the Executive Committee are mechanical engineers.

Already a membership drive is being initiated to help eliminate the lopsided representation. At the time of this writing, ESC has only a handful of members. By publication time, the problem should have abated somewhat; but new input is needed at all times. In fact, elections will be held again in March.

According to enrollment figures from fall semester 1987, the College of Engineering had 2017 students. A breakdown of this number reveals that a total of thirty-six delegates to ESC are allowed by the constitution, in addition to the five members of the Executive Committee. Agricultural engineering is entitled to one representative; industrial engineering is allotted three; civil, chemical, computer, and undecided engineers can have four each; electrical and mechanical are allowed five each. In addition, three freshmen and three graduate students are to sit on ESC. Obtaining all forty-one representatives will allow ESC to staff its standing committees

and have extra manpower for any needed special committees.

The problem with membership seems conquerable, but what about tackling the administration? As Rob Jones says, Dean Anthony Hines "seems very eager to work with ESC to bring about improvements." In fact, Dean Hines has expressed his desire to establish a "close working relationship." He has also been very good about trying to answer any questions that ESC may have, and has been scheduled to field questions at some ESC meetings, which are open to the public.

All these factors have contributed to an enthusiasm within ESC that hasn't been seen for many semesters. One of the projects in the works is a program to allow student involvement in teacher evaluation. It is hoped that student representatives from each department will read the end-of-semester evaluations and make specific recommendations concerning each class.

Another possible reform concerns the cancellation of classes. Dean Hines was forced to cancel over thirty classes for winter semester 1988 due to low enrollments. "Cutting classes is a good reason for representation. People didn't try to express their

opinion in a constructive manner, such as through ESC," says Jones. ESC is seeking to establish a program to help departments plan classes in order to avoid as many cancellations as possible, while still offering an interesting array of electives.

Another proposal involves distributing questionnaires to graduating engineers for an evaluation of the College of Engineering as a whole. One year later, these same engineers would receive a follow-up quiz in an attempt to find out what classes and experiences aided them the most in their transition to a working engi-

neer. ESC hopes to be able to improve curriculum and teaching methods in this way.


As expressed by Rob Jones, lack of action by ESC in the past has promoted a "general feeling of apathy among students, because they can't see anything being done for them. The purpose of ESC is to gather student opinion and take it to the Dean. I feel that our combination of a new Dean, new blood, and new ideas will allow us to change the College of Engineering for the better, in a number of ways."

---

Todd Courtney is currently a senior in mechanical engineering (yes, people *do* live through it). As vice president of ESC, treasurer of ASME, and Technical Editor of the *Missouri Shamrock*, he doesn't have much spare time. But when he finds some, he will find something to occupy it.



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# *Computer Vision*

## A LAYMAN'S APPROACH

*by Patrick Nasiatka*

During my senior year in high school I visited the UMC School of Engineering. Between lunch and visiting with Dr. Devaney that day, I had the opportunity to explore the Electrical Engineering building. While investigating the laboratories and classrooms on the second floor my attention was drawn to a sign which read "Computer Vision Laboratory." I was rather surprised, for I thought M.I.T., Stanford, and Carnegie Mellon University were the only ones with the vision laboratories. I was curious to see what went on in this lab, but it was not until recently that I was finally able to see this lab and the person responsible for much of the research, Dr. James Keller.

The head of the Computer Vision

Laboratory and specialist in the area is Dr. Keller, a UMC mathematics alumnus. Although he is without an engineering degree, his Ph.D in mathematics combined with his past exposure to the engineering field is an ideal combination for computer vision. During the mid to late sixties a program known as the Bio-Engineering Advanced Automation Program was born which analyzed medical images through the use of a computer. Dr. Keller joined this program in the mid seventies. This program, however, was disbanded, but its remnants were absorbed by the Department of Electrical Engineering in 1981. When not doing research with other faculty members, Dr. Keller teaches many classes

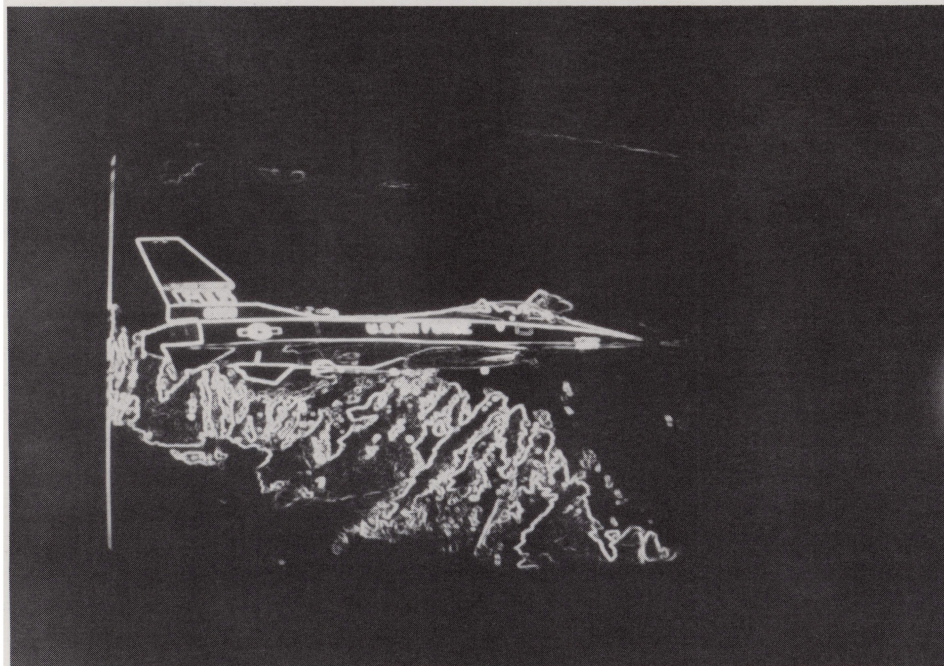
related to computer vision including ones about Digital Image Processing, Pattern Recognition, and Artificial Intelligence.

### COMPUTER VISION

According to Dr. Keller, computer vision is "that area of computing which is geared towards automatic interpretation of visual images." But it is important to note that other images can be analyzed including infrared, color, X-rays, and even ultraviolet images. Computer vision does not end there; it encompasses many more areas such as mathematical modelling, algorithm development, and the study of object representation in particular environments.

Visual interpretation also embraces many other fields because of its unique processing requirements. To understand some of the requirements for processing images consider this: in a medium resolution picture of  $512 \times 512$  pixels (picture elements), there are over a quarter of a million points to be analyzed! Even now, in a world dominated by super-fast computers, vision is still hampered by some of today's technology. It is here that other fields of engineering come into play. On the hardware side, new computer architecture needs to be developed in order to process the massive amounts of data, while, custom VLSI chips need to be explored as possible replacements to current IC's. Other promising technology being explored include parallel processing and neural networks. Engineers and computer scientists are also needed in order to develop new algorithms and routines for the process of interpretation of visual images.





### INTERPRETATION

The main element of computer vision is in the interpretation of objects, whether visual or otherwise. Currently there are numerous techniques to interpret images mainly through the use of pattern recognition techniques which include image or template matching and edge detection.

Template (or image) matching can be thought of as merely looking for the same picture of the object stored in the computer's memory. The idea behind this process is that the com-

puter takes a digitized picture of an object and then searches its own memory until it finds the *exact* duplicate of the digitized object. This system of interpretation has proved very effective, however, the limitations include: 1) the domain of the objects being limited, and 2) this system is often hampered by the speed of the computer's memory search.

One of the basic problems in computer vision is figuring out where one object ends and another one starts. In response to this, edge-detection algorithms have been devel-

oped to determine the edges. This method of interpretation can be used to search for distinguishing characteristics of an object. However many problems hamper general-purpose edge detection including:

- 1) Shadows (Shadows are often times perceived as the edges of an object.)
- 2) Vertex Orientation
- 3) Hidden Lines
- 4) Colors (An edge-detection program will consider a change in color to signify the edge of an object.)

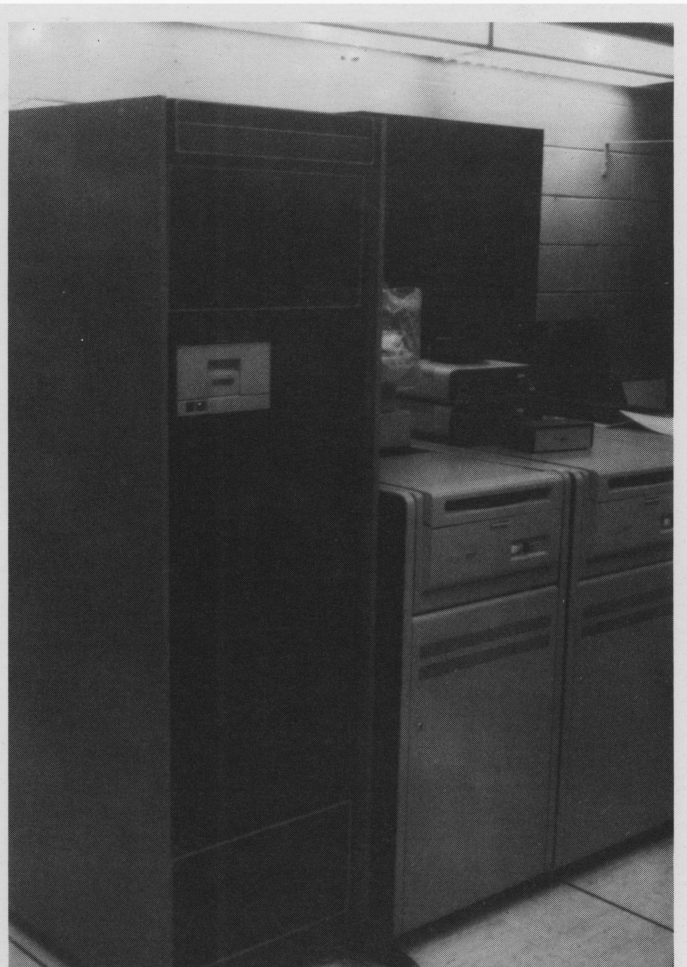
Other techniques being explored include: 1) analyzing the same image from two different angles, thus providing information on depth perception, and 2) combining laser range measurements (also providing depth perception) and combining that information with a visual image.

### UMC FACILITIES

As stated before, the computer vision lab grew out of the Bio-engineering Program, but since that time the lab has grown considerably. The current systems in this lab include:

- 1) Concurrent 3210 processor system: Lexidata 3400 image display processor  
Spatial Data Digitizer with black and white camera  
Various graphics input/output devices
- 2) VAX 11/780 processor system  
VICOM VDC image processor system  
Graphics input device
- 3) IBM AT system  
Image Technology image processor

What sets these computers apart from the average personal computer is their speed, their 'number crunching' ability, software, and price. A typical vision research station includes a camera, a digitizer, and a computer. The Vicom system consists of a camera and a digitizer, but it also includes an array processor and high-speed data bus, along with specialty software (including edge-detection software.) In addition, numerous printers and plotters are available for hard-copies. Current



funding for the lab includes three grants, one of which is a \$79,000 grant from the U.S. Air Force. The purpose of the latter grant is to enable an Air Force jet to distinguish an enemy object (e.g. tank) from other objects. However, an unusual problem must be solved; that problem is distance. The Air Force jet is not 100 meters away from the object, but, rather, many kilometers away. Thus a picture that would be analyzed can sometimes consist of just a handful of pixels.

#### THE FUTURE

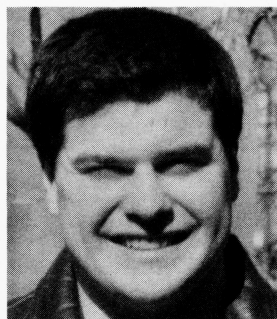
Computer vision is still in its infancy with much basic research needed. However the UMC's vision laboratory, under the careful eye on Dr. Keller and his colleagues, continues to push the frontier of this emerging technology even farther. Recently, a grant was submitted to the National Science Foundation for over one million dollars. This infra-

structure (as it is named) would include money for equipment, personnel, and and maintenance. Hopefully, this grant will be accepted, thus strengthening UMC's role in computer vision research.

Articles:

"Computer Vision", *IEEE Potentials*  
Vol. 5 No. 4 Dec. 1986

Mishkoff, H. *Understanding Computer Vision*, Texas Instruments 1980



Patrick Nasiatka, a native St. Louisian, is currently a freshman who hopes to get a degree in computer engineering. For his study breaks he enjoys reading, using computers, and watching basketball games. He is currently the Production Editor for the Missouri SHAMROCK, a member of the Engineering Student Council, and is active in the Engineers' Club.

# Ascend

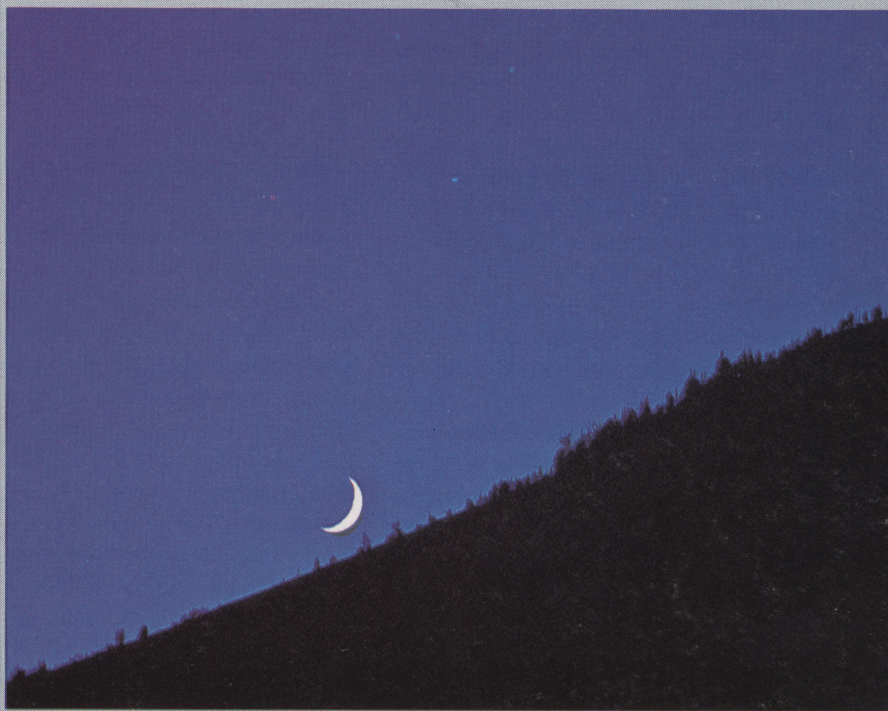
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# JOB SEARCH

by Tom Luebbering

Careful planning and research. These four words sum up the necessary steps involved in a successful job search. By carefully planning your job hunt and researching all your options, you will not only learn more about your own career objectives, but also you may greatly improve your chances of landing the "perfect" job.

Whether you are seeking summer employment or a life-long career, the first step in your job search should be to decide on a career path. Engineering is a diverse field with opportunities in various areas including research, design, manufacturing roles, marketing, and management. Employers will usually specify which departments they are hiring for and will expect you to show an interest in working for that department. If you state on your resume that you are only interested in research and design, it is doubtful that you will be considered for a sales position. Also, it would be futile to apply for a research job with a company that does not perform its own research. The *CPC Annual* provides a good summary of job opportunities with engineering related companies and is available at the engineering placement office.

If you are undecided about a career choice, start researching your options as soon as possible. Several good sources of job profiles and career information are *The Dictionary of Occupational Titles* and *Business Week's Guide to Careers*. Both are available at Ellis library.

Once you are familiar with your career options, you should compile a list of companies that provide job opportunities that appeal to you. A few large corporations such as IBM, AT&T, Texas Instruments, and McDonnell Douglas provide opportunities for employment in many areas, while small companies may concentrate on fewer disciplines.

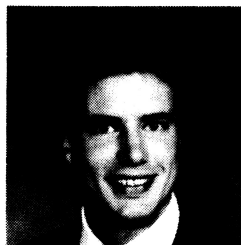
The next step in your job search should be to arrange interviews with the companies you are most interested in working for. Each semester the engineering placement office compiles an interview list which includes the names of visiting companies, dates and times of interviews, and company hiring requirements. If you are not familiar with the placement office or the interviewing process, you should take the time to meet and talk with one of their counselors before you begin your job search. Many of the companies interview at several campuses a week and may visit UMC for only a few days. So do not wait too long because you may miss an important interview.

The final step in your job search is to prepare yourself for the interview. An excellent article on the art of interviewing is *Interviewing: The Inside Story from a College Recruiter*. The article is written by John L. LaFevre and is reprinted in the *CPC Annual*.

Although interview preparation involves many steps, the most important of these steps is to research the company. By taking the time to study the hiring company, you show the interviewer that you are an enthusiastic person who is genuinely interested in working for his company. You also provide a common topic for conversation which can transform a stressful interview into a comfortable one.

To begin your research, visit the engineering placement office and read the literature provided by visiting companies. Other good sources of company information are the *Peter-son's Annual Guides* and the *Standard and Poor's Register*. When researching the companies, try to find information that will give you an advantage in the interview. Vital information could be company growth records, summaries of new products or services, and financial health data. Try not to limit yourself to information that "anyone" could find.

Once you have completed the above steps, you should be prepared to seek out the right job for you. But don't get too discouraged if you don't get an offer after every interview. There are no guaranteed ways of finding a job every time, but through careful planning and research, you can greatly improve your chances.



Thomas Luebbering is an electrical engineering major from Jefferson City. He survived Professor Vredenberg's 256 class so he will graduate in May. After graduation he plans to enter law school at the University of Texas and pursue a degree in patent law.

# BULLARNEY AND PONDERABLES

Compiled by Mark Chan

While cleaning up the Missouri SHAMROCK office, the editor and I stumbled on some old issues of the SHAMROCK. Here are some reprints.

Inside a 1926 article was a cartoon drawing of a man (obviously intoxicated) holding on to a light pole. Under the drawing was the caption. "Electrical under full load condition." Obviously then, as now, engineers were one of the "wettest" crowds.

A 1946 joke goes like this:

Freshman: I want a girl who is beautiful, intelligent, quiet, thoughtful and who doesn't smoke, drink. . . .

Senior: That's easy. Just stand behind the Journalism Building and when the girl you described comes by, those concrete lions will stand on their hind legs and roar.

In the 1956 Bullarney section is an explanation of the "theory of limits" by a Professor to his students. "Assume that you have called on a pretty woman. You are seated at one end of the divan (sofa) and she is seated at the other. You move halfway toward her. Then you move half of the remaining distance toward her. Again you reduce the separation distance by 50 percent. Continue this for some time. Theoretically you will never reach the girl. On the other hand you will soon get close enough to her for practical purposes."

A 1956 joke goes like this:

Chem E: "What would you say if I stole a kiss?"

She: "What would you say to a guy who had a chance to steal a car but only took the windshield wipers?"

Some 1960's jokes are reprinted below:

Professor: "Well, what did you think of the course?"

Chem E: "I thought it was very well covered. Everything that wasn't covered during the semester was covered on the final."

ME Prof: "If you were at the top of a tall building, how could you measure the height, using a barometer?"

Student: "I would tie a rope on the barometer, lower it to the ground, and then measure the rope."

Student: "But professor, isn't this the same exam you gave last year?"

Professor: "Yes, but I've changed the answers."

Student: "What's the hurry?"

Engineer: "I bought a new textbook and I'm trying to get to class before the next edition."

The engineer was out with a flirt, and when his buddy left the table to buy a paper she pursed her lips invitingly and leaned across the table toward her date and, putting her face against his, whispered, "Now is your chance, darling." Glancing around hastily, the engineer muttered, "So it is!" and quickly leaned over and drank his buddy's beer.

Reviving yet another tradition, we present Ponderables, a series of brain teasers. Answers will be in the next issue.

A) Each of the letters in the equation below stands for a digit from 0-9. No digit is used twice. Solve the equation.

$$\begin{array}{r} \text{DONALD} \\ + \text{GERALD} \\ \hline \text{ROBERT} \end{array}$$

Hint: D = 5

B) Using six line segments of equal length, create four triangles of equal area.

C) Using six line segments of equal length, create six triangles of equal area.

D) You have eight poker cards lying face down in the positions shown on the diagram below. Find out what card is in the position of the "X". You must observe the following rules:

1) You have two Aces, two Kings, two Queens and two Jacks.

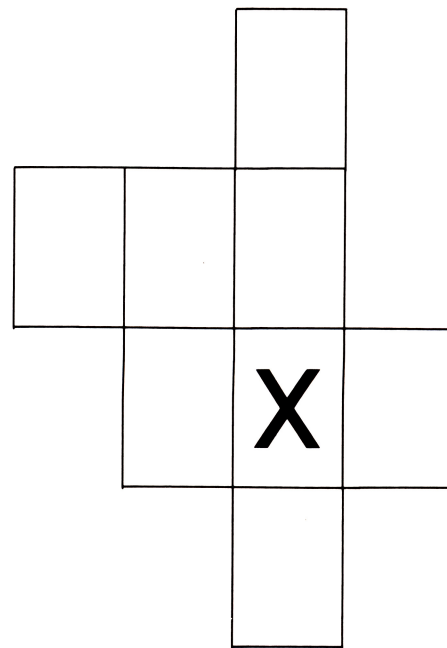
2) Every Ace must border a King. (Corners do not border)

3) Every King must border a Queen.

4) Every Queen must border a Jack.

5) No Queen may border an Ace.

6) No two cards of the same kind may border each other.



# ENGINEERS' WEEK AT MIZZOU

by Mark Chan

Spring is approaching and once again it is time to celebrate Engineers' Week at Mizzou. For those of you who may not know too much about this time honored-tradition, Engineers' Week is an eight day festival where engineers at UMC celebrate their pride of being engineers and, in general, party their tails off. There are a lot of exciting and interesting activities throughout Engineers' Week, but before reviewing them, I would like to present a short history of Engineers' Week.

Engineers' Week is celebrated at different places and at different times all over the country. However, the very first Engineers' Week started right here at the University of Missouri-Columbia in 1903. (*Yes, the somewhat well-known St. Pat's Week at the University of Missouri-Rolla is just a takeoff of our original celebration.*) In 1903, engineers had to attend class six days a week. One day in March, spring fever hit a group of engineers who promptly decided to ditch their classes for the day. Skipping class back then was almost a hanging offense, so to stay out of trouble, the intrepid engineers decided to make that day a holiday. St. Patrick's day was pretty close to the day these students missed class, so these founding fathers "discovered" the fact that St. Patrick, the patron saint of Ireland, was also the world's first engineer. The "discovery" went something like this: Legend has it that St. Patrick drove the snakes out of Ireland. (Snakes were probably pretty pesky in Ireland before St. Pat got there.) Well, a snake is nothing more than a big worm, so St. Patrick drove worms out of Ireland. This made St. Patrick the creator of the first worm drive, which coincidentally happens to be a mechanical engineering device used to transmit motion. Therefore St. Patrick was the world's first engineer, and

thus became the patron saint of all engineers.

Faced with such irrefutable evidence, the engineering students and faculty at UMC in the early 1900's had no choice but to celebrate their patron saint's holy day. This tradition has continued ever since, and the fame of Mizzou's St. Patrick/Engineering Celebration soon spread throughout the nation.

Now, in 1988, St. Patrick's Day has grown into Engineers' Week. Engineers' Week is the perfect time to meet new people in your field of interest, and the numerous activities will give you plenty of chances to go out and just have fun. As promised, here is a chronological listing of all the activities of Engineers' Week 1988. Everyone is welcome to participate, so join in the fun and carry on the tradition of St. Patrick!!

## **SATURDAY, FEB. 27: ROAD RALLY, ROAD RALLY PARTY.**

The Road Rally is a free for all car race among all entering teams. Each team starts out in a car with nothing more than a few sheets of clues. These clues, solved in sequential order, plot out the race course. Prizes are given out for various categories such as best time, best decorated car, worst time, bravest team (last year's winners in this category drove through the muddy course on a motorcycle), and whatever other category the race organizers can think of. The ending point of the course is the place where the Road Rally Party begins. I don't need to say anything more about the Party except that last year I had a great time laughing at everyone that came in after me.

## **SUNDAY, FEB. 28: VOLLEYBALL TOURNAMENT**

Sunday is the day for the traditional Volleyball Tournament. Any group of people may form a team, and everyone is invited to watch.

You must pre-register if you wish to participate in the tournament.

## **MONDAY, FEB. 29: SHILLELAGH HUNT, CAMPUS STUNT, KING SKITS, BEARD CONTEST FINALS.**

Engineers' Week kicks into high gear on Monday. The Campus Stunt is a huge prank that certain engineers usually pull off to start the week. Be on the lookout as anything goes. The Shillelagh Hunt is a week-long search for the mythical shillelagh of St. Patrick. The coveted staff is hidden somewhere in the universe; but, for some reason, it is usually found somewhere on or near our campus. Clues to the location of the shillelagh are given out every day, and the first team to find the staff wins a prize. At 7:00 in the evening we have the King Skits at Middlebush Auditorium. This is everyone's chance to see the Engineering King Finalists show off their creative talents. Don't attend if you are offended by Rolla or J-School jokes. Lastly, we have the Beard Contest Finals. This is the judging of men who have worked hard to grow the most creative beard after being clean shaven a month earlier.

## **TUESDAY, MAR. 1: PROFESSOR FOR A DAY, S.P.A.C.**

On Tuesday and Wednesday you may see someone different lecturing your engineering class. This new person is your Professor for a Day. I remember one year when a curvaceous lady with a red dress and long legs lectured one of my classes. (I forgot what she was lecturing about, though.) Also, throughout the day, IEEE sponsors S.P.A.C., the Student Professional Awareness Conference. This is a series of four very informative and interesting lectures by professionals in the field of engineering. These are not your ordinary Physics 176 lectures; I had a blast at S.P.A.C. last year! Also, as an added incentive, some of your professors may let you

skip class or even give you extra credit for attending these lectures. I really recommend that you attend S.P.A.C. this year.

**WEDNESDAY, MAR. 2: QUEEN SKITS, BAR NIGHT.**

On Wednesday night at 7:00 P.M., we get the chance to see the lovely Queen Finalists perform their Engineers' Week Skits at Middlebush Auditorium. After the skits, everyone is invited to Bar Night at a local bar.

**THURSDAY, MAR. 3: EGG CATAPULT FINALS, ENGINEERS' BARBECUE.**

Thursday afternoon is the time for the Egg Catapult Finals, an event which has received tremendous media attention in the past. Contestants must fire an uncooked egg at a frying pan target 25 feet away using a homemade catapult. The winner is the contestant who egg lands closest to the pan. The Engineers' Barbecue is a great party held at the Sunrise Optimist Club. Lots of barbecue, beverages, and good fiends will be there. Be sure to attend!

**FRIDAY, MAR. 4: KNIGHTING CEREMONY, LAB EXHIBITS.**

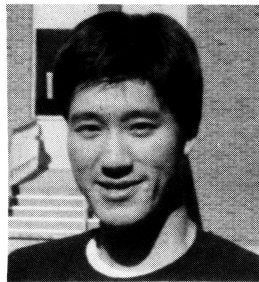
On Friday the senior engineers get knighted to become Honorary Knights of St. Patrick. Lab Exhibits are technical designs on display throughout the Engineering building.

**SATURDAY, MAR. 5: GREEN TEA, ST. PAT'S BALL.**

The last day of Engineers' Week begins with a reception at the Chancellor's residence in the afternoon. One of the drinks served will be Green Tea. Engineers' Week finally comes to a grand conclusion with the St. Pat's Ball held this year at

Day's Inn. The Engineering King and Queen are crowned at the Ball to close out the celebration of Engineering at Mizzou.

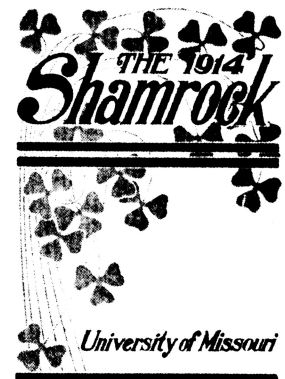
Make preparations now to attend as many events as you can! Information can be found on the Engineers' Week bulletin board located on the first floor of the Engineering building. Some events require pre-registration (with the deadline usually being the day before the event.) Times and places may change due to extenuating circumstances such as Mizzou Basketball games, so watch out for information. See you during Engineers' Week!!



Mark Chan is a junior in electrical and computer engineering from Overland Park, KS. (There is nothing, not even universities, in Kansas.) He is a member of the Engineers' Club and is currently the Managing Editor for the Missouri SHAMROCK. Mark's interests include soccer, collecting calenders, and pestering the editor.



# Help Keep The Tradition Growing . . .



1914



MISS FROSTY GALAKATOS  
Queen of Love and Beauty—1966

1966



1985

*Don't Miss Your Chance to join the SHAMROCK*

# The Logical Suspect

*Soot particle growth as it takes place in wood-burning fireplaces, diesel engines, and industrial furnaces, has been attributed to a complex set of interdependent chemical reactions.*

*A researcher at the General Motors Research Laboratories has demonstrated that the decomposition of a single species is primarily responsible.*

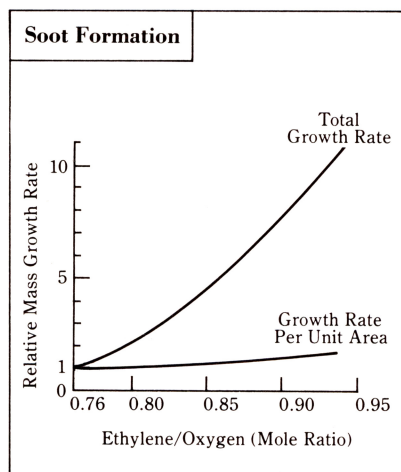
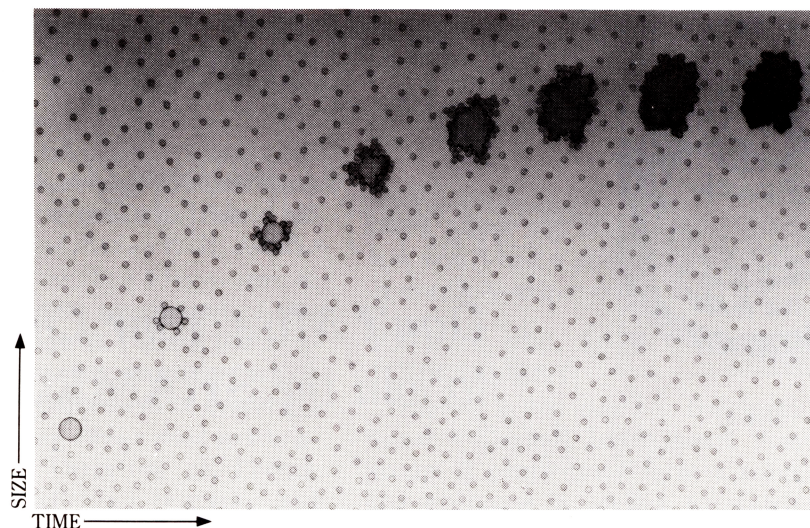


Figure 1: Total growth rate contrasted with growth rate per unit area plotted as a function of ethylene/oxygen mole ratio measured at a given height above the burner face.

Figure 2: Artist's rendition of the surface growth of a single soot particle by the incorporation of acetylene molecules.



**S**OOT FORMATION may be divided into two stages. Microscopic soot particles are generated in the "inception" stage. They reach full size in the "growth" stage, which accounts for more than 95% of their final mass. Most scientific exploration has concentrated on particle inception which, despite all the effort, remains unexplained. Dr. Stephen J. Harris, a physical chemist at the General Motors Research Laboratories, has reversed traditional priorities. Combining experiment with logic, he has formulated the first quantitative explanation of the growth stage in soot formation.

Dr. Harris arrived at his mechanism through an elaborate process of elimination. To focus on the chemistry of soot growth, he began by eliminating from his

investigation the complexities introduced by turbulence and mixing. He limited his research to premixed, ethylene/oxygen, laminar flames with one-dimensional flow.

Previous descriptions in the literature told him that two processes take place simultaneously during growth. Incipient particles collide and coalesce into larger particles, while growing at the same time by incorporating hydrocarbon molecules from the burned gases.

The first process reduces total surface area without changing total mass, while the second, called "surface growth," increases both total surface area and total mass. Hence, the increase in the total mass of soot can be entirely attributed to surface growth.

Dr. Harris set out to identify the hydrocarbon molecules — or "growth species" — responsible for surface growth. Increasing by increments the richness of the flame, he made the key discovery that although the total mass growth rate (gm/sec) increases strongly when the ratio of ethylene to oxygen is increased, the mass growth rate per unit surface area (gm/cm<sup>2</sup>/sec) increases only slightly (see Figure 1). Thus, the controlling variable for how much soot is formed is not the concentration of growth species, but the surface area available for growth.

This finding led him to conclude that richer flames produce more total soot because they gen-

erate more particles in the inception stage. More incipient particles offer greater initial surface area for the incorporation of hydrocarbons.

Since the growth rate per unit area must depend on growth species concentration, this concentration must be similar from flame to flame. Dr. Harris went on to reason that there must either be enough growth species at the outset to account for the total soot growth in the richest flame, or the species must be rapidly formed within the flame from another hydrocarbon present in high enough concentration.

**H**E NARROWED his search to the four most abundant classes of hydrocarbons found in flames: acetylene, polyacetylenes, polycyclic aromatic hydrocarbons (PAH), and methane. Methane can be eliminated, because its concentration does not decrease as soot is produced. There is not enough PAH to account for soot formation in any flame. Neither of these two hydrocarbons can be readily formed from the other major species present. That left only acetylene and the polyacetylenes.

Acetylene contains enough hydrogen to account for the hydrogen content of soot measured in the early stages of growth. But among the polyacetylenes, only diacetylene could possibly supply enough hydrogen. That left acetylene and diacetylene.

There is more than enough acetylene to account for the mass of soot produced. There is not enough diacetylene, and while diacetylene can be formed from the abundant supply of acetylene, the reported rate of conversion is too slow for diacetylene to play a significant role. That left only acetylene.

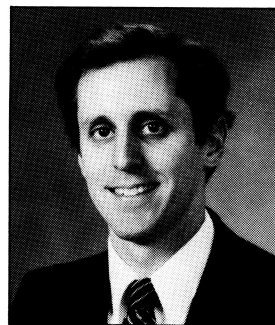
Dr. Harris verified that acetylene is the growth species by determining that the slight increase in growth rate per unit area is proportional to the increase in acetylene concentration (see Figure 1). He also found that the rate constant he measured was in agreement with the reported rate constant for the decomposition of acetylene on carbon. These findings confirmed his hypothesis that soot particles grow in flames by the incorporation and subsequent decomposition of acetylene.

"Now that we know how soot grows," says Dr. Harris, "we can examine how it begins with greater understanding. Then, perhaps our knowledge will be complete enough to suggest better ways to reduce soot."

## General Motors



## THE MAN BEHIND THE WORK



Dr. Stephen J. Harris is a Staff Research Chemist at the General Motors Research Laboratories. He is a member of the Physical Chemistry Department.

Dr. Harris graduated from UCLA in 1971. He received his Master's and Ph.D. degrees in physical chemistry from Harvard University. His doctoral thesis concerned Van der Waals forces between molecules. Following his Ph.D. in 1975, a Miller Institute Fellowship brought him back to the University of California, this time at Berkeley, where he spent two years studying laser-induced chemistry. He joined General Motors in 1977.

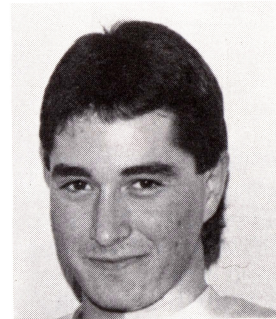
Dr. Harris conducted his investigation into soot particle growth with the aid of Senior Science Assistant Anita Weiner. His research interests at GM also include the use of laser diagnostic techniques in combustion analysis, with special emphasis on intracavity spectroscopy.

# SHAMROCK STAFF



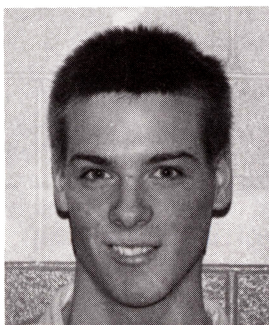
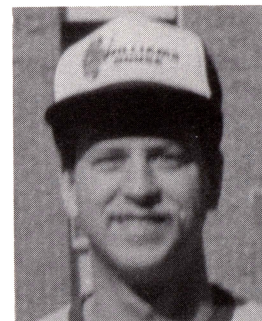
Michael Sparkman is an electrical and computer engineering senior from St. Louis, home of the number one CARDINALS. He is currently Business Manager of the Missouri SHAMROCK, as well as a member of IEEE, and Engineer's Club/St. Pat's Board. Mike enjoys bicycling, playing soccer, and road tripping to White Castles.

Dale Hinson is a junior from St. Charles, MO, majoring in accounting. This is his first year on the Missouri SHAMROCK Business Staff. He likes lifting weights and loves fast cars. He eventually wants to own an accounting consulting firm and one day hopes to rule the world.



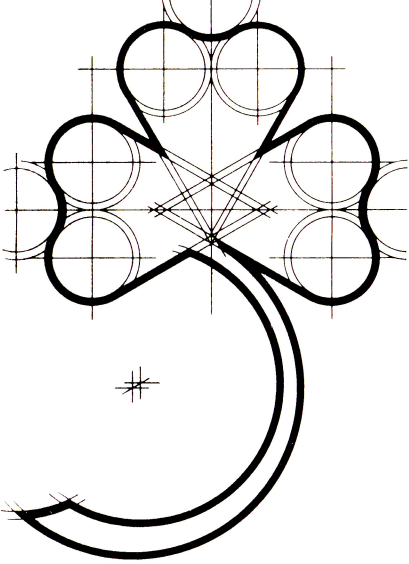
Victoria Johnson is an Electrical Engineering junior from St. Louis, Mo. She is currently the Advertising Manager of the Missouri SHAMROCK. In her spare time (which she has lots of this semester) she likes to go shopping, watch soap operas, and do other things equally non-productive.

Ed Szczuka is the SHAMROCK Photographer and a graduating electrical engineer. Originally, he started college in Memphis, TN, and then transferred to MIZZOU in the Fall of 1986. He loves the out of doors—going rock climbing and rappelling whenever he can. He's always saying to the guys, "Great! Do you want to go camping!"



Jay Lorenz is a sophomore from Steeleville, IL, majoring in accounting. This is his first year on the Missouri SHAMROCK Business Staff. His favorite pastimes include wrestling, buoy ball, indoor hand gliding, and cow tipping. His goals in life are to own an oil company, have a harem, and play the lead role in FERRIS BUELLER'S DAY OFF, PART II—THE SEQUEL.

A Message from Jack Sandridge, P.E., President



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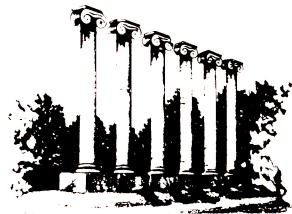
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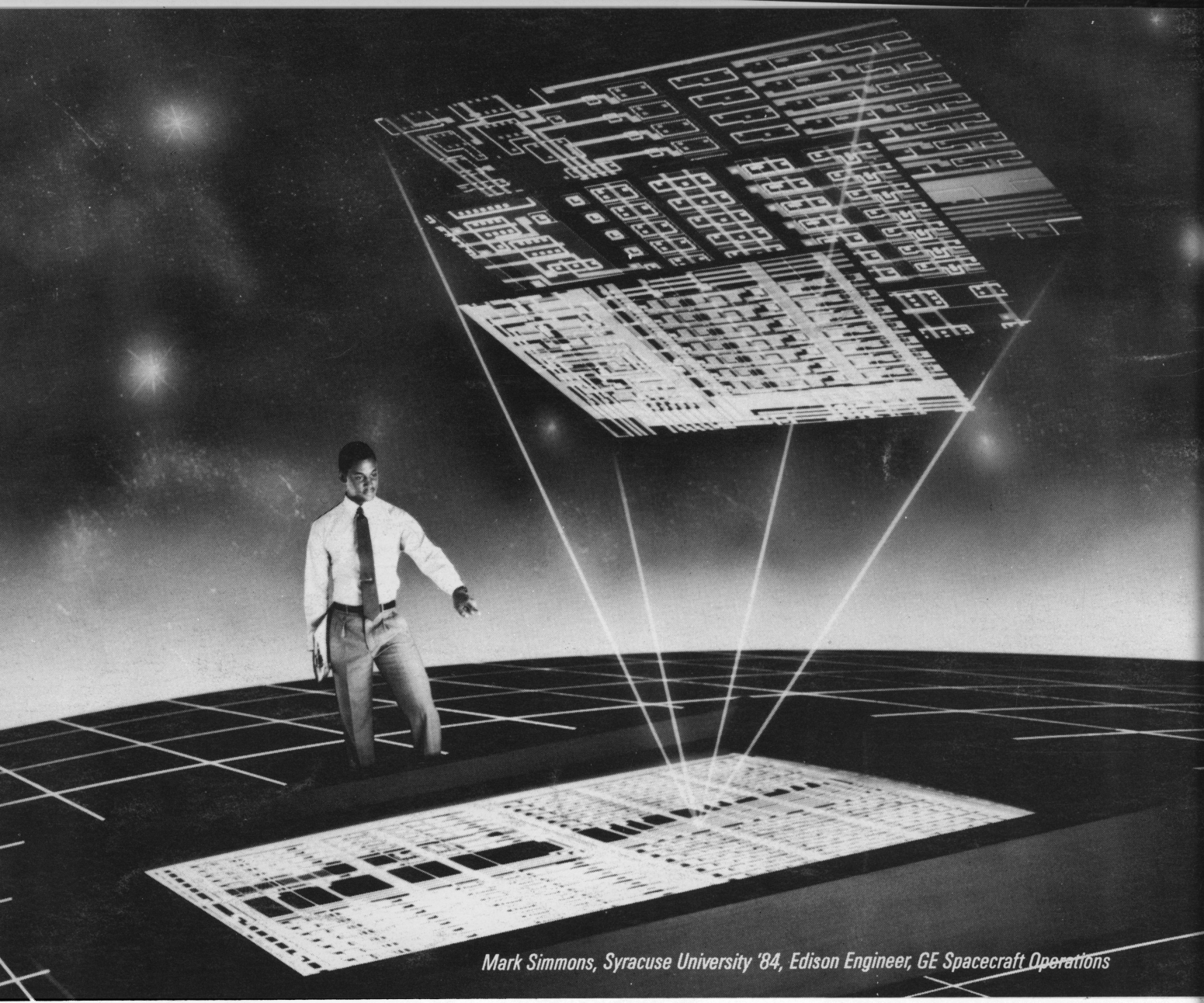
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