

October/November 1989

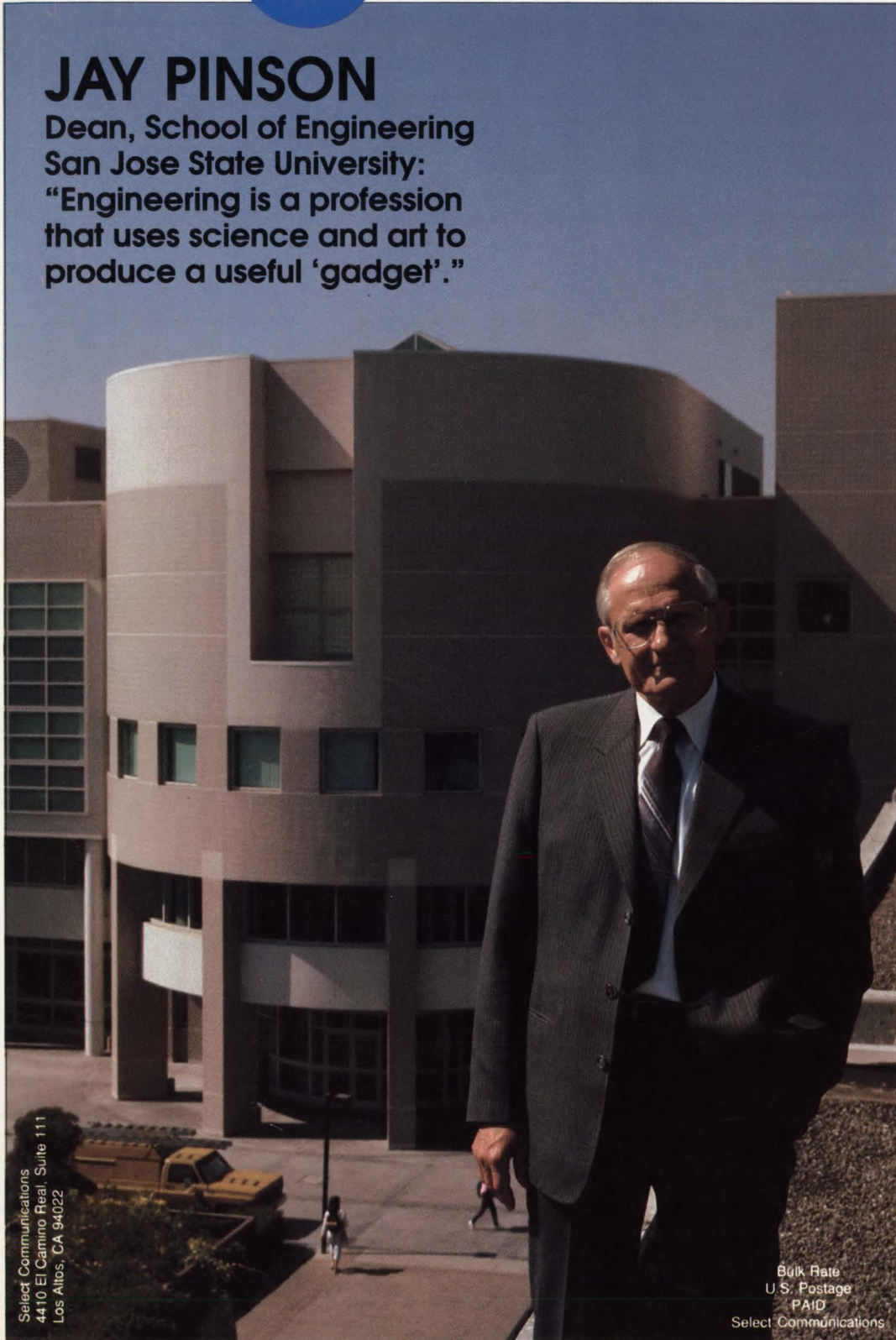
SILICON VALLEY Engineer™

Vol. I, No. 5
Complimentary

JAY PINSON

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produce a useful 'gadget'."



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THE RISING SUN CASTS A SHADOW

First of a two-part
series on why America
is falling behind as
discussed by Carl
Clement, Chuck Leake
and John Huntington.

IF YOU'RE FLYING HIGH YOU MAY BE GROUNDED

Flight simulators—how
they developed, and
what they're like today,
with comments by
Rudy Fischer.

LEADERS WHO LEARNED IN S.V.

A sampling of SJSU
engineering graduates
including Dale Pilgeram,
Lester Ferguson, Ray
Abu Zayyad, James
McCoy, Nancy Thomas.

"IT'S A PUZZLEMENT?"

Readers respond to an
ethical dilemma about
work hours put to them
by Roy Brant.

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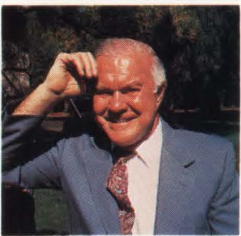
The supply of students into engineering is declining. It is not just the educators who must work to change this situation, claims Terry Shoup, engineering dean at Santa Clara University.



Page 18: Jay Pinson, a champion for engineering education at SJSU.



Page 22: Norman Gunderson remembers how engineering at SJSU has grown.



Page 14: Carl Clement: "Why has the U.S. fallen behind?"



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Page 28: Jane Evans of HP is a role model for all of tomorrow's engineers.

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PUBLISHER'S LETTER

Finding enough good reasons to give a special salute to Dr. Jay Pinson and the School of Engineering at San Jose State University was easy.

Here is a farm boy from Ohio who has never really taken his hand off the plow, in a manner of speaking. He has continued to plow new furrows in the world of engineering education for the past two decades.

Dr. Pinson says it was experiencing the transition from horses to tractors that first got him interested in engineering. Horse-drawn farm machinery—plows, harrows, corn binders, cultivators and hay machines gave way to the bark of John Deere tractors, self-propelled Massey-Harris combines and J.I. Case haybalers during a relatively short period following World War II.

The "Industrial Revolution" really did not arrive in the Midwest farm belt until the late 1940s—it then motivated thousands of young people like Jay Pinson to search for

better ways to get things done.

That's what engineering is all about, and today Dr. Pinson's leadership has created one of the most productive engineering schools in the nation whose goal is to prepare graduates to find better ways to get things done.

But the engineering profession is losing momentum. Fewer and fewer young people are seeking careers in engineering. One solution: engineers of today can show young people by example what engineering is all about. (See Terry Shoup's comments in "One Engineer's Opinion," page 38).

Silicon Valley ENGINEER Magazine is



A farm boy who got his vision for engineering on a tractor.

dedicated to educating the industry for the future. As we keep engineers informed about the activities and the lives and lifestyles of people in their profession throughout Silicon Valley, we must all work together to educate tomorrow's engineers.

Here's the challenge to all professionals: take time out from your work to share your expertise with potential engineers of tomorrow. Teach courses, volunteer for lectures, work together to meet the demand for engineers in the years to come. Get involved with the Technology Center of Silicon Valley. The rewards you reap in personal satisfaction and building for tomorrow will be beyond your wildest dreams.

Thanks, Jay Pinson, for following your dreams.

A handwritten signature in black ink that reads "Paul D. Nyberg".

Paul D. Nyberg
Editor and Publisher

COMMENTS FROM READERS

Is The 40-Hour Week Passé?

Roy Brant's article on "work ethic" ("Worktime Versus Work Ethic," *Silicon Valley ENGINEER*, August-September 1989) smacks of communism, socialism, or some other "ism" that says, "Don't work hard."

Read my lips, young man – for it takes youthful thinking to believe that eight hours a day will do the job. No way!

That great and elusive "quality of life" you mention will continue to elude the pursuer that only works 40 hours per week. Remember these old clichés – "The idle mind is the devil's workshop." "The harder I work, the luckier I get."

Your job must be first on your list of priorities for the good life. Without a job, you have nothing. No home, no wife, no family, no church, no recreation, no car, no boat, no second home – nothing!

Dale Briggs, President
Westates Pacific Company, Inc.
Los Altos

Party, Please?

Incredibly, the article on six Silicon Valley Engineers involved in politics ("What Makes Engineers Run?" *Silicon Valley*

ENGINEER, August-September 1989) did not identify the party affiliation of any of these "dedicated" individuals, nor could their leanings be gleaned from the text. Would a fair assumption be that they are all conservative or right-wing Republicans? Most engineers are.

Donald M. Wilson
San Francisco

"Who Was That Masked Man?"

Just a short note to thank you for the picture of John (Jocko?) Joss ("Publisher's Letter," *Silicon Valley ENGINEER*, June-July 1989). Over the years, I have read a number of his articles, and on a number of occasions I have sought his input. However, time and circumstances kept us from ever meeting. Now, at least, when I see the Blue Knight tooling off to new adventures off 280, I can give him a toot.

Art Allione
Saratoga

Answering the Call to Teach

I read with great interest Emil Kissel's article, "Teaching as a Second Profession" ("One Engineer's Opinion," *Silicon Valley*

ENGINEER, August-September 1989). I am also very concerned about the lack of quality math and science education in our schools. My letter to you was prompted by your call to "do something about it."

I am an aerospace engineer at Lockheed in Sunnyvale, with a Master's Degree in Engineering from UCLA, and more than 11 years of engineering experience. I also love teaching, and have taught in the past, albeit at the university level. Teaching science and math to young kids would be a great challenge, and I would like to learn more about it.

Nik Djordjevic
Santa Clara

This entire issue discusses the importance of educating tomorrow's engineers. As to specific ways you can help, see what the folks at San Jose State University are doing to train new engineers. And read this month's "One Engineer's Opinion" column and see what Dean Terry Shoup of Santa Clara University's School of Engineering has to say about how you can contribute. You might also contact your local school board and professional associations. —Editor ▲

COLD FUSION

Is there a free lunch?

Reader response to the article on cold fusion ("Fusion: Is There A Free Lunch?," *Silicon Valley ENGINEER*, August/September 1989) was impressive in its diversity. Among the letters, we found all manner of cynics, poets, comics, serious thinkers, and even a dreamer. Here are some of the more salient ideas:

Robert Flaminio of Santa Clara: "Oil companies would never allow a limitless energy source on the market."

Steve Falcon of Burlingame:

There once were a people who
lived in a bottle:
the land of Atmo-Quo
where pressure was priceless
because it powered
and made their little things "go."
They'd blow and blow to meet
their needs
'til their little lungs got tired
So they made a solution of
vinegar-bicarbo
and then Atmo-Quo expired.

Howard Sharek of Aptos:

"Cold fusion is rather outdated; antique in nature; elementary in content. I've been driving around North America for over 18 years in my motor car with my personally designed micromagnetohydrodynamic engine (MMHD-2). A trip to Boston uses about 3.78 grams of pure hydrogen hydroxide. I have approached most of the major auto makers in the U.S., Japan and Europe. The internal combustion engine's design works, the economics don't—to obsolete prehistoric internal combustion engine designs; to put 350,000 people out of work, and to close down 258 plants worldwide would cause a catastrophic dislocation of corporations. I approached 12 of the major power companies and they all turned me down. A close friend of mine in the U.S. UBI agency informed me that several ma-

nor fossil fuel-producing companies have put a price on my head.

Three months ago, I approached several semiconductor companies. They all seemed interested. Studies have been completed by all three, and the major material costs are as follows:

MMHD-2 engine	\$1200
Electronics	\$1908
Frame	\$ 268
Total	\$3376
Labor	\$ 189
Total cost	\$3565

Back in 1969, Berkeley, Stanford, MIT, and UCLA studied my first engine, the MMHD-1. It worked far better than my fondest dreams. The engine is still under guard in Engineering Building 12B at UCLA. My family and bodyguards are traveling abroad until all the studies and funding are completed."

Bob Ulicki of Cupertino: "We could design a U.S. Rapid Transit System to move people efficiently around cities and the country."

William Kegg of Capitola: "Very simply, the impact of limitless energy from fusion will be the third industrial revolution."

Eric Winkler of Palo Alto: "Perhaps the greatest benefit of fusion would be political, reducing our country's dependency on foreign oil, which then reduced the political pull of less stable governments in the Middle East."

Thanks for the responses. The six people noted above have earned a free lunch on *Silicon Valley ENGINEER Magazine*. Call us for details at 415-941-6200. ▲

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The Engineers at NUMMI: It may not be high-tech but the engineers in Fremont are learning skills we can all use.

Retirement Planning: It's never too early to develop a financial blueprint for your future.

Engineers as Winemakers: Wine-making has been called an art, but these engineers demonstrate that a little applied science helps too!

Industry Initiatives for Science and Math Education: IISME's innovative program supports high school teachers who motivate students in math and science.

When Depression Hits: Engineers are not immune to being hit by the doldrums—Jean A. Hollands shares some tips on how to get through those gloomy times.

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DIALING FOR DATA

Software help and shareware programs are only as far away as your modem.

By William F. Weitze

Stuart Smith has an unusual hobby. He is a systems operator or sysop, and devotes considerable time and money serving engineers and computer enthusiasts by running Comp-U-Ease, a computer bulletin board system (BBS). A BBS is a personal computer that other PC users can call to exchange messages and computer files.

If you have a PC, you can get free programs, generally small utilities that can make your life easier. There are also shareware programs that you can try before you buy. As the big software publishing houses delay the latest versions of their software for another year, frustrated users are finding that the most up-to-date software is free, or at least very cheap. Things happen fast in the world of shareware/public domain software.

When things go wrong with software, the message base on most BBSs can be a big help. You can get advice from someone who has already slogged through the muck, trying to get things to work.

How does a BBS work? Incoming calls are answered and interpreted by a modem. This converts outgoing letters and numbers into phone line-compatible signals, and incoming signals into the proper characters. Special software controls the entire setup.

Stuart's system is a multi-node BBS. Three computers are hooked up in a network that shares disk drives and a monitor so more than one person can call the board

at one time. I went over to Stuart's house to see the system in action. Five computers, three of them on line, take up the guest room. The online PCs share a common monitor to save space.

Stuart taps the screen on the monitor. "This fellow's a new user," he says. We watch as a menu fills up half the screen, giving the user choices such as "Enter Message," "Read Message," and "File Directories." The user is obviously overwhelmed; he types an incorrect command. The menu slowly rewrites itself, giving the beginner another chance.

"Why is it so slow?" I ask. "Because he's only got a 1200-baud modem," replies Stuart.

Getting the right modem is central to BBS enjoyment. Few things are more frustrating than a slow modem. If you're starting out, it makes sense to get a good 2400 bits-per-second (bps or baud) modem. Higher speeds are available, but protocols are not standardized yet for higher speeds.

Stuart Smith came over from England at the age of 20, after serving a five-year apprenticeship in engineering (what he would call Machining) after leaving school at the age of 15. This is the usual age at which most Englishmen finish their version of high school. He is amazed at the indif-

ference to the opportunities available here.

"I came over here with nothing," he says, "and now I'm living better than I ever could in England."

Stuart's BBS has a few interesting features. He belongs to an international message and file relay system called PCRelay. There are nationwide conferences covering specific programs, applications, and areas of general interest (one of Stuart's favorites is the Beer conference). There is even a global conference, with callers from Scandinavian countries as well as the USA and Canada. The board also has an engineering conference which is a separate message and file base devoted to engineering computer applications. The files cover the full range of engineering, and the message base will soon be merged with a national engineering conference.

To call his board, dial (408) 286-8332. Set your terminal or PC software to 8 bits, no parity, 1 stop bit. Then, sample the mainboard, conferences, and files. If you like it, remember, this is only the beginning. There are lots of other BBSs covering every interest imaginable. Happy BBSing! ▲

Bill Weitze is a mechanical engineer in San Jose and editor of the ASME Santa Clara Valley Section newsletter.



Stuart Smith uses three PCs for BBS.

BAY AREA BULLETIN BOARD SYSTEMS

This list is by no means complete and phone numbers are subject to change.

PHONE	BBS NAME	COMMENTS
408-238-9621	Servu	CP/M oriented
408-243-1933	Liberty Bell BBS	Libertarians BBS
408-246-7854	Crumal Dimension	Games
408-263-8134	Wyrlid Wyrn BBS	Sci-Fi topics
408-286-8332	Comp-U-Ease	Engineering, ACAD, RelayNet
408-287-8399	Crime Bytes BBS	San Jose Police Department
408-371-7654	Brown Bag Software	Shareware from Brown Bag
408-395-1402	Saratoga PC Clone	Engineering, utilities
408-723-3181	Computer Zone	Public domain software
408-732-2353	Computer Tyme GAP	GAP BBS software
408-732-2814	Halted Specialties	Electronics store
408-732-4126	Consumers BBS	Insurance listing
408-733-3734	House of Ill Compute	aka Sil Val Netcm
408-745-0880	Logon-Sunnyvale	Public domain software
408-773-9573	Moose is Loose	BBS novice help
408-866-1880	River City Delirium	Fido Hub 200
408-946-8561	Pacific Exchange BBS	Conferencing
408-985-8675	KOME Silent Side	KOME FM Radio BBS
408-988-4004	Home Base	Messages, virus software
408-988-8927	PRACSA	Sysops organization
415-322-6451	Palo Alto Writer	Writer's BBS
415-941-2647	Disk Cache	IBM programs
415-949-1072	Murphy's Remote	CP/M oriented
415-964-9039	SPACE	Stanford Computer Exchange
415-968-7369	SIGSIG BBS	DOS & CP/M files

THE WORK TIME VERSUS WORK ETHIC DILEMMA

Readers respond to last issue's dilemma and we offer a new dilemma on education in Silicon Valley.

By Roy Brant

In the August/September issue we posed the following ethical dilemma and asked readers to offer alternative solutions:

THE SITUATION

Art Brown was recruited for an engineering position with a Silicon Valley firm approximately one year ago. At the time of his hire, Brown did not specifically discuss hours of work with his employer, but, he did mention that he was active in community affairs, his church, and coaching his son's soccer team each fall.

After he began work, Art discovered that his boss worked from 7:00 a.m. to 7:00 p.m. each day and at least a half day each Saturday. Further, he realized that his boss expected his subordinates to duplicate this schedule. Notwithstanding the fact that he could easily complete his normal duties in eight hours or less, Art worked a 12-hour schedule from January through August, at which time he reduced his hours on two days per week to 8:00 a.m. to 5:00 p.m. He also eliminated working Saturdays for the duration of his son's soccer season.

When he received his first annual performance appraisal in early October, Brown's boss acknowledged that he had successfully completed all of his goals and objectives on a timely basis. But he was informed that his decision to spend fewer hours at work was considered a clear indication that he had a problem with his priorities and that he was "not a team player." Shortly thereafter he received a sub-normal wage adjustment based on his review.

THE RESPONSE

We received a variety of reader responses to Art Brown's dilemma that ranged from obscene comments to very practical alter-

natives. Ironically, the majority of the suggestions directly or indirectly recommended that Art should seek employment elsewhere. Further, many respondents alluded to the recruitment advertisements and contended that Art should seriously consider the fact that there are more jobs for engineers in Silicon Valley today than there are qualified applicants, before accepting what they considered unfair treatment.

Perhaps the most interesting comments were those about Art's reduction from working 64 hours per week to an interim schedule of 52 hours. This reduction is perceived as tantamount to working a 40-hour work week and "long hours were a necessary ingredient of the Silicon Valley culture and should be accepted as an act of faith."

We received very few comments on the issue of "work for work's sake." This was surprising to me. Based on my personal experience alone, I would estimate that there are several hundred engineers and other professionals in Silicon Valley that go to work each Saturday just to please their boss, or to be available when roll call is taken, notwithstanding the fact that most of Saturday's tasks could be easily accomplished at home.

In any event, it was difficult to choose from the many viable alternatives that were offered, but we have chosen four reader responses that provide a variety of alternatives for dealing with Art's dilemma.

1. *"Ask for a one-on-one meeting with his manager to clarify the point that an engineer (or any knowledge worker) ought to be judged by his/her creativity and productivity, not by the number of hours of overtime he/she works. Bring concrete examples of*

his accomplishments over the past year to bolster his case."—Daniel Van Der Weide

The success of Art's argument in pursuing this alternative would depend on his boss's personal values. His boss has already admitted that Art has successfully completed his goals and objectives. He would have to be persuaded to abandon his own thinking that time spent at work is more important than an individual's actual output. He will have to acknowledge that being a member of his team is "physically being there."

2. *"Quietly seek employment elsewhere. Give two weeks notice when new employment is found. Discuss ethics and priority issues during an exit interview with the reviewing manager."*

—Lewis R. Ivers

Seeking alternative employment opportunities, regardless of their availability, simply begs the question of what to do about an unrealistic manager who imposes his will upon his subordinates, regardless of the real needs of the business. Art should at least attempt to plead his case by contacting Human Resources or appealing to the next level of management before opting to leave. Further, movement after only one year on the job could reflect negatively on Art and his career.

3. *"Reiterate his community affairs involvement to his boss, and state that his pay should not suffer because quality, not quantity of time, should take precedence. If Art's boss still does not agree, Art should get his resume out on the street."*

—Eric Emanuel

While Art may be well-served to reiterate his community affairs or involvement on his family's behalf, his timing leaves a great deal to be desired. After eight months on the job, he should have been able to anticipate his boss's reaction. If he had discussed the matter with his boss before altering his schedule, he might have been able to affect his "not a team player" reaction.

4. *"Form a labor union with his fellow employees. His boss needs to be converted—will yelling do it? Does it make sense to attempt to bargain with a nincompoop? Engineers need bread and roses too!"*

—Anonymous

Silicon Valley professionals have historically avoided unions, regardless of the leverage unionization could provide in dealing with an unrealistic boss. But there is no greater catalyst for seeking third-party assistance than an unyielding manager who never stops to listen to the realistic needs of his employees.

Given the number of quality reader responses and comments received, we are offering a new dilemma in keeping with this month's focus on education and educating Silicon Valley.

THE DILEMMA

Jack Smith has spent the past ten years working for a Silicon Valley components manufacturer, and has always enjoyed his relationship with the company. During his employment he has evolved from a technician to senior engineer thanks to solid performance on his job, attending school during non-work hours, and obtaining both a B.S.E.E. and M.S.E.E. degree.

Over the years, the company has underwritten most of his college expenses through its tuition reimbursement program and Jack, in turn, has consistently achieved outstanding grades. Shortly after achieving his M.S.E.E. this summer, he was contacted by a direct competitor wanting to explore "a significant opportunity for a man of his education and experience."

But when Jack shared his potential interest in investigating the position in question with his boss, he was told that "to pursue an opportunity with a competitor after the company had made such a significant investment in his education was selfish, immoral, and unethical."

Given his manager's response, what should Jack do?

We would like to hear your practical, ethical, and legal views on this situation. Send your responses to:

"Dilemma"

Silicon Valley ENGINEER Magazine
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Roy Brant is president of People Performance Programs, a Los Altos-based human resources consulting company and developer of a series of management training programs.

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Tech Talks. . .

HOW DO THEY DO IT?

Tales of High-Tech High Adventure

1989

October 20

How they are inventing the future at MIT

Speaker: Nicholas Negroponte
Director, Media Lab, MIT

November 16

How technology now looks at the ocean's bottom from the top

Speaker: Dr. Robert Ballard
Finder of the Titanic

1990

January 25

How they are looking at living in outer space and in the deep ocean

Speakers: Sylvia Earle, Aquanaut
Earl Carpenter, Astronaut

February 22

How they flew around the world on a tank of gas

Speakers: Dick Rutan, Pilot
Jeana Yeager, Pilot
Burt Rutan, Designer

March 22

How they are exploring Mars together with the Soviets

Speakers: Don Rea, JPL; Chris McKay,
NASA Space Scientist,
USSR Science Program

April 19

How to make a "Star Trek" movie

Speaker: Leonard Nimoy, Director,
Writer, Actor, Producer

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FEARLESS FLYING

*Flying is for the birds.
For humans, it's easier to simulate
an otherwise unnatural act.*

By John Joss

Humans do daily what most other species do: travel, climb, or cavort on the ground using hands and feet; swim and dive in oceans, lakes, or streams by moving our extremities. But as for flying, we remain resolutely earthbound, unable to emulate what birds do naturally. When we do fly—man has been doing it less than 400 years, Da Vinci's dreams notwithstanding—we enter an alien environment. We fly via complex, sophisticated technology, as in airplanes or spacecraft.

It costs hundreds of thousands of dollars to train a commercial pilot; \$1 million or more to train a military aviator. But since aircraft flight simulators were invented by Edwin Link in 1929, men and women have learned to perform the unnatural act of flying faster, better, less expensively, and much more safely. No other machine in the world offers this extraordinary sense of flying, without any of the inherent risks.

Blending Art With Technology

The essence of flight simulation depends on continuous, real-time processing in computers, of mathematical models duplicating real-world events. Since his 1929 'blue box,' Link and his successors have designed, developed, installed, and supported more simulation systems for flight, space, ground vehicles, gunnery, and maritime training than any other manufacturer.

"It's hard to re-create the effects of flight, including aircraft motion, 'G' forces, sounds, and out-of-the-window scenes," says Rudi Fischer of Singer's CAE-Link simulator group in Sunnyvale.

"It's as much art as science, involving most of the engineering disciplines—electronics, mechanics, optics, thermodynamics, fluid mechanics, and mathematics.

"Working here (at CAE-Link) takes a special kind of person," says Fischer. "Making something appear real requires unique talent. Not only must we duplicate a real system's performance exactly, we must also reproduce the world in which that system works. That 'world' may be dodging thunderheads or missiles, flying or landing in the dark or rain just on instruments, or responding with the correct sequence of crisis-management actions attending, say, an engine fire or control failure. Regardless of the situation, we must create a 100 percent accurate simulation."

How good does it get? Having flown a dozen simulators, from the F-4, F-14, F-15, F-16 and F/A-18 jet fighters all the way to jumbo jets like the 747 and DC-10, and lots of stuff in between, I can vouch for the simulator. It will strip a pilot's delusions of competence faster than an instructor's cruel comments. Perhaps its only failing is lack of full, authentic vestibular (inner-ear) response, which tends to induce roll-jitter pilot-induced oscillation (PIOs).

On Into Orbit

Flying (Link's) Space Shuttle simulator at NASA's Houston Manned Spacecraft Center is a high point in this pilot's life, paralleled only by flying the U-2 at Beale Air Force Base, near Marysville.

Settle in, strap it on. The cockpit is authentic to the smallest detail, incorporating many 'ribbon' vertical instruments and a HUD (head-up display from Kaiser Aerospace, San Jose) where in the past round cockpit dials were the norm.

They crank you back until the cockpit is 'sitting' atop the Shuttle. Now you're lying down, looking out at the (simulated) launch gantry as the countdown proceeds. "We

have ignition," says the ground controller. In the cockpit you can feel and hear the rumbling, rolling sensation of millions of pounds of thrust unleashed behind you in its awful ferocity.

"We have liftoff." Now you are flying, watching the instruments as the beast lofts itself into the black void of space under computer control. Here comes the roll maneuver, which puts the Shuttle on its

back. Through the window the receding horizon of Earth provides visual indication of the stupendous, Mach 10 climb.

We flew the RTLS (Return To Launch Site) emergency maneuver, which permits the Shuttle to return to Cape Canaveral safely, despite an engine failure. Under computer control, the thrusters turned us around in space at Mach 10, and we powered back down on the two 'good' engines,

pulled up to jettison the empty fuel tanks and maneuvered around under manual control for arrival, Canaveral's runways in sight. On 'final approach' at 235 knots, we penetrated some puffy cumulus clouds on instruments, picked up the runway, and glided in to a smooth, 185-knot touchdown.

Armchair Aeronautics

Instrument 'flight' can be done in the safety and comfort of your living room. Software for home PCs can give pilots and would-be pilots a taste of the real thing, and can provide genuinely valuable exercises. It can help train a pilot in instrument proficiency and offer useful understanding of the mechanisms of flight.

Several software programs are available (be sure to check your system for main-memory capacity and disk compatibility). It is useful to have a color monitor that can duplicate the colors of cockpit instruments, especially the ADI (attitude and direction indicator) that shows sky (blue) versus ground (brown). While such PC activities are not a substitute for the real thing (or the real simulator), the instrument indications are authentic.

For *unreal* simulations, just home video games, try some of the 'jet fighter' PC software that claims to 'put you in the cockpit' to fly. For example, you can use a joy stick to lift off and land on an aircraft carrier in the V/A-18 Hornet or fight the F-15 Eagle. If nothing else, these games give you an inkling of the horrendous complexity of modern jet-fighter cockpits. These games, and the home-PC flight simulators, are up to the minute in one important respect: they offer displays on a CRT. The CRT, or MFD (multi-function display) as it is called in cockpits, is the state of the art in military and commercial flying.

Does the simulator concept work? Today no nation in the world engaged in serious aircraft operations—civilian or military—trains its pilots in 'the real thing' alone, without relying on simulators, either owned or borrowed from a larger organization. In other words, the world's aviation community has put its money where Edwin Link's original invention lives. Proof enough? ▲

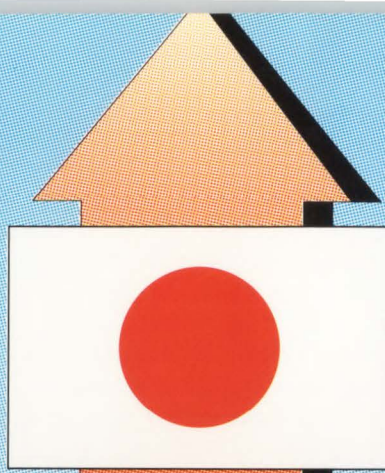
John Joss got his flight training in real time and now flies simulators and real planes whenever he can.



Soviet fighters and helicopters are displayed meticulously in CAE-Link military simulators, providing authentic targets for pilots in training. How authentic are they? In the case of this helicopter simulation below, even the grass is 'flattened' by the rotor downwash!



Rising Sun...



Falling Star

To combat a common market enemy, we first must make peace between industry and government.

by Fred Levien

Winning teams in the United States evoke feelings of adulation that border on religious fervor. Be it baseball, football, or basketball, our admiration knows no bounds for those teams, which by working together for a common goal, come up winners. Why, then, in a country like ours, with such a plentiful supply of outstanding role models, have we allowed the most important team of all, an industry of the people and a government by the people, to fail so badly in working toward the common goal: A strong and healthy U.S. economy?

After decades of unquestioned leadership in both technology and production, the U.S. finds itself today slipping toward the

number two spot in the world with a speed that has startled even the most smug among us. At the present rate, by 1993 Japan Inc. will be the world's leading industrial nation. Under raucous banners of "Profits Above All," or "Stamp Out Fraud and Abuse," both sides — government and industry — have allowed an adversarial relationship to develop that has corroded the base of the partnership of what has made the United States the envy of the world.

What has caused this unprecedented slide toward the precipice of failure? What can be done to bring us back on track? Are there any signs of improvement on the horizon?

We posed these three vital questions to a

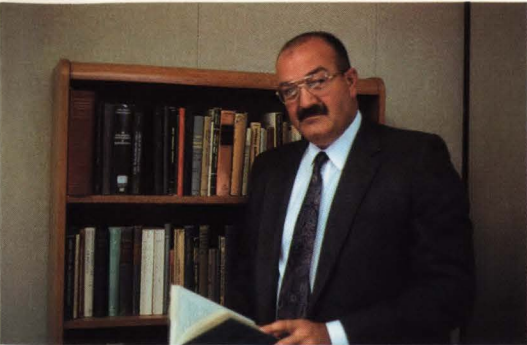
panel of Silicon Valley leaders who, because of their unique positions and experience, were able to provide invaluable insight into the dilemma. The panel included Dr. John Huntington, President of Astron Research and Engineering Corp.; Chuck Leake, head of Leake Associates, a professional engineering firm specializing in systems engineering, maintainability and reliability; and Carl Clement, who as president of Clement Associates, a product design group, has been a Silicon Valley leader in high-tech design for the last 36 years.

As expected, each examined it from his own perspective, but all shed considerable light on this otherwise bleak problem. The

discussion was lively and extensive. This article is the first in a two-part series offering their insights.

"We Have Met The Enemy, and He Is Us!"

Dr. John Huntington has spent the last 24 years working toward meeting the high technology needs of the Department of Defense. His nine-year-old company, As-



Huntington: "It's difficult to tell your mother with pride that you are in the field."

tron Research and Development, now heading toward \$4 million in revenues, is 100 percent employee owned. Because of its leadership in the high-tech world, it has managed a profitable 36 percent growth rate since its birth.

Huntington's insistence that Astron stress innovative solutions has put the company into programs as diverse as advanced submarine technology and electromagnetic rail guns, to survivable space solar power systems. He is quick to add, "All this within the FAR (Federal Acquisition Regulations) requirements, and no legal problems!"

Guilty Until Proven Innocent

"Immorality among a few in our society," Huntington feels, "will always exist. You cannot legislate that out of existence." The government's attempt to do so through the establishment of the Office of the Inspector General "was a serious error," he says. This has created a "punitive attitude" among over zealous investigators where "the presumption is that fraud exists everywhere, now go and root it out!"

This "guilt-before-innocence" mind set has cast a "heavy, dampening pall...even more, a chilling effect" on all in the industry who toil hard and honestly to support government programs in their high-tech fields. Huntington puts it in very human terms: "It is difficult to tell your mother with pride that you are working in the field." Even more ominously, it has precipitated an

exodus of the best minds in the country out of government-related employment. "Why be associated with people," he asks through the eyes of a scientist, "with organizations that are presumed to be riddled with fraud?"

The Inspector General's office tends to adopt a strategy of "Ready, Fire, Aim," and it so thoroughly pervades current thinking that this tilt is similarly reflected by the press in their reporting attitude. Huntington offers a case in point: "Lockheed recently had a whistleblower call complaining that highly paid professional personnel were sitting around Lockheed reading magazines rather than working on the program for which they were hired."

Huntington related his recollection of the "black-and-bold" headlines. "More fraud and abuse again" was their message. "However," he went on, "when the situation was more closely examined, it turned out that these people were waiting for a government security clearance and were forbidden by law to work on their program until they were cleared, which often takes many months." But once the facts were released, it was too late, the damage had been done. The whistleblower's complaint had been given. One more erroneous "fact" was driven as a wedge between industry and government.

Finally, an added financial burden shared by all companies working on government projects, as a result of the cumulative subliminal effect of what can often be described as "harassment." This burden reveals itself when these companies search for capital to operate and to grow. "They can bank on having to pay more for it, and usually getting less than they need." The impact on the country is to seriously weaken much of the industrial base on which we depend to provide our nation's defense.

The High Cost of Curiosity

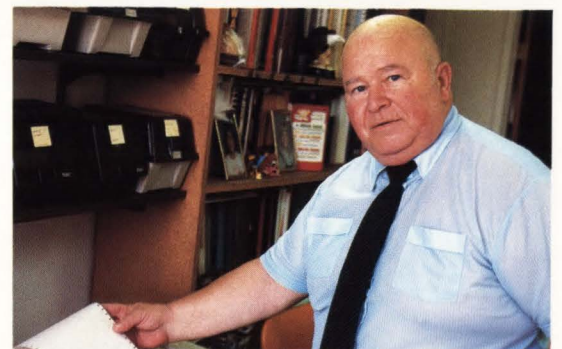
Chuck Leake has been an engineer "making things work properly" for more than 40 years. As head of Leake Associates, Leake has had a window into both government and industry working on programs such as GPS, the MX missile, the Litton-Saudi Defense Communications Systems, in addition to a host of other space and ground electronics systems. With a BSEE from the University of Southern California and an MS from San Jose State University, his firm assists many of the major Silicon

Valley corporate players to achieve their quality and reliability goals.

Leake believes that the early seeds of distrust, particularly between the military and industry, were sown many years ago when "the services first began ordering complex weapons systems that they did not have the technical expertise to properly manage." Almost always, "a general or a colonel was program manager," very capable in his military function as a combat leader, "but as a program manager for a technically sophisticated state-of-the-art electronics project? No way!" They were forced to call upon consultants specializing in the high-tech fields, specialists who gave "guidance and technical review" to project progress. The financial responsibility, however, remained with the military, and herein lay the flaw.

The consultants, having no money problems to concern them but faced with the possibility of having the albatross of performance failure hung around their necks, asked the supplier, "Have you considered doing it this way?," or "What if you tried this approach?" Each question raised required more design effort to answer it or refute it. This took "already expensive programs and drove their costs through the roof" as the system builders, reluctant to challenge and possibly anger their biggest (and often only) customer, returned to the drawing board again and again. When the time came to pay the bill for the now rampant overruns, fingers of blame were pointed faster than an F-14 scrambling to head off a Russian bomber.

The consultant faded into the shadows.



Leake: "Nothing kills the image of a company faster than having its equipment fail when it is turned on."

The customer, as always, had to remain blameless, and industry was stuck with the bill. Cost overruns became the rule. The game became really nasty when Congress came charging in, asking, "How come?"

Leake strongly believes that another major irritant that has exposed the U.S. military to heavy criticism (and left U.S. industry with a black eye as well) can best be described as D.O.A. — dead on arrival.

"Nothing kills the image of a company faster than having its equipment fail when it is first turned on," Leake explains. Lack of adequate quality control has left many military systems "inoperable precisely when the military needed them most."

Comparison of quality performance is always being made between the U.S. and Japan. "Be careful," Leake admonishes, "not to blame the Japanese for our inattention and failure to instill the importance of quality into U.S. management. After all," he emphasizes, "we were the ones who taught the Japanese what quality is all about in the first place!"

The Tyranny of Innovation

There is little doubt in Leake's mind that the failure of U.S. industry to control costs, is the single biggest cause of the souring of industry-government relations. Much of the blame for overruns can be attributed to the *modus-operandi* that has allowed the engi-

neering drive for innovation in the U.S. to become a self-feeding monster.

"The constant push of engineers to always design the most innovative and most advanced system" using all of the latest "new gadgets and widgets...despite the fact that many of them remain years away from being reliably available" is one primary cause of failure, Leake says. This blatant disregard for the eventual production needs of the program has been a root cause of many project overruns. He refers to the Packard Commission Study, done in the early 1980s, for much of the data he relied on to confirm his own observations.

This failure to set a balance in the trade-off between innovation and cost has left a dark cloud over the world's perception of U.S. industry's ability to bring a high-tech program in on any reasonable cost budget.

Image Versus Action

In addressing the adversarial industry and government relations, Carl Clement follows a quite different path from Huntington and Leake in assessing the "whys."

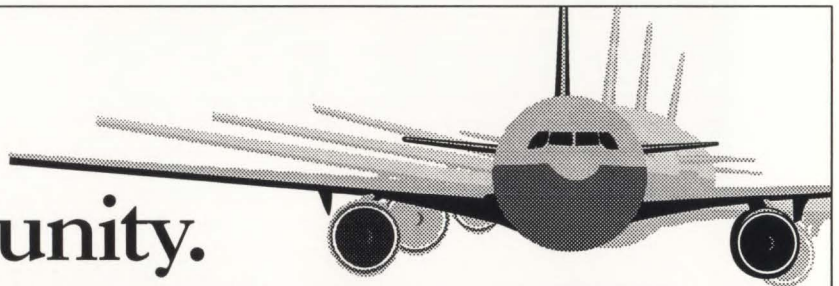
He digs deep, viewing the problems as more a fundamental stand-off between Washington and entrepreneurs in general, and toward private business in particular. He plumbs the depths of basic human motivation, theorizing that if an individual's potential for failure is lifted from his shoulders, then "he has less and less reason to produce, ergo, loss of individual produc-



Clement: "The public is naive in assuming that the politician will always act in the best interest of the country over the long term."

tivity." Therefore, he reasons, ultimately it leads to a "loss of national competitiveness." Clement decries the many govern-

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ment give-away programs and adapts an expression often applied to government officials,—“Charity —corrupts; absolute charity corrupts absolutely.”

Clement points out that in evaluating the people we elect and send to Washington, “There are those in government who are overly focused on the ‘image’ of their own role in government. They are more concerned with moralizing to our own citizens and to other nations than they are with the proper nuts-and-bolts business of ensuring that conditions are favorable to running the country at a profit.” Furthermore, looking at all of us as individuals who, through our vote, control our destiny, Clement feels “the public is naive in assuming that the politician will always act in the best interest of the country over the long term.”

In examining the records of history, Clement notes “it has been all too often proven that profit-motivated private enterprise can do almost any given job better than unaccountable government.” He adds that the government is doing too much “for us” that would be better assigned to private enterprise. We, then, share the blame for having put people in power (and continue to keep them there) who fail to recognize what has historically made this country strong.

A Learned Student

In looking across the Pacific Rim, Clement’s thoughts regarding Japan Inc. tend more toward praise than condemnation. “With no capital gains tax,” he points out, and “a willingness of the Japanese people to endure a lower standard of living temporarily in order to ensure their country’s competitive edge,” their approach to business is more to be copied than condemned.

He sees Japan’s national strategy as one of having targeted the U.S. as its arch competitor, waiting for the U.S. to do the expensive R&D, and then sorting out those products offering the most promise for future growth. Once focused on these areas, the technology is acquired and perfected with unparalleled determination. Thus Japan searches for those weaknesses in the U.S. system, which opens the door for their entry. A darn good strategy, if you’re Japanese!

But before the pall bearers reach for the handles on Uncle Sam’s coffin, let them stop and consider. Consider carefully the forces of change. For with all the problems

Continued on page 30



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JAY PINSON

Community leader and educator, SJSU's dean of engineering creates opportunities for tomorrow's engineers to take risks.

by John Joss

Twenty-first century engineering and keeping the United States technologically competitive are the forces driving Jay Pinson, the man who has served as Dean of the School of Engineering at San Jose State University for the last decade. His engineering alumni are among the best educated and most sought after in Silicon Valley due largely to Pinson's efforts in developing an excellent learning environment, curriculum and faculty.

Dean Pinson draws on an extensive engineering background and a long career. He is the champion of higher education, an area in which he sees this country lagging. An outspoken and articulate critic of past neglect and indifference in higher education, Pinson uses the facts to support his contentions. His call to action for better education has national scope, international implications, and long-term meaning and goals. It

is his legacy to a profession to which he has given his life: teaching engineering.

"I was raised on a small farm in Portsmouth, Ohio," Pinson smiles as he recalls his life, "on the Ohio River north of Cincinnati. I went to a rural high school there, one of eight (five boys, three girls). The farm wasn't our livelihood; my father worked at the local steel mill. But he wanted to give us roots, so we boys ran the place under his supervision." Pinson's mother, now an alert and active 90-year-old, still lives in Ohio.

"Why did I become an engineer?" He cites his baseball coach as a mentor, but reflects on how farm mechanization—"from horses and mules to tractors" as he put it—was happening while he was growing up. It made him intellectually curious about many different technologies and led him directly to the academic life.

Pinson went to Ohio University (BSME,

1950), then to Oklahoma State University for his Master's and Ph.D. degrees in mechanical and aeronautical engineering, starting a lifelong love affair with flying that continues to this day. (He worked on the X-22 and, for 16 years, has run an annual Aircraft Design Short Course in Dayton, Ohio). He started teaching at the University of Dayton's Graduate School of Engineering where he was appointed Associate Dean in 1970. San Jose State University recruited him as dean in 1979.

"I'm not really interested in the past," Pinson confesses. "I'm much more interested in the future. After all," he chuckles, "we prepare engineers to create the future. That's our goal here."

His accomplishments at SJSU's School of Engineering have created an institution ranking with the world's best. A year ago, under Pinson's direction, the University completed its \$40 million renovation and expansion of the engineering facilities, now valued at more than \$150 million. As he leads a visitor around, it's clear that this is one career achievement of which he is particularly proud.

"Private donations of \$17 million made it possible," Pinson says. "Now we have 62 labs—32 donor-equipped with computers and workstations from firms like Apple, IBM, and Sun, or semiconductor fabrication facilities from local semiconductor outfits. We teach virtually all current advanced technology subjects, such as computer-aided engineering and design, production automation, and robotics. There are 48 faculty offices, graduate student areas, and a conference center. All classrooms, offices and labs are networked for digital and video communications."

In considering the size, scope and value of these facilities, realize that SJSU produces more than 3,000 engineers each year.



In his boyhood, a fascination with farm machinery led Pinson into engineering. Here he is shown doing some 'hands-on' work during construction of the new Engineering Building 1988.



"Engineering education is vital in ensuring that we have a technologically competent work force that can compete in global markets," asserts Pinson.

Part of Pinson's problem before the expansion was the inability to accommodate the students who wanted to attend.

"We could enroll only one out of three qualified applicants," he explains. "With the new facility, we can expand overall enrollment by 42 percent, and graduate enrollment by 100 percent. And we'll be able to accommodate many more minority students who comprise an increasing proportion of our school-age population locally."

Pinson also formed an Industrial Advisory Council composed of CEOs and vice presidents from major Silicon Valley and Bay Area corporations to create long-term ties and a dialogue between industry and education. He expanded both graduate and R&D activities, and in the fall of 1983 he developed a new Interdisciplinary Master's Degree program in engineering, in cooperation with corporations.

"Engineering careers are an extension of the learning process," Pinson insists. "You can't separate them. So I established what we call 'Centers' for Productivity and Manufacturing Engineering, Electronic Materials and Devices, and Applied Materials, to support education and R&D in related technologies. The local industrial and educational communities support these Centers with large commitments of their resources."

What does Dean Pinson see in the future for engineering education and Silicon Val-

ley? Despite his focus on SJSU over the last decade, his vision is global and extends beyond the century's end.

"The U.S. has lost its global dominance in the technology-based industries. Industries that have lost dominance include bicycles, binoculars, cameras, castings, clocks and watches, consumer electronics, machine tools, motorcycles, robots, semiconductors, sewing machines, ships, shoes, steel, telescopes, and textiles."

It's a disturbing list, but Pinson doesn't let up. "Other U.S. industries being threatened include aircraft, autos, computers, electronics, gas-turbine engines, and precision instruments."

What's his solution? "Engineering education is vital in ensuring that we have a technologically competent work force that can compete in global markets. Engineering is a profession that uses science and art to produce a 'use-

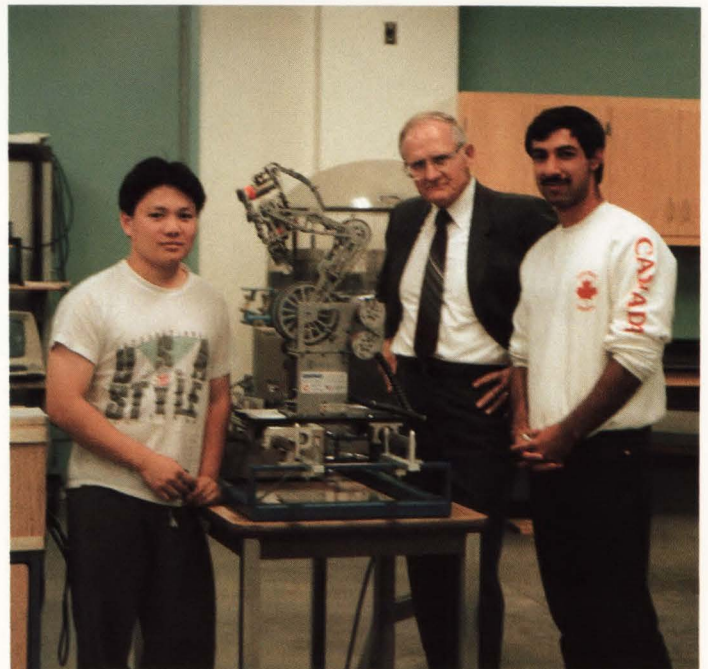
ful' gadget. That's what we must prepare our graduates to do."

"We engineers have come through an era in which we could do lots of experimentation. We weren't penalized by the current liability problems. Remember, today the world expects engineers to be able to predict the results of what we do. We are *accountable*. But how long can our society continue as it has been going for the last decade and compete in world markets?"

What has Pinson received from his more than 30 years in engineering education? "One reward is that you see knowledge evolve in real time. You need not wait 10 to 15 years to see how good your 'product' turns out. To me, much of the personal pride that I feel is that my students are like my children. I must never take them away from their right to fail; I must let them take risks, experiment, succeed by learning from their mistakes and failures. You never fail in science because you never give up. You only fail in engineering because of the constraints of time and money."

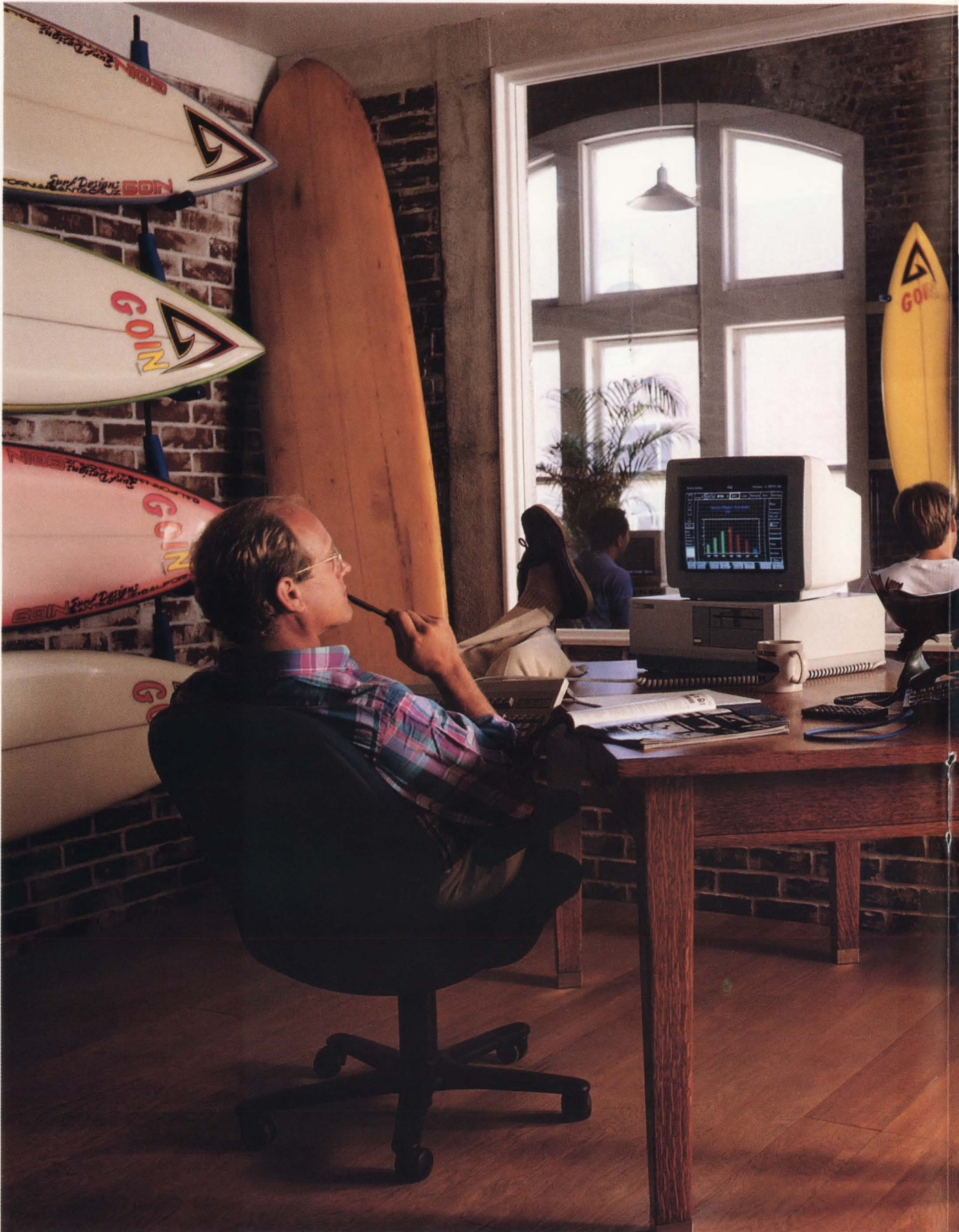
Under Pinson's direction, San Jose State's School of Engineering has been rejuvenated, modernized, and energized. It will stand as his generous professional gift to Silicon Valley. ▲

John Joss is a Silicon Valley-based writer and a regular contributor to the magazine.



Pinson with mechanical engineering students in the CIM laboratory: "My students are like my children."

Robert was sold on Hewlett-Packard PCs while he



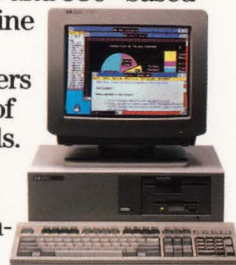
e was still in college.



He was studying engineering and contends an HP calculator was the secret to his success. Since then, HP LaserJet printers have been a big help to his growing company. So when he found he could get Hewlett-Packard reliability in a network of personal computers, Robert decided to stay with a sure thing.

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SAMPLER OF MEMORIES

San Jose State University has come of age with Silicon Valley; Engineering alumni remember the past while shaping the future.

by Mary van Tamelen

When Norman Gunderson came to San Jose State University in 1948 as a young civil engineer, he was one of three new faculty members joining four established professors. The new engineering labs—two 40-by-80-foot quonset huts—were ready to be dedicated, and the faculty were preparing to move their offices into temporary Butler huts. At that time, SJSU offered a Bachelor of Science degree in practical engineering, with specialties in construction, production, communication (vacuum tubes), or food processing. There were 200–300 students, mostly World War II veterans.

These students, however, could not obtain accredited engineering degrees. State colleges were prohibited from offering such engineering degrees; the state legislature believed that the three existing universities, Berkeley, UCLA, and Davis, could meet the need. It was not until 1958 that big local companies—Westinghouse, General Electric, Food Machinery Corporation (FMC), and IBM—garnered the support of Assemblyman Bruce Allen and overturned this education prohibition.

Meanwhile, Gunderson remembers, the SJSU Engineering Department was growing: A 55,000-square-foot building opened in 1953. The engineering program expanded—construction became civil engineering, production became industrial engineering, and communication became electrical engineering, and new programs were added. By 1957 there were graduate study research programs available, and in 1958 civil and electrical engineering became accredited programs.

After Sputnik was launched in 1957, “the doors were wide

open,” according to Gunderson. Plans were already in place to expand for 800–1,000 students, but that number abruptly grew to 1,400. Construction of a 150,000-square-foot building got under way and there was more money for equipment than could be spent.

Gunderson, who became head of the department in 1955 orchestrated this expansion. “We were adding faculty like mad,” he says, “and we were overwhelmed by students.” By the end of his deanship in 1970, SJSU had a full-blown engineering program. There were 80 faculty members, a diversified staff of technicians, and Master’s degrees were being offered.

What sort of students were graduating from SJSU during this period? *Silicon Valley ENGINEER* magazine has interviewed a few of the alumni whose careers have grown with Silicon Valley and SJSU.

Career Patterned After Role Models

Lester N. Ferguson (class of 1950) was among the first to graduate with a B.S. in communications engineering. Ferguson spent his professional career alternating between jobs at GTE/Sylvania and working primarily on classified projects. He was an early authority on magnetic recording, and his 1956 book on the subject, *The Magnetic Recording Handbook*, authorized by the government, became an important resource to the recording industry. When he retired last year, Ferguson was assistant to the president of ESL.

What Ferguson remembers particularly about SJSU was a seminar taught by the first department chairman, Ralph Smith. Smith required two reports from each student, one technical and

one non-technical, on religion, psychology, or philosophy. Ferguson chose Manichaeism, a pre-Christian religion, as his subject, and though he remembers little about the report, he does recall the “wonderful rapport” he had with his classmates. “We had discussions that were real.”

Ferguson says the professors at SJSU were “role models—incredible role models.” They “taught me how to think.” One particular piece of advice he remembers: “If you have a problem, take all the advice you can get, then do what you want to.”

Transforming Raw Materials

Bob Hansen (class of 1960), Technical Director at F.L. Jennings, first entered SJSU in 1954 because “the price was right.” He set out to get his degree in civil engineering, changed to electrical engineering, but when he started to work at Jennings while attending SJSU, he discovered his life-long fasci-



Hansen: “Precision and discipline were beat into me at San Jose State University.”

nation with material sciences. Hansen has done graduate work in this field and has taught engineering as an Associate Professor at SJSU.

Hansen remembers his student days at SJSU as “lots of hard work,” especially since the school was in the process of becoming accredited. The professors were “bearing down, and making life a little more difficult for the students.” Furthermore, he was holding down a job at the time. But Hansen found it valuable to pick up the lab work at school and then take it to a real application at Jennings.

“Precision and discipline were beat into me at SJSU,” he recalls. “I had to make everything come out right.” He vividly remembers one statement from Professor Gunderson: “Engineering is the field of most efficiently transforming raw materi-



Ferguson: “Take all the advice you can get, then do what you want.”

als to the use of mankind." That is a perspective that Hansen lives by today.

Learning How To Be A Professional

Thomas W. Collins (class of 1961) says that SJSU "prepared me for graduate school and industry. There was a wide range of curriculum, and a good fundamental out-



Collins: "When the chips are down, I pull out my old SJSU textbooks."

look in engineering science." Today, Collins is Director of Engineering Operations at Tandem Computers Inc. His current responsibilities include Product Assurance, Components Engineering, Reliability, Industrial Design, Hardware Education, Documentation, and Quality Control.

Collins says he is "truly a product of all the affordable education you can get in California." He went to SJSU while working part-time at IBM, living in an apartment without hot water; then he did graduate work at Berkeley and got his Ph.D. from the University of California, Davis/Livermore; on an IBM scholarship.

"SJSU provided me with the foundation in how to be a professional, practicing engineer," he says. "When the chips are down in dealing with circuit design, I pull out one of my old textbooks from SJSU." He

credits the quality of the school to the professors and the fact that "most of them were also working in industry and knew the latest things going on." Collins himself has



Rositano: "Students need to understand all aspects of engineering."

taught in the Master's degree program. He is also a Senior Member of IEEE and a registered professional engineer, State of California.

Career Development By Design

Salvador Rositano wanted to be an engineer ever since he read *The Boy Electrician*

by Alfred P. Morgan in the sixth grade which inspired him to change his mother's basement into "an electrical fix-it shop." SJSU was near where he lived, so it seemed natural to go there.

Chairman Ralph Smith became his professional role model, particularly in the teaching of the Engineering Preview class which looked at a smattering of all engineering disciplines—a class Rositano considers so important that after he retires he hopes to revive it at SJSU. He feels that engineering students need to control their own careers, and the best method of doing so is to provide choice, and the best method of choosing is through understanding all aspects of the engineering.

He went directly to work for NASA after graduating from SJSU, got interested in the life sciences program, and wrote the definitive study on the effects of particle acceleration on cardiovascular systems using non-invasive techniques, which became the basis for his doctoral thesis. Presently, Rositano is Chief, Electronic Systems Branch, Systems Engineering Division at NASA.

"Value the Teacher"

Ray AbuZayyad (M.S. 1963) is President and CEO of Rolm Systems and has directed the organization's manufacturing and development efforts since being named president of Rolm Corporation in 1987. He entered SJSU in 1962 for his Master's degree after graduating from U.C. Berkeley where he'd come to study from his native Jerusalem. He had been working for IBM since he was a sophomore in col-



AbuZayyad: "You can't get an education from just the textbooks."

lege, and he selected SJSU because it was a good school and it was nearby.

There he received an "applied" education, with lots of lab work and experiments. What he appreciated most was the "accessibility of teachers." AbuZayyad says, "A good deal of my growth was heavily influenced by the people

I came in contact with," and so his advice to students is to "value the teacher, as opposed to thinking you can get an education from textbooks."

Students and Teachers Teach Each Other

Helmut Krawinkler (M.S. 1966), Professor of Civil Engineering, Stanford University, came to SJSU as a Fulbright Scholar from his native Austria for his Master's degree. In Austria, he had to contend with a stratified academic atmosphere, but at SJSU Krawinkler found the teaching to be excellent and the students and faculty made a congenial group. "We never had the feeling we were students," he says. "We worked on research projects right along with the faculty."

He says the teaching at SJSU was universally excellent. Most of the professors had a good association with engineering prac-



Krawinkler: "SJSU professors combined theory with field experience."

tices, and could combine theory with field experience.

When he came to SJSU, he "had zero exposure to computers." This was very different from students educated in the United States, and at SJSU he learned to use computers as a tool.

Krawinkler got his Ph.D. and did post-

doctoral work at U.C. Berkeley, and then taught at SJSU before joining the Stanford staff in 1973. He says he has "too many" graduate students, and is publishing many papers based on his research. Krawinkler is also Director of the John A. Blume Earth-

quake Engineering Center, where he develops protective measures for life safety and damage control. "All existing buildings must be updated," he says. Civil engineering "is not in the high-tech mode, but it does provide a service."

Focusing on the Future

Dale Pilgeram (class of 1967) went to SJSU to play basketball. He took a mixed academic curriculum to begin with, studied math and humanities, and in his third year took up engineering. He first studied civil

The Dean's Award:

BUILDING THE BRIDGE BETWEEN SJSU AND INDUSTRY

Dean Jay Pinson is certainly the architect of the bridge between San Jose State and Silicon Valley industries. Today there is real cooperation, communication, mutual support, and exchange of ideas between town and gown. If Pinson is the architect of this heavily traveled bridge, then his engineers have built the bridge, and he has rewarded their efforts with the presentation of the SJSU Dean's Award.

Keeping Pace with the Technology

Nancy Thomas was the first recipient in 1983. She went back to school when the youngest of her three children entered nursery school. She remembers being full of trepidation about having to remember the electrical engineering courses she'd taken many years before in Milwaukee. When she enrolled at SJSU, she was told, "Don't retake courses. Pick up where you left off."

With hard work, and "learning to live with clutter and mess at home," she was able to graduate with honors, as well as gain work experience at Hewlett-Packard as a lab technician.

Through a series of jobs at HP, "each built upon the other," and a Master's degree from Stanford, Thomas has worked up to a position as Contributions Manager, where she makes grants to non-profit organizations nationwide.

Serving on the SJSU Engineers Alumni Board, she watched Dean Pinson come into a university where there was little industry involvement and a lot of antiquated equip-

ment. Pinson made a tremendous change. Her own efforts help bring about much of this change as she worked to get grants and set up modern labs. "Now," she says, "students really get a chance to work on state-of-the-art equipment—what they'll be working on in industry."

Building for the Future

The next Dean's Award went to Barney Morias, who is presently President of Synergistic Applications, Inc., systems engineers. When he received the award, Morias was a Cal Poly graduate then working at Lockheed. While at Lockheed, Morias saw that there was a great shortage of systems engineers, and a lack of motivation and commitment on the part of students. So he approached Dean Pinson with the idea of setting up a course on systems engineering, design, and analysis. It worked out well, and SJSU built a complete Master's degree program around these classes.

Morias is impressed with the changes occurring at SJSU under Pinson. Pinson has managed to convince industrial concerns of the need for good student training, including adding a new building and equipment. And he has brought in new, young faculty, and created courses responsive to the needs of the Valley.

"SJSU is the biggest source of engineers, and they tend to be ideally suited to industry," Morias says. "Most of them are older, more mature, and most of them have work experience during their education."

Rallying the Team

Dr. Emil Sarpa, a Stanford graduate, was Corporate Manager for Academic Affairs at Intel Corporation when he met Dean Pinson. Sarpa liked Pinson's ideas and vision, and convinced Intel to place resources into SJSU as a good investment.

"Jay took a group of disparate people and shaped them up into a team in a very short time," Sarpa says. Even though he has left Intel, Sarpa is still an active and enthusiastic member of that team. He is now Manager, Collaborative Research, Education Products Division, at Sun Microsystems, Inc.

Meeting the Demand

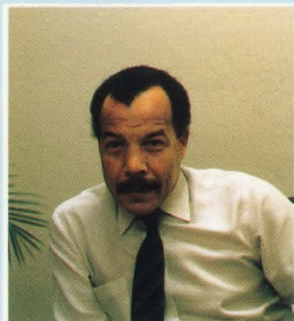
Another Dean's Award winner, 1987, is James McCoy, a 1964 graduate from SJSU and now Vice President and Chief Engineer of MacKay and Soms, a civil engineering firm. During McCoy's days at SJSU, he felt there was a great press for excellence because the department was in a state of transition, struggling to gain accreditation. Grading was all done by numbers and proficiency tests. A new building was going up; meanwhile there were the quonset huts that were "extremely warm."

Now he takes part in the annual "Engineer's Week," where students exhibit their projects to be judged. "Students now are quite capable," he says, "their grade point averages are unbelievable."

McCoy thinks SJSU has really grown in stature as a school for engineers. He says they probably train 50 percent of the engineers in the Bay Area. But the demand for good engineers still exceeds the supply. McCoy has a "standing order with the chairman for good recruits."



McCoy: Quonset huts were extremely warm.



Morias: He saw the need for systems engineering.



Thomas: Helping to modernize SJSU labs.



Sarpa: SJSU is a good investment for industry.

engineering, then mechanical, then electrical. Pilgeram went directly to work for IBM where he is now Vice President of Development of the General Products Division.

During Pilgeram's years there, SJSU "had a good reputation" as an engineering school, "but was in a state of transition from traditional technology to transistors." The new wave of electronics shifted the focus to electrical engineering, resulting in a "very strong sub-department with good individuals working on control design."

What Pilgeram appreciated about SJSU was the "close relationship between professors and students." The professors took the time to participate in social activities and help each student define a discipline. As student president of Tau Beta Pi, Pilgeram found a fraternity symbol in an attic and decided to rally the fraternity for the campus



Pilgeram: "There was a close relationship between professors and students."

to have this symbol mounted for posterity. He led the "effort of students to avoid bureaucracy" and endless waits for permits, by installing a "multi-ton rock in dark of night on a weekend" with the symbol embedded on the rock. He got all the materials and the services, including the donation of the use of a crane, and garnered help from all sorts of people, including some faculty. And *voila*, one morning the

rock appeared, with only one water main as a casualty. The rock can still be seen on the SJSU campus, and when it had to be moved to make way for a new building, Pilgeram was consulted as the SJSU rock installing authority. ▲

Mary van Tamelen is a freelance writer. She also serves on the City Council and is a former mayor of Los Altos Hills.

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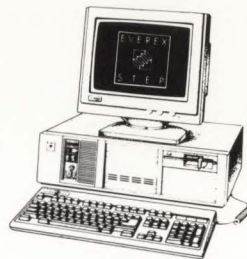
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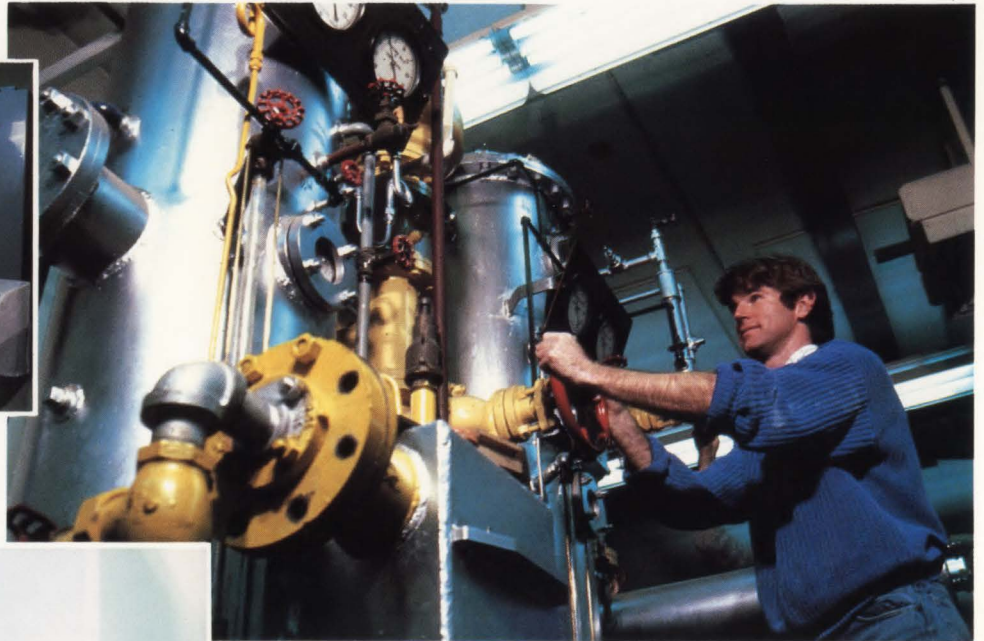


THE FUTURE IS NOW

New state-of-the-art labs provide engineering students at SJSU the use of equipment that is on par with that in industry.



(Above) Materials Engineers use an up-to-date transmission electron microscope.

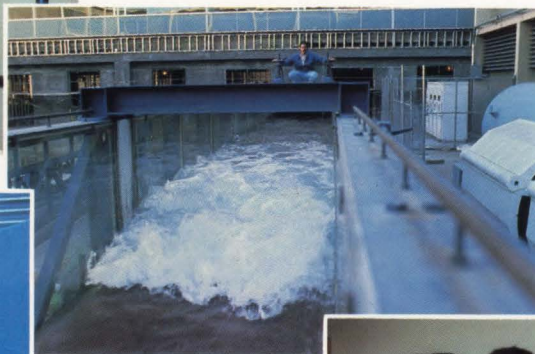


(Above) A unit operational lab in the Chemical Engineer school.



(Left) Mechanical Engineering student works on a special project using the Autocard CAD/CAM system.

(Below) For Civil Engineers—a hydraulic jump in a flume.

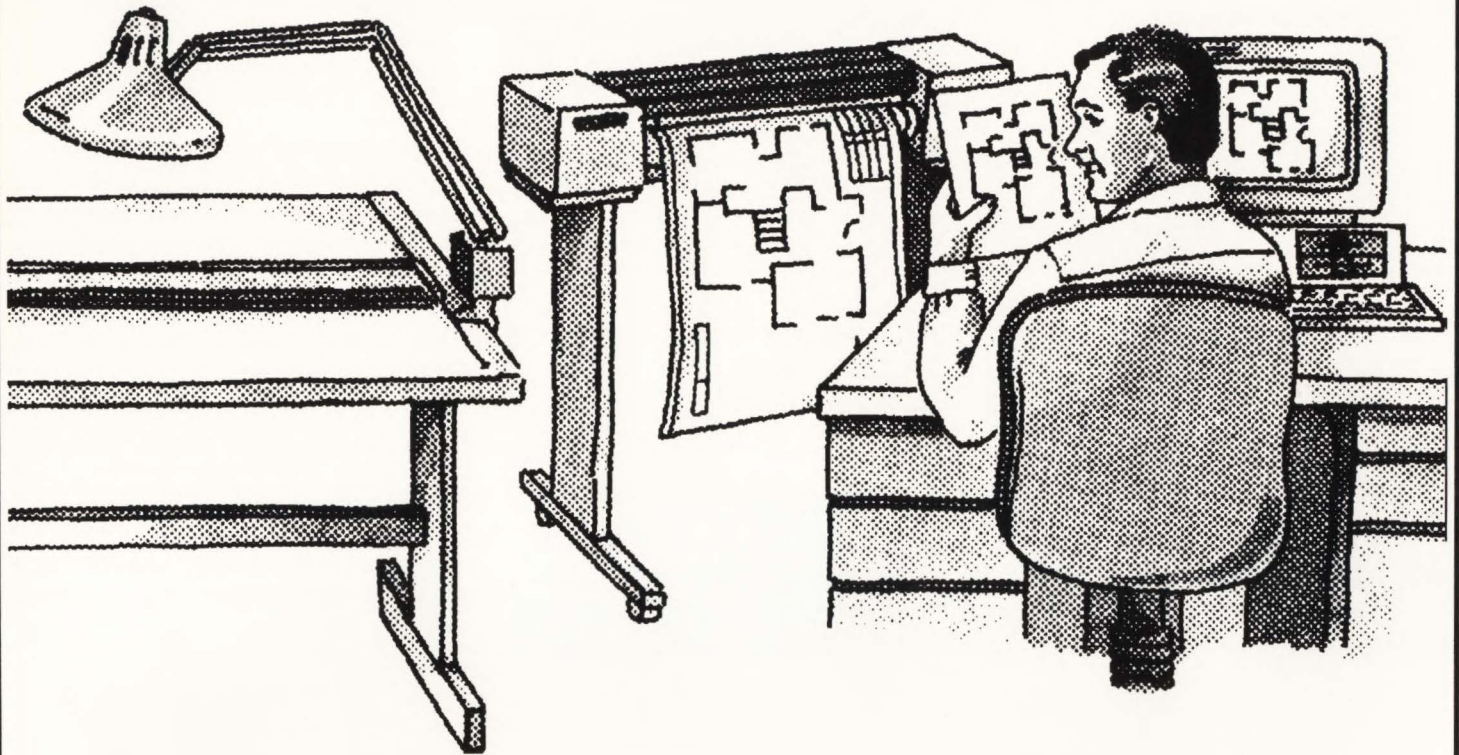


(Below) Students in Industrial Systems and Engineering learn robotic programming using a teach pendant on the Microbot.



(Left) A subsonic wind tunnel (with model rocket) for tests up to 100 mph is available for Aeromechanical students.





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Jane Evans says that her objective is to "help the young people of Silicon Valley catch the excitement of engineering."

Award from the Society of Women Engineers, Centennial Medal from the IEEE, and Fellow Award from the American Association for the Advancement of Science.

In the Chemist's Lab

Jane, who grew up in Houston, began her career with a degree in chemistry from Rice University. She first worked for Union Carbide Corp. and later at the University of California's Los Alamos Scientific Laboratory.

"Much of my work as a chemist was with electronic instruments," she says. "I decided that my real interest was in electronics and the sort of hands-on work that engineers did."

So Jane decided to pursue a degree in electrical engineering. She gives much credit to the support of her husband, John, a research physicist. "John has encouraged me in every technical endeavor I've undertaken," Jane comments. "He's never questioned my ability to do anything."

Jane and John jointly decided to move from Idaho Falls, Idaho to California, seeking both "climate and career opportunities." Jane then enrolled in San Jose State University to pursue a BSEE. Upon graduation, she joined HP, first working in applications engineering for setting time and frequency standards with cesium beams. From there, she moved to nuclear instrumentation and learned about computers as the company developed them for automated instrument control. She later became involved with systems integration between host computers and intelligent peripherals.

Despite a demanding career as an engineer and project manager, Jane has always found time for professional organizations and groups that support engineering students. This interest and dedication ties in perfectly with her current job at HP—where she works to provide HP equipment to students in teaching laboratories at the nation's universities. HP's philanthropic donations to educational institutions totaled some \$50 million in 1988; most of this was equipment. "One of my goals is to help the young people of Silicon Valley catch the excitement of technology," Jane says.

Earlier this year she coordinated a presentation on behalf of the Society of Women

BREAKING NEW GROUND

The first woman BSEE graduate from San Jose State University makes her mark at HP.

by Michele Drake

Jane G. Evans radiates enthusiasm when she talks about the electronic information age in the Silicon Valley and the promise it holds for young engineers—particularly women.

"The Information Age is of great importance to women," she says. "We've been a part of it from the first, and we've been welcomed into fields like computer science and programming with a refreshing lack of stereotyping."

An engineer with Hewlett-Packard Co. since 1965, Jane knows a lot about being there first. She was the first woman to graduate from San Jose State University with a degree in electrical engineering in 1965. She was also the first woman to join San Jose's chapter of Tau Beta Pi, the

national honor society in engineering. And she was the first woman to be elected a Region Director for the Institute of Electrical and Electronics Engineers (IEEE). Jane's national post on the IEEE Board of Directors followed her stint as Council Chairman for the San Francisco Bay Area.

Jane was honored for her pioneering activities by the Career Action Center in Palo Alto last May. She was one of five women from the Bay Area to receive the organization's annual "Women of Vision" award given to women who "have gone beyond the ordinary in their fields," according to Career Action Center Executive Director Gail Stypula.

"That award was quite an honor," comments Jane, who lists it with her Fellow

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Engineers. The audience was a group of young black women just entering high schools in the San Jose area. She and two HP engineer-volunteers set up an actual HP data acquisition and control system that involved "dog and pony" figures marching back and forth on a conveyor belt under computer control, just as industrial processes might be controlled in today's automated factories.

"The kids were all eyes," Jane reports. "We spoke with missionary zeal about how many interesting careers exist in today's technology, and told them, 'You can do it!'"

"Seeing the increasing number of women enter engineering schools is a great source of pride for me," Jane reflects. "We're still behind law and medicine, but our numbers are climbing steadily."

In the Off Hours

Jane and John live in Los Altos where, she says, they raise pumpkins and onions in what's left of a garden taken over by giant zucchinis. As they have supported one another in their technical careers, Jane and John support each other at home, too. "I'm

the person who worries about the cars and does the cooking—John can't even make toast," Jane quips. "But he pays all the bills, keeps the records and does the gardening."

John is a research physicist at Lockheed's Palo Alto Research Lab, right across the street from Jane's Hewlett-Packard location, which allows for occasional lunches together, joint commuting, and workouts three times a week at the nearby Y, where they keep fit for their shared interest, golf.

In late August, the couple was starting to pack their bags in anticipation for their annual migration to Mapili Bay, Maui. For at least 20 years, they've been staying for two weeks at a resort that has full kitchens since Jane likes to prepare island favorites such as stuffed papayas and grilled fresh ahi tuna and ono. "One suitcase always has spices and favorite kitchen implements among the snorkels and fins," Jane says. ▲

Michele Drake manages Hewlett-Packard's Corporate Personnel Communications Department and has published articles in many corporate and trade publications.

Rising Sun Falling Star

Continued from p. 17

in the past, now, and in the future, the United States more than any other country in the world has demonstrated an uncanny ability to self-correct.

From the fresh crop of young, technically competent Air Force officers who are now calling their own shots on big programs (and doing it well); to all the stirrings of tax policy changes along the Potomac (a 17 percent capital gains tax?), the U.S. is once again looking inward, looking to change the system to make it even better.

U.S. corporations and government can work together to challenge the threat posed by Japanese industry. By building on home-grown strengths and initiative, we can compete with Japan Inc. In the next issue, our panel members will offer their solutions to these problems. They will provide an earful, offering some very creative, provocative and controversial ideas. ▲

Fred Levien is a contributing editor to Silicon Valley ENGINEER Magazine.

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WHEN EVALUATIONS HURT

*How to turn a bad evaluation
into a good experience.*

by Jean A. Hollands

John, you are brilliant on the project, but you don't take criticism. You sometimes miss the big picture."

"Bob, you are VP potential with this company, but you create tension around some of the collaborating team."

"Jane, you are technically strong, but you miss deadlines too frequently."

No matter what is said about your personal or technical competence, you probably don't like negative criticism when you hear it or read it. In fact, if you are like most engineers or employees, you won't like criticism in any form! Three common feelings usually trigger the dreaded reflex to poor reviews:

1. You feel misunderstood: This hurts. You feel your manager misread your intentions, or more probably, you experience double messages. "Get the job done," you heard. You didn't hear, "...and make everybody happy while you are doing it!"

2. You feel rejected: How could your boss do this? You feel duped. You believed you were on track, you hadn't heard many complaints, and you thought you were one of the favorite sons or daughters. The review shows you are no longer fair-haired!

3. You feel scared: If you can be surprised about this, perhaps there are other surprises. "What else have I missed?" you worry. Fear is a powerful emotion which creates paranoid responses and an inability to risk. Poor ratings can make you afraid in some over-generalized forms.

Why are we so attached to our tasks? The reasons we take our evaluations so personally is that we have become a culture of conscientious over-achievers. We take our proj-

ects very seriously! We attach these tasks to our psyches so closely that our egos cannot disengage from them without major surgery. We can't help it. We've been programmed. Schools, colleges, companies all encourage exceptional ego orientation to our tasks.

Here in Silicon Valley, and particularly in engineering, we are seen as a community of high-profile magicians! Miracles are expected; continued creativity is the goal. We are designed to design the best. But, sometimes there is slippage; occasionally our priorities do not meet those of the powers that be. Periodically we only selectively listen to the directions, the bosses' values, the company's deadlines.

Excellence Does Not Mean Perfection

Make your best effort. Don't kill yourself for perfection. Perfection is never attainable for the compulsive person (you or your manager) who always has one more hurdle for your race. Hurdles need to be spaced in distances that allow for *stride recovery*. If you are expecting too much of yourself, you may not be able to take a lowered evaluation even though you have life strains, company reorganizations, or difficult colleagues.



Jean A. Hollands says, "use your review as a turning point."

Give yourself a break. If you feel you've done all you can, rest up. If you feel the evaluation is on target, don't punish yourself any more than your evaluation does. *And*, get started on a plan to improve on every line item on the review!

What To Do About A Poor Evaluation?

1. Appeal: Don't give up easily. Ask for a second or third meeting. Assure your evaluator that you have learned some strong lessons from the review. You want to negotiate the misunderstanding or the crossed signals. It is your job to sell your boss on the work that you have done. Don't claim that the boss also has a responsibility for the final outcome of the communication! This is, of course, true, but we are not always privileged with wise supervisors. Help yours along!

But do hint that in the future you are willing to bend over backwards to assure that both of you understand the priorities. Remind your supervisor that "I want you to take in to account my excellent work on the KY1441 project." Bring in your statistics, letters of thanks or recommendation, a typical work day, the schedule you followed. "Credentialize" yourself with your evaluator!

2. Reframe the consequences: Make the best of the bad news! You may choose to learn from the situation, to use this as a turning point. Even if the evaluation leads to your quest for another company, look upon the review as

good news, the perfect catalyst to look for the new work scope or work behavior you may badly need to put into practice.

3. Complain: Make a fuss; don't eat it. If you really feel that the review is unjustified, get a friend or colleague to read the review over with you and then encourage honest feedback. Secondly, take the review to yet another resource who may give you more constructive suggestions. If those people still believe you have a justifiable complaint, then complain!

Gently ask for a capitulation of your review. Suggest at the outset that you recognize that there may be no final changes, but that you believe you deserve the time to voice your objections. Expect that the outcome may only be a hearing; that numbers may not change, but convince yourself

that you are setting seeds with the boss to be used later—the next evaluation, the next round.

4. Use this as a time to make a change! If the evaluation follows a series of other disappointments, misunderstandings, missed raises, or unhappy meetings, use this moment to make the job change you probably need.

5. Ignore the whole thing—get on the next project—and forget it. Get busy. Your next evaluation may make up for this bleak moment in your history. Don't give a lot of energy to this review. You have bigger work to do, more important projects to finish, more vital people to impress.

6. Give yourself a monthly evaluation. Try to get your boss to buy in to the idea. But make it easy for the boss; just show your own evaluation with "agree" or "disagree" boxes to fill in. This allows you to rank your priority issues and gives you both some new criteria for next time.

7. Ask for formal evaluations more often. If you can increase immediate feedback levels, you will have a better barometer reading of you. But most managers *hate* to give reviews. Remind them that "more often" may not mean "more work." You promise that you will take responsibility for getting forms ready, doing your share, and sticking it under bosses' nose. Promise that you will make sure the meeting happens.

"Why," you wail, "do you have to do so much of the work?" Because it is *your problem*, you don't like the review, you want a better one, you want to succeed! Stop griping; do it!

Lastly, look at the review which hurts as a turning point for you. Behavioral changes happen when we are hit by a truck, face death, or face ego damage! Use this critical moment to find a new and exciting you. Take a communication class, find new ways to look at your job scope, learn to negotiate priorities with your manager, and seize the moment. Let this black letter day serve notice for the new era. ▲

Jean A. Hollands, President of Growth & Leadership Consultants, trains in over one hundred and fifty corporations in Silicon Valley. She received her M.S. degree from San Jose State University in 1975, the first ever to graduate with a degree in Marriage and Family Counseling.

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TAKING THE TRAUMA OUT OF TECHNICAL TRANSFERS

How to buy a house in Silicon Valley.

By Denise Davis

Suppose you are a manager of technical support living and working in New Jersey with your husband, also an engineering professional, and your eight-year-old daughter. You accept a position with one of the largest engineering firms in Silicon Valley. You sell your home in New Jersey—a split-level house on one-half acre—for approximately \$250,000. How do you



This home was purchased by a relocating family from New Jersey at an attainable price.

find a comparable home in one of the country's most expensive residential markets? Where do you begin?

One family began their search by contacting a local New Jersey realtor who put them in touch with Grubb & Ellis Real Estate Services' Relocation Department in Northern California. They were referred to a home finding counselor whose job was to determine what they needed in a community and wanted in a home. Over the phone, the counselor asked them about their time frame, price range, distance they were willing to commute, education needs and employment requirements for the spouse. The call was followed by a personalized relocation packet containing information about the areas that met the clients' criteria.

"With the relocation packet we tried to construct an accurate picture of the areas the client was considering," says Ilene Clancy, home finding counselor. "Silicon Valley is a high-cost area and the relocating family needs to know what they are up against." The packet contained general information about California and the Bay Area, price ranges for all, loan and creative

financing information, *Homes & Land Magazine* for the targeted areas, and test scores for elementary through adult education in various school districts. The packet also included sections on recreation & entertainment, with information and articles on helping children adjust to a new environment.

Once the client has studied the information in the relocation packet and arrives for a tour, the home finding counselor refers them to a sales agent in the targeted areas. In the case of the family from New Jersey, Clancy referred them to Spencer Robbins, a relocation specialist with Grubb & Ellis' Los Altos office. Robbins began by taking the family on a three-hour tour of Silicon Valley, giving them an overview of the area. This was followed by several house-hunting trips. One of the chief considerations, according to Robbins, was finding a house in a neighborhood with a solid school district. "This family had an eight-year-old with years of education in front of her. They wanted a district that rated well from elementary through high school," said Robbins.

Robbins showed the family approximately a dozen houses before finding the one they would call home. Last November, a 3 bedroom, 2 1/2 bath home in San Jose came on the market for \$385,000. It had been completely remodeled inside and out—new paint, new carpet, new redwood deck—and it was in the Cupertino school district, one of the highest rated districts in California. They signed the contract immediately after touring the home. One month later, it was theirs.

Dolly Toms, executive vice president of Grubb & Ellis' residential brokerage services Northwest division says, "We're here to make the relocation process as stress-less as possible. Whatever it takes to get the move accomplished is done."

The specialized services offered through Grubb & Ellis are:

For Transferees

- Pre-move counseling by telephone
- Mailing of personalized relocation packet and other requested information
- Pre-arranged motel/hotel reservations upon request
- Area orientation
- Tour of area housing and highlights
- Home search assistance, i.e. *Homes & Land Magazine*
- Short and long term rental assistance
- Furniture rental assistance
- Spouse employment referrals
- Moving and storage information and discounts
- Post-settlement assistance programs

For Corporations

- Flexible marketing plan to assist transferees in marketing their homes more efficiently before corporate buyout
- Individual home marketing plan for corporate-owned homes
- Simplified bookkeeping/billing of corporate-owned home expenditures
- Orientation tours arranged without cost to corporation
- One point of contact
- Literature supplies to help in initial recruitment

In conclusion, this is not a one of a kind Cinderella story—with a little diligence one can find a home within their means, in the San Francisco Bay Area—one of the most sought after areas in the country. ▲



SILICON SLICES

Edited by John Joss

Biotechnology is a growing discipline, as many will see at the end of October. **Linda Cartledge** is the force behind the second International Biotechnology Expo and Scientific Conference coming to the San Mateo Expo Center October 24-26. She expects 8,000-10,000 visitors who will roam 440 exhibits (40 or more from Canada, the U.K., Switzerland, and the Federal Republic of Germany.) There will be 42 workshop seminars and an employment clearing house. Linda formed the non-profit International Biotechnology Suppliers Association at 3097 Moorpark, San Jose, CA 95128, to coordinate this growing world industry. You can call her there at (408) 554-6644 for more data.

Education: The theme recurs throughout this issue. Welcome, then, **Dean Hal Hendrick** who runs the University of Denver's college of Systems Science, dedicated to helping engineers get the big, systematic picture to manage today's typically complex projects. The concept started at USC in 1952. Today UD awards MSSM (Masters of Science in Systems Management) degrees, and has more than 12,000 graduates and almost 40 study centers nationwide, including Silicon Valley. Who believes? Scores of corporations and military activities—The cream.

Update: Since **Bob Brown** of Interactive Network graced our cover, Interactive Network has made strides. Beta tests start soon. Want to participate? Call (415) 255-3843

(voicemail) or (415) 960-1000 (working hours) to qualify. Sites: Mountain View, at IN's offices, and the Young & Rubicam ad agency, SF. Says VP Marketing **Kevin Randolph** (Washington State, EE, BA biz/mktg): "We'll let people play (interactively with TV) any games they already play with their minds." Any? "Any." Watch for big announcements late '89 and public splashes by mid '90.



Fred Byers—from electronics to wine tours.

Career changes for engineers are common. Take **Fred Byers**, a refugee from Dalmovictor in Belmont (electronic warfare). After a stint at Defense Electronics in Palo Alto, he decided to follow his wine avocation. Voila: 'Vineyard Ventures,' private tours for 10-12 visitors to select wineries in a luxury van. He makes the day a joy: the Oakville Grocery for gourmet goodies, lunch at the Sonoma Hotel, champagne in Gloria Ferrer's caves, a final stop in the Marin Headlands above the Golden Gate Bridge for a glimpse of the City. Oh yes, the envelope: call him at (415) 578-8631 for reservations.

Colleagues' praise for **Dean Jay Pinson** (cover) isn't just drill. He has formed the Silicon Valley Engineer Council to sponsor/promote "education to foster engineering career development, especially among the young, and to increase public understanding of how engineering enhances the quality of life." Among the corporate supporters are **Sid Hollander** of Aerospace Corp. and **Mary Rogers** of Lockheed. Member organizations

include IEEE, ASME, ASCE, the American Public Works Association, and the San Jose Engineers Club. Technology companies are invited. Write to 95 South Market, Suite 650, San Jose, CA 95113.

Brad Shrick, CEO, Engineering Software Concepts (Palo Alto), ex-NASA engineer, commercial rocket developer, satellite logic control designer, CAE expert, and pilot, is a Renaissance man. "Technology makes the future," he says, "so I became a technologist. But blind creation of technology can't produce American Dreams, even for technology companies...people who resist good new technology do so for good nontechnical reasons." Words of wisdom for those who think technology is the end, whereas it's only the means.

Woman power proves itself one more time. Consider **Gaylen Herfurth**, CEO of Advanced Micro Consultants, of San Jose, and her

marketing manager **Nanci Cooper**. AMC Communications provides CAD/CAM services, installations, training, and support to PCB designers, engineering groups bringing in CAD, and facilities management departments (and has created User Groups in all three categories). Now 15 strong and growing, AMC typifies the kind of tough-minded and effective achievements of woman power.

They keep coming back with new ideas. Now it's **Mike Geilhufe**, memory circuit design pioneer at—remember?—AMS, or Advanced Memory Systems, folded into Intersil which became part of G.E. in the '70s-'80s industry implosion. Mike went to Intel, cellmate with **Federico (Synaptics) Faggini**. Now he has formed Information Storage Devices, at 2332 Walsh in Santa Clara. Analog data on silicon. So we've come full circle with silicon vs. magnetic media, with digital vs. analog in key applications. ▲

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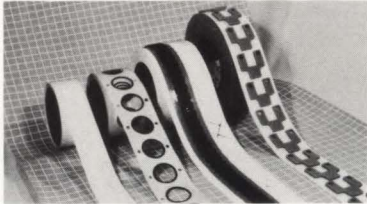
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One Engineer's Opinion

THE FUTURE IS IN YOUR HANDS

Who will inspire the engineers of tomorrow?

By Terry E. Shoup

This past summer, 15-year-old Gabriela Hernandez of East San Jose decided to become one of the success stories of the engineering class of 1996. The Andrew Hill High School sophomore plans to keep up her good grades, take more math and science courses and study for the Scholastic Aptitude Test (SAT).

Gabriela is one of the lucky ones: a potential engineer inspired early enough in her schooling to prepare for the rigors of an engineering college education and career. I met her in July at Santa Clara University, shortly after I arrived as the new dean of the School of Engineering. She attended our Engineering Week, part of the university's Project 50 outreach program for minority 8th and 9th graders. Gabriela went from calling engineering "boring and a lot of paper pushing" to aspiring to become a computer or civil engineer.

Unfortunately, there aren't enough Gabrielas getting turned on to engineering. Many high schools can't afford to provide the science and math courses, motivation and career counseling necessary to prepare students for technical studies. And it is becoming clear that the time to excite students about a college education in engineering is during elementary and middle school. Yet there aren't enough outreach programs inspiring younger students, particularly women and minorities, to take the required science and math courses in high school. We engineers can help by "selling" engineering and making it appealing to a diverse student body at a younger age. We all need to make

education our business and excite more youth about our profession.

Why Should I Get Involved?

"Hey, education is your business, not mine," you might be thinking. "You're the new dean of an engineering school, it's your job to attract students."

Once it was possible for engineering schools to sit back and wait for the top high school graduates to beat a path to their



The author gives Andrew Hill High School student Gabriela Hernandez a ride in a Mini-Baja, all-terrain vehicle designed by Santa Clara University mechanical engineering seniors.

doors. And industry reaped the benefits of this academic competition.

Today, engineering schools can't keep up with the personnel needs of industry. As the college-age population of young people grows smaller from the low birth rates of the '60s and '70s, fewer students are entering the science and engineering pipeline. The National Science Foundation reports that the interest of freshman students in science and engineering majors has declined by one-third over the past two decades.

The proportion of racial and ethnic minorities and women earning baccalaureate

engineering degrees is alarmingly low. Yet, three-quarters of American workers entering the workforce between now and 2001 will be women, nonwhites, immigrants; a pool of potential new engineers making up more than half of the population.

The National Science Foundation projects a shortfall of more than 500,000 science and engineering professionals, both in higher education and in industry, by the year 2010.

How You Can Help

You *can* send money to your engineering school, local university, high school, or grade school. Your dollars help fund scholarships for students, buy new equipment, and build new engineering and science facilities. But your support of engineering education can and should go much further.

Here are some ways you can help:

- Contact your professional engineering society to volunteer for education committees and school career fairs.
- Join your company's speakers bureau and urge community groups to support engineering education.
- Support your engineering school's mentor program to encourage prospective students.
- Talk to science and math classes at local schools. Share past experiences that motivated you to enter engineering.
- Spend a "sabbatical year" at a college as a visiting lecturer or teach part-time at night without leaving your job.
- Serve on an advisory group to your local university or school of engineering. Educators are seeking ways to make engineering education more accessible.

Whatever your level of involvement in engineering education, you will likely find your efforts rewarded manyfold.

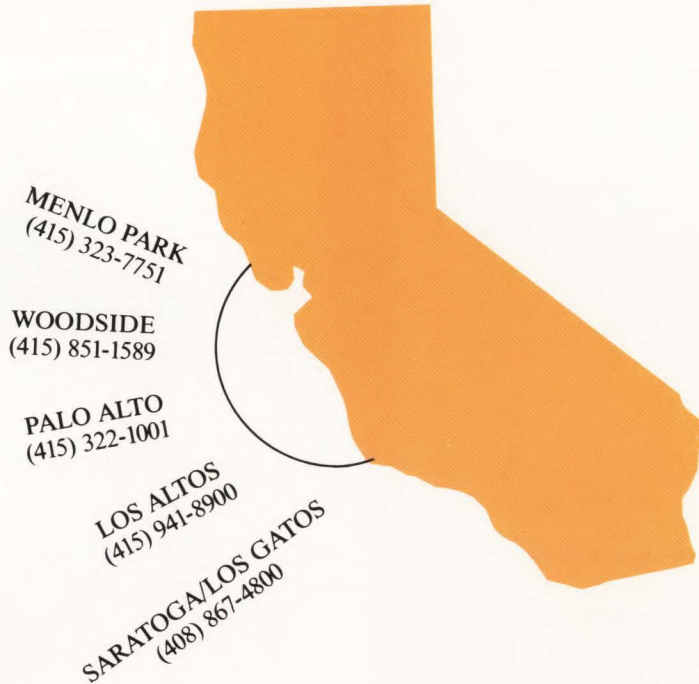
Remember Gabriela. She learned about engineering firsthand from professionals. Today, she is training to be one of tomorrow's engineers. You can have a similar impact on other students. We will all reap the rewards. ▲

Dr. Terry E. Shoup, a mechanical engineer, is the new dean of Santa Clara University's School of Engineering and holds the John M. Sobrato Endowed Chair. Author of more than 100 technical papers and 13 books, he is editor-in-chief of the journal Mechanism and Machine Theory.

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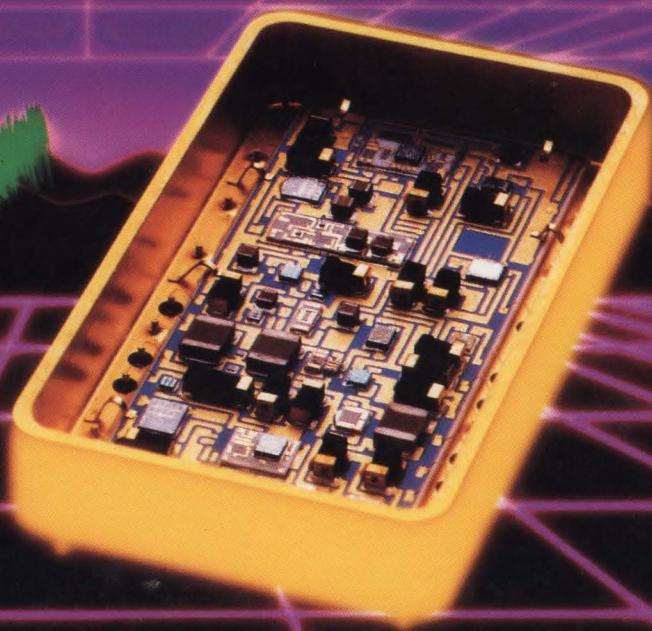
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