



The IEEE

Newsletter

PUBLICATION OF THE NORTH JERSEY SECTION OF THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS

No. NJ Consultants' Network: **Federal SBIR — Small Business R&D Opportunities**

On January 27, 1994, the IEEE Consultants' Network of Northern NJ will present "The Federal SBIR Program—Opportunities For Small Business R&D." The speaker will be Michael Miller, of Michael Miller Associates and SBIR Technical Liaison for the State of New Jersey.

About The Topic

This presentation will be an introduction to the Federal SBIR Program, a program established exclusively for small businesses to enhance the development and commercialization of new technologies in the U.S. He will describe the program, explain how individuals and small firms can get involved and provide tips on competing successfully for SBIR funding.

The SBIR Program budget will grow from \$500 Million in FYE '93 to over \$1 Billion in FYE '97. Through the program, eleven major R&D contracting and granting agencies request research in technologies spanning a broad spectrum of topic areas. Projects are funded in two phases: Phase I, a feasibility study phase (funded up to \$100K) and Phase II, a prototyping phase (funded up to \$750K). To be eligible, a firm must be for-profit, employ less than 500 people and be U.S. owned. Many successful SBIR awardees are one-person firms.

About The Speaker

Michael Miller is the Principal of Michael Miller Associates (MMA) in Annandale, Virginia. He is also the Washington Technical Liaison commissioned by the New Jersey Commission on Science and Technology to help small high-tech businesses in New Jersey pursue Federal R&D funding opportunities. Mr. Miller is an engineer/marketer involved exclusively in advanced R&D fields for over 25 years and is a former staff member of the Battelle Memorial Institute. MMA maintains an extensive file on federal R&D organizations, technical interests and key personnel.

Optional Pre-Meeting Dinner

Members of the NJ Consultants' Network are invited to come and meet the speaker at the Steak and Ale Restaurant in the American Way Mall on Rte 46 Eastbound, (right next to Bennigans—after Passaic Ave. and before Willowbrook), in Fairfield, N.J. For directions, call (201) 227-2134. For reservations (**REQUIRED**), call Frank Scholten (201) 994-9819.

Time: 7:30 PM, Thursday, January 27, 1994.

Place: GEC-Marconi Facility, 150 Parish Drive, Wayne, NJ.

Directions: From Intersection of Rte. 23 and Rte. 46, approx 1 mile east to Riverview Drive. North on Riverview for 1.5 miles to traffic light at golf course. Go straight on Valley Road to next light; turn left onto Parish Drive. Follow to "T"; left turn for 2 short blocks to Dey Rd. Left on Dey Rd. GEC entrance approx. 100 ft. on right side.
Information: For alternate directions and up-to-date meeting status call (201) 736-0771 (Walker Elec. Services 24hr VOICE MAIL).

North Jersey Section PACE: Re-Engineering— Does It Really Work?

At the January 13, 1994 meeting of the North Jersey Section's Professional Activities Committee for Engineers, the topic will be "Does Re-Engineering (Reconstructing) Really Work?—An Employee's Perspective." The speaker will be R.V. Rebbapragada.

About The Talk

Many companies are expending their precious resources to re-engineer to look

like a winner. Are they really producing long-lasting, bottom-line results? While it achieved positive results in some cases, in many others it was a flop. There are several reasons for these failures, because the implementation of these changes does not fully penetrate the breadth and depth of the organization in the following areas: responsibilities, incentives, structure, office automation, shared values and skills. In addition, sometimes the models that are used simply do not work.

In this talk R.V. Rebbapragada will discuss why this concept is popular with the management and what could go wrong that would bring in its wake, layoffs, poor morale and inferior quality of performance.

About The Speaker

R.V. Rebbapragada received a BSEE from the Indian Institute of Science (1959), MSEE from Purdue University (1969), and MS (Operations Research) from Polytechnic Institute of Brooklyn (1972).

Mr. Rebbapragada is employed by Ebasco Services Inc., as a Senior Consulting Engineer in the Nuclear/Advanced Technology Department and is responsible for technical consulting services involving the engineering/design of power generation, transmission, and distribution facilities and substations. He is 1994 Chairman of the IEEE North Jersey Section, Chairman of the Power Engineering Society chapter North Jersey Section, and a senior member of IEEE. He is a registered professional engineer.

Time: 7:30 PM, Thursday, January 13, 1994.

Place: JCP&L Co., 300 Madison Avenue and Punch Bowl Road, Morristown, N.J.

Further Information: Robert Sinusas (201) 228-3941.

JANUARY, 1994 Volume 40 Number 7

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It is not necessary to inform the North Jersey Section when you change your mailing address. The NEWSLETTER and other section mailings use a list provided by IEEE's national headquarters in New York. This means the Section has no need to maintain a mailing list or addressing plates. Section membership records are changed when Headquarters notifies us.

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The North Jersey Section Executive Committee usually meets the first Wednesday (except holidays and December) of each month at 7 PM. These meetings are open to all members. Information on meeting agenda is available from Mel Lewis, Section Secretary at (914) 968-2500, ext. 2304.

Elected Section Officers are listed above.

No. Jersey-Control Sys. Soc.: Control Applications For Mobile Robots

The February 9, 1994 meeting of the North Jersey Section IEEE Control Systems Society will feature a talk on "Control Applications For Mobile Robots." The speaker will be Mr. Alan Santucci, of the Automation and Robotics Laboratory at Picatinny Arsenal.

About The Talk

A common goal of the many research and development projects in the area of automated mobile platforms has been the development and construction of completely autonomous vehicles capable of functioning in some intelligent fashion. However, even the most basic problems of navigation and collision avoidance encountered in such projects have been found to be very difficult to solve in any environment more general than that of a very structured laboratory.

The speaker will review the types of sensors that have been used to solve these problems in the past and then suggest how new technology can be applied to find alternative solutions to the navigation problems associated with automated mobile platforms. He will then describe the capabilities that his laboratory group has incorporated in the autonomous testbed that they have developed for material handling applications. He will present video tapes of such vehicles in action and of a simulation tool being used to generate the state tables for the control rules being designed.

About The Speaker

Alan Santucci has been a Research Scientist and Project Engineer in the Fire Control Division of the U.S. Army Armament Research, Development and Engineering Center (ARDEC) at Picatinny Arsenal in New Jersey, since 1981. Since 1985, he has been a Project Engineer for the Automation and Robotics Laboratory working in the fields of robotic control, image processing, autonomous navigation and digital signal processing. His work has focused upon basic research on autonomous robots and their application to labor intensive tasks such as material handling and logistics support in an unstructured environment. He received a BS degree in electrical engineering from Rutgers University in 1981, and a MS degree in computer science from the Polytechnic Institute of New York in 1992 and currently is pursuing doctoral studies in computer science at Stevens Institute of Technology.

Free Pre-Meeting Buffet

Reservations are strongly recommended for the pre-meeting buffet which starts at 6:00 PM followed by the meeting at 7:30 PM.

Time: 7:30 PM, Wednesday, February 9, 1994.

Place: John Howard Room, second floor, Hazell Student Ctr., NJIT, 323 Dr. Martin Luther King, Jr. Blvd., Newark, N.J.

Reservations/Information: Tim Chang (201) 596-3519; Fred Chichester (201) 744-7340.

Princeton/NJ Coast NPSS: Fusion Energy: Meeting The Challenge

The IEEE Nuclear and Plasma Sciences Society (NPSS), Princeton/New Jersey Coast Chapter, will present a colloquium "Fusion Energy: Meeting The Challenge." This meeting will take place February 9, 1994. The speaker will Dirk Arnold Plummer, P.E.

About The Topic

Controlled thermonuclear fusion is undergoing intense study and development as a possible replacement source of energy. This initiates a requirement for a suitable container to hold ongoing fusion reactions. A satisfactory container will protect the people outside it from radiation and will not disturb, cool, or quench the reaction. Its disposal should not create a radiation hazard. Inertial and magnetic confinement have been selected for development and constitute the major distinguishing characteristic for the two most favored reactor prototypes. This presentation introduces both, giving preliminary looks at and suggestions for the extraction of power, either directly or by conversion from heat generated in surrounding materials. It focuses on fusion reactor control.

About The Speaker

Dirk Plummer received an SB in Chemical Engineering from MIT., a BS in Electrical Engineering from Univ. of Calif., Berkeley, and an MS in Electronic Engineering from Monmouth College. He has worked in industry, performing the design of the Plainsboro Industrial Reactor Laboratory cooling and purification system, and in Government, as in-plant representative for the Lunar Orbiter power and communications subsystems at RCA Astro-Electronics Division in Hightstown. He is currently working on his own as a professional engineer.

Time: 8 PM, Wednesday, February 9, 1994.

Place: Princeton University, Engineering Quadrangle, Convocation Room C-217, Princeton, N.J.

Information/Directions: Charley Bowman (609) 490-2132; Dirk Plummer (908) 219-9553.

NY/NJ/LI EMBS:

Fighting Anxiety, Depression, And Fatigue Without Drugs

On January 20, 1994, the Metropolitan Sections Engineering in Medicine and Biology Society will present a program on "Fighting Anxiety, Depression, And Fatigue, Without Drugs." The speaker will be Joel H. Levitt.

About The Talk

This lecture will review the most common causes of the biochemical imbalances which commonly manifest as anxiety and/or depression and/or fatigue:

1. Disturbed sugar metabolism; 2. Allergy to foods or inhalants; 3. Deficiencies of vitamins, minerals, amino acids; 4. Metallic toxins (lead, mercury, excess copper); 5. Infections (by bacteria, virus, yeast).

Negative and Positive Feedback will be reviewed from the standpoint of orthomolecular vs. drug treatment.

Some of the issues to be discussed: Why low-blood sugar and high-blood sugar conditions should be treated with the same no-sugar diet; why a nasal reaction to pollen may point to a food allergy; why a person on an excellent diet may have severe nutritional deficiencies; why chlorinated water delivered through copper piping is not suitable for drinking; why yeast infection is far more serious than bacterial infection and the consequences of this with respect to indications for use of anti-biotics.

Although most of the material to be presented is not new, it is usually excluded from medical college curricula.

About The Speaker

Professor Levitt holds four degrees from Columbia University and has been a member of the faculty of Pratt Institute for over 25 years. He is serving his second year as Chairman of this EMBS chapter. He also teaches a course titled "Fighting Anxiety, Depression And Fatigue Without Drugs" at the Brooklyn College Institute for Retired Professionals. His last lecture at Rockefeller University "Panic Attacks And Sugar Metabolism—What's The Connection?" was given in October 1990.

Time: 7:30 PM, Thursday, January 20, 1994.

Place: Rockefeller Univ., Tower Bldg., Room 305, 1200 York Avenue, NYC.

Directions/Parking: Entrance gate at 66th Street, Free admission. Free parking. By subway—68th on #6 (Lex). By bus—M15, M31, M58, or M66.

Further Information: Joel Levitt (718) 891-6460; Sol Manber (516) 585-8200; Andrew Baxt (516) 678-6563.

North Jersey Section Activities JANUARY 1994

January 5, 1994—"North Jersey Section Executive Committee Meeting"—7:00 PM, Plant 11, GEC-Marconi, 164 Totowa Road, Totowa, N.J. Mel Lewis (914) 968-2500, Ext. 2304.

Jan. 11—"Preparing For The Future"—NY/LI PES & IAS, Student Activities, 6:00-8:00 PM, Con Edison Co., Rm. 1425, 4 Irving Place, NYC. S. Weaver, IEEE Student Branch CCNY, (212) 650-7154.

Jan. 13—"Does Re-Engineering (Reconstructing) Really Work?—An Employee's Perspective"—NJ Section PACE, 7:30 PM, JCP&L Co., 300 Madison Ave., Morristown, N.J. Robert Sinusas (201) 228-3941.

Jan. 19—"Electrical Heat Tracing Methods And Applications"—NY/LI PES & IAS, 5:30-7:30 PM, NY Power Authority, Paramount Plaza Bldg., 1633 Broadway, NYC. Hazem A. Huss (201) 822-1016.

Jan. 20—"Fighting Anxiety, Depression And Fatigue Without Drugs"—NY/NJ/LI EMBS, 7:30 PM, Rockefeller Univ., Tower Bldg., Room 305, 1200 York Ave., NYC. Joel Levitt (718) 891-6460.

Jan. 27—"The Federal SBIR Program—Opportunities For Small Business R&D"—IEEE Consultants Network of Northern NJ, 7:30 PM, GEC-Marconi Facility, 150 Parish Drive, Wayne, N.J. Jim Boyd (201) 584-0329.

Jan. 30-Feb. 3—"1994 Winter Meeting"—NY/LI PES & IAS, Student Activities, New York Hilton Hotel, 53rd Street & Avenue of the Americas, NYC. S. Weaver, IEEE Student Branch-CCNY (212) 650-7154.

Upcoming Meetings

Feb. 2, 1994—"North Jersey Section Executive Committee Meeting"—7:00 PM, Plant 11, GEC-Marconi, 164 Totowa Road, Totowa, N.J. Mel Lewis (914) 968-2500, Ext. 2304.

Feb. 9—"Control Applications For Mobile Robots"—No. Jersey Control Systems Society, 7:30 PM, NJIT, John Howard Room, Second Floor, Hazell Student Ctr., 323 Dr. Martin Luther King, Jr. Blvd., Newark, N.J. Tim Chang (201) 596-3519.

Feb. 9—"Fusion Energy: Meeting The Challenge"—IEEE NPSS, Princeton/New Jersey Coast Chapter, 8:00 PM, Princeton University, Engineering Quadrangle, Convocation Room C-217, Princeton, N.J. D. Plummer (908) 219-9553.

Feb. 15-April 5—"Seminar: Introductory C Programming"—IEEE North Jersey Section, Tuesday Evenings, JCP&L Co., 300 Madison Ave., Morristown, N.J. John Baka (201) 455-8534.

Feb. 16-April 20—"Seminar: Object-Oriented C++ Programming"—IEEE North Jersey Section, Wednesday Evenings, JCP&L Co., 300 Madison Ave., Morristown, N.J. John Baka (201) 455-8534.

Feb. 23—"Microprocessor-Based Generator Protection"—NY/LI PES & IAS, 5:30-7:30 PM, New York Power Authority, Paramount Plaza Bldg., NYC. Hazem A. Huss (201) 822-1016.

Feb. 24—"Consulting Engineering As A Career"—NY/LI PES & IAS, 6:00-7:30 PM, Con Edison Headquarters, 4 Irving Place, NYC. S. Weaver (212) 650-7154.

Members and Non-Members Welcome PLEASE POST

IEEE North Jersey Section Seminar

"Introductory C Programming"

Tuesday Evenings, February 15 - April 5, 1994
6:30-9:00 PM

Jersey Central Power & Light Co.,
300 Madison Avenue, Morristown, N.J.

The North Jersey Section is offering an evening course entitled "Introductory C Programming." C is one of the most widely used computer programming languages because it is powerful, portable and permissive. It is also the basis for C++, the popular object-oriented programming language. This course will be an introduction to C and will cover all the basics of the language as well as emphasizing C's philosophy or world view. The course will cover ANSI C on the PC but, because there are C compilers for most computers, the expertise will be applicable from PC through mainframe. The C techniques learned will be useful on their own, and also will be a preparation for either an advanced C course or a C++ course. There are plans to offer both in the future.

There will be 8 weekly lectures and each will be followed by a short optional work session. Homework will be assigned and corrected. The topics listed below will be covered. The instructor is Dr. Edward (Ted) Byrne, owner of a local software consultant business.

- (1) - Background of computers, operating systems, compilers and high-level languages.
- (2) - Introduction to C and the parts of a real C program: philosophy of C vs other languages, ANSI vs older C nature and constituents of a simple C program, C program examples (ongoing).
- (3) - Reserved words, variables, declaration and definition, parameters, permanent, temporary, local and global data.
- (4) - Branching: simple and compound statements, relational operators and expressions and their use in branching, various kinds of branch statements.
- (5) - Loops and Conditions: various ways to enter and exit a loop, auto-incrementing, statement labels, goto.
- (6) - Formatted and character I/O: output to screen, input from keyboard, formatting, file and device input and output.
- (7) - Defensive programming and debugging: debugging levels, asserts, lint, case tools.
- (8) - Functions, subfunctions and arguments: names, arguments, return value, main program arguments, exit, return levels.
- (9) - Text and Libraries: character data type, string data type, characteristics of strings, libraries, and header files, #include statement, common functions, #define.
- (10) - Groups of similar and dissimilar data items: arrays, structures, indexing, items.
- (11) - Introduction to pointers: concept of a pointer, addresses, pointer arithmetic, indirection.
- (12) - Introduction to some advanced topics in C: touch on graphics, unions and enums, casts, typedefs, bit variables and operators, switch statement and case and default, conditional assignment.

Class Size will be limited to a maximum of 25 with a minimum registration of 15. Early registration is recommended. Phone Reservations will **not** be accepted. Reservations accepted after February 3, 1994 will require an additional late fee of \$25. No reservations will be accepted after February 9, 1994.

Where: Jersey Central Power & Light Co., 300 Madison Avenue, Morristown, N.J.
When: Eight sessions, Tuesday evenings, starting February 15, 1994 from 6:30 PM to 9:00 PM.
Cost: With Text Books and QuickC compiler, IEEE Members \$275; non-IEEE Members \$350.
With Text Books only, IEEE Members \$ 200; Non-IEEE Members \$275.
Contact: Mr. John A. Baka at (201) 455-8534 (Business)

Registration "Introductory C Programming"

To: Mr. John Baka, Distribution Engineering, JCP&L Company, 300 Madison Avenue, Morristown, NJ 07962-1911

Name _____ IEEE No. _____

Affiliation _____ Phone No. _____

Address _____

Check if QuickC Compiler is needed or not Yes [] No []
Enclose required fee made payable to "North Jersey Section IEEE"

Signature _____

IEEE North Jersey Section Seminar Object-Oriented C++ Programming

Wednesdays, February 16 - April 20, 1994 6:30-9:00 PM

Jersey Central Power & Light Co.
300 Madison Avenue, Morristown, N.J.

The North Jersey Section is offering an evening course entitled "Object-Oriented C++ Programming." Object-Oriented programming has been described as the biggest advance in computer programming since the creation of higher level languages 30 years ago. Instead of focusing on functionality (what the programs do) it focuses on the natural objects comprising the problem and how they, and their capabilities, are modeled in the program. C++ is, by far, the most widely used language today for object-oriented design and programming. This course will cover both the concepts of OOD and their implementation in C++ code. The course will begin with a review of common aspects of C and C++ but this time will be too brief to learn C. **THEREFORE ONLY THOSE WHO ARE FAMILIAR WITH C SHOULD REGISTER FOR THE C++ COURSE.**

There will be 9 weekly lectures and homework will be assigned and corrected. The topics listed below will be covered. The instructor is Dr. Edward (Ted) Byrne, owner of a software consultant business.

- (1) - Review common elements of C and C++: punctuation and keywords, variable naming, typing and scope, functions and subfunctions, arguments, operators and assignments, conditionals and logical variables, looping and testing, handling text strings, arrays and structures, pointers.
- (2) - Concept of Object-Orientation: objects and classes of objects, methods and messages, encapsulation and abstraction, overloading of functions and operators, inheritance and polymorphism.
- (3) - C++ improvements to C: new commands and operators, comments, stream I/O, function prototypes, more explicit typing and linking.
- (4) - C++ implementation of objects: what is a C++ object, data and method functions within an object, public, private and friend, static and dynamic objects, constructors and destructors.
- (5) - Encapsulation and abstraction within C++ objects: references and aliases, scope control operator, 'this' object, overloading, functions, operators.
- (6) - Inheritance and polymorphism among C++ objects: parent class or object, extending classes, redefining object data and methods, multiple inheritance, templates.
- (7) - C++ I/O streams: standard I/O, formatted I/O with manipulators, disk and device I/O.
- (8) - C++ library classes and their use: characteristics of a good library class, conversion base classes, video base classes, window base classes, database base classes.
- (9) - Overall program structure with C++ objects: how to lay out a C++ program, how to reuse classes in a program, how to test and evolve a C++ program, how to find errors and debug C++ object programs.
- (10) - Object-Oriented design methodologies: Booch method, Coad Yourdon Nicola method, Shlaer Mellor method.

Class will be limited to a maximum of 25 with a minimum registration of 15. Early registration is recommended. Phone Reservations will **not** be accepted. Reservations accepted after February 3, 1994 will require an additional **late** fee of \$25. No reservations will be accepted after February 10, 1994.

Where: Jersey Central Power & Light Co., 300 Madison Avenue, Morristown, N.J.
When: Nine sessions, Wednesday evenings, starting February 16, 1994, 6:30 PM to 9:00 PM.
Cost: With Text Books and Borland Turbo C++ Compiler, IEEE Members \$280; non-IEEE Members \$360. With Text Books only, IEEE Members \$200; Non-IEEE Members \$280.
Contact: Mr. John A. Baka at (201) 455-8534 (Business)

Registration "Object-Oriented C++ Programming"

To: Mr. John Baka, Distribution Engineering, JCP&L Company, 300 Madison Avenue, Morristown, NJ 07962-1911

Name _____ IEEE No. _____

Affiliation _____ Phone No. _____

Address _____

Check if Borland Turbo C++ Compiler is needed or not Yes [] No []

Signature _____

Enclose required fee made payable to "North Jersey Section IEEE"

NY/LI PES & IAS: Microprocessor- Based Generator Protection

On February 23, 1994, the Power Engineering Society and Industry Applications Society NY/LI Chapter meeting topic will be Microprocessor-Based Generator Protection. The speaker will be Chuck Mozina, Manager Application Engineering - Protection Systems, Beckwith Electric Co., Largo, FL.

Mr. Mozina will highlight the many advantages of using cost effective microprocessor-based relaying to protect generators. In addition to short circuit protection, the methods of detection of a number of abnormal generator conditions (loss of field), overexcitation, unbalance

current and underfrequency operation) will be addressed. This presentation will also outline an approach to providing redundancy to address common mode failure. The benefits of oscillographic data captured by these relays will be discussed as well as the use of this data to more quickly return generators to service after they have tripped off line.

The meeting will take place Wednesday, February 23, 1994, 5:30-7:30 PM at the N. Y. Power Authority, Paramount Plaza Bldg., NYC. Refreshments will be provided. All welcome. No fee required.

For information: Hazem A. Huss at (201) 822-1016.

NY/LI PES & IAS: Electrical Heat Tracing Methods

The Power Engineering Society and Industry Applications Society NY/LI Chapter will host a presentation on "Electrical Heat Tracing Methods And Applications." The speaker will be Mr. Scott C. Kaplan.

Mr. Kaplan has ten years of heat tracing experience with Cooperheat, a leader in thermal technology. Attendees will be updated on the latest advances in the field of electrical heat tracing.

The meeting will take place Wednesday, January 19, 1994, 5:30-7:30 PM at the N. Y. Power Authority, Paramount Plaza Bldg., NYC. Refreshments will be provided. All welcome. No fee required.

For information: Hazem A. Huss at (201) 822-1016.

PACE News

By Richard F. Tax

The following is reprinted from the December 1993 issue of IEEE "Impact."

Teamwork Is Needed to Maintain U.S. Leadership In Technology

The United States has always been a world leader in research and development (R&D), much of it funded by the U.S. Department of Defense. Unfortunately, R&D has been narrowly assessed by peer reviews and a number of quotations in science publications. As the Massachusetts Institute of Technology report *Made in America* observed, "Universities have concentrated on the body of knowledge that represents the best that has been thought and said in the world and how it can be enlarged."

Such ethereal research evaluation is incomplete. Our Federal Government provides the money for R&D; thus, it is reasonable to require at least the repayment of that investment over time, in order to justify continued expenditures. Without R&D conversion to products marketable in the new world economy, R&D becomes a dole for U.S. researchers. Since most often the new commercial products based upon Federal R&D investments have been innovated and developed outside of the United States, more often than not U.S. R&D becomes foreign aid to overseas industries.

The three sectors involved in R&D—Federal laboratories, industry, and universities—all blame someone else for America's apparent inability to compete in the global economy. When their poor quality products do not sell overseas, industries complain that the "playing field" is not level. Businesses want protection and tax breaks. The Government accuses foreign companies of "dumping" their products but closes its eyes to studies showing that 17 of the 20 largest U.S. firms are also guilty of "dumping" overseas. Universities bemoan the lack of funds for R&D, even though continuing large R&D expenditures has led to little U.S. economic benefit.

All three R&D participants want to find a simplistic way to address the technology conversion to products, but none really want to disturb their comfortable semi-isolated environments. They complain, talk, and come up with such buzzwords and phrases as technology transfer, consortia, and cultural change. None of the players mention that a fundamental, basic structural redesign of

U.S. technology, including the creation of teams, is necessary to function in a global environment.

U.S. industry has difficulty converting new technology to successful products. Many large companies cannot even commercialize R&D from their own laboratories within other divisions of their firms. But without R&D laboratories, these industrial firms will have little success commercializing any Federally funded R&D.

The universities do not want to emerge from research isolation or acknowledge that R&D must be restructured to function in a total economic framework. The requirement to provide innovative inputs to the U.S. economy is rejected as threatening research freedom. So, no basic change from the demonstrably failed "publish or perish" approach is even considered. Further, as a result of universities' and researchers' isolated academic environments, they turn out students who are not well educated enough to contribute significantly to innovation, entrepreneurship, and commercialization.

The Federal laboratories, although staffed with some brilliant and creative scientists, are not strong enough to help carry their output toward commercialization. Lab personnel have trouble understanding the economics of innovation and entrepreneurship.

Joint industry and Federal lab cooperative agreements and even partial Government funding is encouraged through the *Stevenson-Wydler Technology Innovation Act of 1980* and the *Federal Technology Transfer Act of 1986*. Congress authorizes CRADAs (Cooperative Research and Development Agreements), but only large industrial firms can afford R&D projects utilizing Government labs. Many truly innovative ideas and applications come from small firms generally unable to fund the CRADAs. As a result, CRADAs have a very inconspicuous record of success.

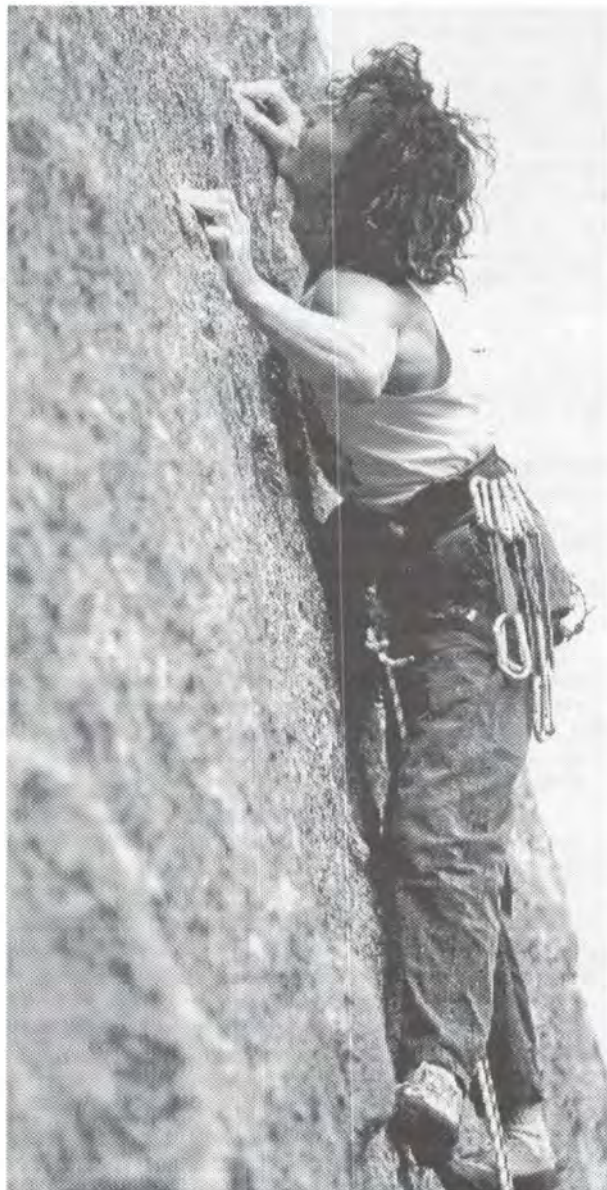
Universities, industry, and Federal labs must radically reorder their individual and collective structure to include three-party cooperative R&D efforts extending through research, development, manufacture, and sales. Each party must educate one another through such team efforts and must champion a team-effort philosophy throughout each's individual structure and organization.

No longer can each participant judge its success in isolation—industry by its next quarter's profits, Federal labs by dollars contracted or expended, and universities by research reports published. U.S. technologists must either succeed as teams, or the United States will eventually lose its position as a world leader in technological development.

by Robert L. Feik

Member Defense and Engineering R&D Policy Committees

We go to great heights to solve a problem.



Over the past six years, San Diego-based Pacific Communication Sciences, Inc. (PCSI), has achieved prominence as a recognized leader in wireless communications and internetworking products. We are continually reaching our goals in a wide variety of areas related to the technologies of communicating both human speech and computer data in the most efficient ways possible.

If you are an ambitious, talented Engineer with a BSEE (MSEE preferred), we invite you to explore the following career opportunities we currently have available.

Hardware Engineers

Very Senior Digital Designer with consumer electronics/volume production experience; preferably familiar with DSP's and RF; has directed others; 12 years of experience. Respond to dept. VSDD/B.

Senior, mid and junior level Digital Designers with high-speed microprocessor-based communications systems experience. Minimum 2 years of experience. Respond to dept. DD/B.

Systems Engineer

Support numerous emerging mobile communications programs. Advanced technical degree with 7-12 years of experience in mobile communications systems engineering required; demonstrated track record in the development of complex communications systems and product specifications required. Experience in all aspects of a mobile communications system including subscriber units, base stations/cell sites and protocols preferred. Candidate will be required to assist in developing system requirements, system specifications, infrastructure and subscriber unit product specifications and participate in follow on development stages. Specific knowledge of cellular telephony a plus. Respond to dept. SE/B.

Sr. Software Engineer

Needed to lead a software team in design and implementation of real time embedded firmware for communication product, and to work on architectural and system design of data communication products. An in-depth knowledge of embedded real time software/firmware, C, and communication products necessary. T1 familiarity preferred. Requires 5 or more years experience and a BSCS/BSCE/BSEE, MS a plus. Respond to dept. SSE/B.

Software Engineer

This individual will implement real time software for data and voice communication products. Must be fluent in C and have 2 years experience using microprocessor and assembly language. A BSCS/BSCE/BSEE required. Respond to dept. SWE/B.

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