

FACE TO FACE

O. Schmitt / pc & J
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2) Calgary folder.

as BMET of the Year, "My achievement was more like a team effort achievement."

BMETs should play a central role in hospitals' quality and cost-containment efforts, Azizi believes. "The vendors and biomedical technicians should have a better relationship. We need more feedback from them, and we need to give them more input."

Patient involvement is one aspect of his job that Azizi likes, and he wants to see the role of BMETs in patient care expanded. "I would like to be more involved with the patient. I believe that is what our field is heading toward — we're not just 'bench technicians' anymore. We're getting more involved clinically to use the equipment more effectively, directly with the patient."

Azizi is eager to educate himself and others to advance the role of BMETs in the hospital. He recently received advanced cardiac life support (ACLS) certification. This education has helped him in his work on defibrillators and related equipment. "When I talk to the nurses and doctors, I feel I can communicate with them. I know exactly why they want the equipment and how they want it." He hopes to eventually become an ACLS instructor and take part in community outreach efforts.

Giving back to the community is a central theme of Azizi's life. "When you receive or take something, you give it back," he says. When his alma mater, Schoolcraft College, recently hosted a group of Indonesian technical school instructors looking to learn about this country's medical equipment to develop a BMET training program, Azizi went out of his way to make their visit a successful one. He provided transportation to CBET review classes, made his home computer available, led a sightseeing expedition, and hosted a picnic at his home. "I believe that we should get more involved in third

world and lesser-developed countries," he said. "I felt that I could help by helping these students."

At home or around the world, Azizi is proud of his profession, and is working hard to advance it.

Laufman Prize Winner Otto Herbert Schmitt: Man of Ideas

Otto Herbert Schmitt, PhD, is an amazing man. At 79 years of age and just celebrating his 55th wedding anniversary, he holds a triple PhD in physics, mathematics, and zoology; a résumé so packed with accomplishments it takes one page, single-spaced, to list only the highlights; a list of over 260 publications to his name that include only those through 1983; and a list of inventions, patented and unpatented, that include the Schmitt Trigger circuit,

which is hysteretically bistable and so has become standard in digital computers and many biomedical applications where noise-free 0 or 1 signals are desired. The DC transformer, the differential amplifier, the cathode or emitter follower, the three quadrature compaction algorithm, the 3-D virtual reality displays, and the corrected differentiator and integrator are some of his much-used circuits in medical, military, industrial, and domestic devices. Schmitt was a founding member of AAMI as well as the Biophysical Society and the Biomedical Engineering Society, and last May at AAMI's Annual Meeting in Anaheim, CA, received the AAMI Foundation Laufman Prize. The prize of \$5,000 and a commemorative plaque honor an individual or a group that has made unique and significant contributions to the advancement of medical instrumentation.

Schmitt himself is quite a charac-



Otto Herbert Schmitt

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ter. A rumped man, he walks with a slight limp ("My Jeep tried to run over me in the great Halloween snow"), and his pockets bulge with the essentials of his everyday life. He carries with him three watches, one on each wrist and a penwatch in his pocket ("you have to have a non-replicate redundancy tiebreaker"); several rulers; a flashlight ("to light up the page on conference programs when they have the lights out!"); a 2-inch-high stack of membership cards for the various organizations throughout the world to which he belongs; a handful of multicolor pens; a stack of index cards filled with reminders and addresses of friends and former students he'd like to contact; a surgical knife; a Navy electrician's knife; a lighted magnifying glass; and packaged tasties, all keeping company with the usual keys, airline tickets, and money. He peers at you intently, eager to learn and excited to share the vast wealth of knowledge and figures of thought he has acquired. Like his pockets, Schmitt himself seems to have retained much of what he has read or heard over the years, and he is able to recall things instantly, making connections where none seem to be apparent.

Connections are a central theme of Schmitt's life — connections between people and ideas. He regularly receives 5 to 10 pounds of mail a day, much of it from former students and diverse colleagues. He gets many visitors from all over the world in his basement office. He was a professor of biophysics, biomedical engineering, and electrical engineering at the University of Minnesota starting in 1939, and technically retired nine years ago. "They said at 70 you have to retire!" he said. "They said, 'You can teach courses and do research, we just won't pay you.' So my wife and I are still doing it." Many years ago he obtained an advanced version of the Polaroid camera. He

uses later models of the camera to photograph visitors for his "Rogues Gallery." His 13 photo albums include over 2,000 pictures and at least six Nobel Prize winners.

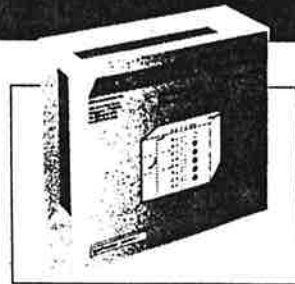
Schmitt strongly feels that bridges must be built between traditional disciplines such as physics, engineering, and biology — multidisciplinary rather than interdisciplinary. He is a proponent of "biomimetic science and technology" in which physical sciences imitate and are inspired by biology. Schmitt describes it as "looking to biology for inspiration instead of doing it the other way. . . . It leads us to new mathematical insights that let us handle new concepts and, in particular, lets us be willing to invent new mathematics to fit the biology rather than somehow trying to pare it down into fitting old-fashioned conventional engineering." He cites as one invention derived from biomimetic science the chirp radar, which imitates the way a bat navigates by using a frequency-modulated chirp.

As a founding member of AAMI, Schmitt recognized long ago the importance of bringing together members of different disciplines to "to talk to each other and think creatively with each other." He today sees himself as an emissary, moving among different groups, learning their special jargons, spreading ideas and making new connections. "Let's get people to know each other well enough to realize that if you talk to them with the right figures of thought, that they have something to add to your repertoire. That's what I've been trying to do vigorously, but without getting excommunicated by any of these groups."

When it comes to having an open mind, Schmitt's is more open than most. He has studied paranormal phenomena. "There are frauds, but there is also important reality," he said. "It's another major neglected

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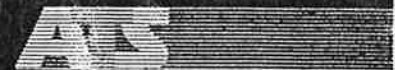


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or excluded part of our health, medicine, and quality of life. We need to learn the range and reality of these new concepts, get rid of the bunk, but learn that there is new, exciting biophysics outside of our conventional medicine and engineering." Schmitt himself often relies on his "superconscious" to solve difficult problems for him. "Other cultures have for centuries understood this wisdom of the subconscious and several hierarchies of higher consciousness, but they have not put them into algorithmic form. You can have your other layers of consciousness worry about difficult problems for you, and maybe in the middle of the night they give your ordinary consciousness the solution to that problem." (This interest in "advanced consciousness" is evident in his work, "A Hierarchically Cooptimized Plan for the Enhanced Health Care System of the Year 2000," shown in the box.)

Schmitt frequently turns his mathematical abilities to questions that few would undertake. For instance, he has developed an index designed to quantitatively measure an individual's perceived quality of life, called the Santosha Index. This index takes into account features such as fear of death, sex drive, fulfillment, business plans, fame, wealth, research goals, ethics, and shared consciousness. Through this effort, he has been trying to bring attention to the role of health care in "enhancing the quality of life beyond mere absence of manifest illness, extension of life, rehabilitation and even total fitness." The term "Santosha" is a Sanskrit word Schmitt first learned from his foreign students. It means "the best combination of all good things."

As a child, Schmitt began performing experiments early, from about age 5. By rare chance, he became acquainted with Jacob Siler, a remarkable Civil War hero, a historic photographer, a photographic

and microscopic technical expert, and a biomedical engineer as well as a patent medicine manufacturer, philosopher, and theologian who had befriended Schmitt's orphaned father. A generation later, by postcard, he invited "Master Otto Schmitt, Jr." to visit his "residence," an old shack on 7th Street in a bad neighborhood of St. Louis, at 3 PM on Saturday afternoons for "scientific, philosophical, technical and theosophical discussions." Siler introduced Schmitt very realistically to physiologic, medical, and surgical techniques, microscopy, and even human sexual information and comparative theology.

In the early 1920s Siler had young Schmitt do what is now known as "TENS (transcutaneous electrical nerve stimulation) therapy" using a rotary rheotome and saline pads applied to his amputated arm lost in a Civil War attack, to relieve phantom limb pains. Upon Siler's death with full military honors burial, Schmitt was allowed to select about 100 books from Siler's large collection in widely diverse fields.

With the help of three high-school buddies and one of Siler's book reports on Nikola Tesla, Schmitt managed to build a large tesla coil system using a pole power transformer run backward and his mother's dishpan and salt-water-filled Mason jars for a tuning condenser. The system yielded about 200,000 volts. "I learned which currents you could stand through your body, and that at this frequency, they burn but don't shock you." He stood up on a platform, "took hold of this thing, and fire started coming out of my nose and ears and light bulbs lit up in my hands. My mother came in and fainted!"

In fact, Schmitt spent a good part of what would have been his high-school senior year in Germany at the Dahlemdorf branch of what is now the Max Planck Institute of Biologie

where his brother Francis was doing postdoctoral studies. When he returned to the United States and tried to enter Washington University in St. Louis, he learned that he would have to pass first-year college examinations in four subjects to replace the missed senior high-school year. With the aid of Professor Lee DuBridge, who later developed the MIT Radlab and finally became the president of Cal Tech, Schmitt learned the whole first year of college physics in three days and thus entered college as a sophomore.

Otto Herbert Schmitt brings a lifelong love of learning to any project he tackles. He no longer patents his inventions but rather gives away many of his ideas. He cleverly packages them as part of his "idea stealing program," letting ideas slip out at opportune moments when entrepreneurial students or colleagues are nearby. He found that when he tried to give valuable ideas away, no one took them seriously. He now proudly reports that he has up to one idea successfully stolen per month. His goal, he once told an interviewer, is to "get the thing in service to benefit people without having to do all the financial and government mess" involved in getting patents and finding marketers.

Schmitt learned long ago that much more than innovation is involved in becoming a successful inventor. Ideas must be carefully marketed; otherwise, they remain hidden. Much of his work today seems to involve marketing his new ideas. He believes in the "gradualness" principle — "a really new idea takes 15 years to realization, 30 more before it can honestly be reinvented, and a century before it has a secure spot in science," he says. If he's right, we will be well into the 21st century before Schmitt's legacy can be measured accurately.

A Hierarchically Cooptimized Plan for the Enhanced Health Care System of the Year 2000

By Otto H. Schmitt

Given adequate diligence and dedication, we should be able by the millennial year 2000 to report as "in operation" a System Reengineered Plan incorporating the following advances:

1. Sufficient professional security and tolerance to allow the now-taboo-and-neglected prime features of quality of life, mind, spirit, and soul to be added to our currently accepted body and brain functions; to allow "consciousness," at its several levels, to become a regular part of health care procedures.

2. A rudimentary insight into rules of advanced consciousness "field theory" to allow us to investigate usefully, as fundamentals of life communication, what are now regarded as "paranormal."

3. The rapid emergence of an acknowledged "new" science and technology based on life itself, "biomimetic science and technology" and its important subset incorporating the Santosha Index, understanding of the quality of life at the individual level, at the family or "group" level, and at the community level, possibly going to the global level.

At the operational level this system plan must offer:

4. An inflation-adjusted decrease of 50% in the annual cost of our health care delivery system and its services, with at least 50% improved performance and perceived results.

5. A whole-life medical-history card in each person's possession giving a cursive life-trajectory-oriented, detailed, personal medical and life progress history, easily updatable (but not deletable), inexpensive, robust, and structured to allow matching with similar histories in a large national data bank for ergodically adjusted prognoses and recommendations.

6. Public and professional understanding of our intellectual progression from the "homeostatic" view of self-regulation, where we fix whatever is wrong, as well and as long as we can easily manage, and then discard the patient diplomatically, to the homeodynamic view of self-regulation, where, through adjustment to the changing vicissitudes of life, we gain some extension of rewarding life, to the new "enlightened" view of technically, pharmacologically, and mentally reprogrammed lifestyle,

and consciously perceived reality, toward the goal of multifaceted and enhanced optimized life quality.

7. Identification, education, and establishment of necessary "new and different" health care professionals fitting the new system to avoid the huge cost and liability of using a "one size fits all" physician image, in an automation-cobbled-up adaptation of the classic, simplistic individual patient-physician relationship.

8. A welcomed development and move into the home, as a family friend or pet companion, of the modularly organized, individually parametrized, health care computer, with instructional prompting, advice resources, and competence to participate in diagnostic, monitoring, training, therapeutic, and even rehabilitative procedures, in the home environment, but compatible with health maintenance organization (HMO) or other traditional modes of care, and adapted for quality of life interpretations.

9. A full National Strand Epidemiology Library database from which to extract ergodically adapted medical and quality of life records for empirical or theory-based treatment and lifestyle recommendation plans.

10. A good repertoire of quality of life components organized hierarchically on at least the three primary levels of consciousness: 1) ordinary perceptive consciousness — "projection screen of reality" type, 2) the multibranch subconsciousness, and 3) at least the first level of superconsciousness.

11. National awareness and eagerness to accept the possibility of being offered personally adapted life plans adjusted for individual strengths, weaknesses, and eccentricities, with a choice, readaptable at any time, of several comprehensive available, attractive, fulfilling, and otherwise rewarding "life plans" readily alterable utilizing the "Three Quadrature" insight into appreciation of time-series events, including the human life career.

12. Well-planned "carrot and stick" strategies for research and development, marketing, education, and public relations to persuade legislators, academic researchers and educators, and biomedical device and service suppliers, among others, to find rewards and avoid penalties by cooperating with this overall plan or improving and extending it.