

Careering Through Optics

When I was 10, I decided I wanted to be a scientist. Mr. Shoemacher, my fifth grade teacher, was a mentor of singular quality who placed much more emphasis on science than my previous teachers and he inspired my ambition. I earned my bachelor's degree at the Massachusetts Institute of Technology (MIT) and my master's and Ph.D. degrees at the University of Pennsylvania, all in physics. Along the way, I became curious about opportunities for physicists in industry. While most of my colleagues were focused on postdoctoral fellowships or assistant professorships, my target was corporate research.

My doctoral dissertation concerned the properties of surface plasmons, and my original ambition was to enter the field of fiber and integrated-optics research. But my best job offer came from Texas Instruments (TI) in Dallas, which I joined in February 1974 to work on ultrasonic surface acoustic wave (SAW) device research. I learned a lot of engineering at TI, particularly microwave and radio-frequency electronics. I was part of a fine group of SAW engineers, some of whom went on to found SAWTEK in Orlando, Florida.

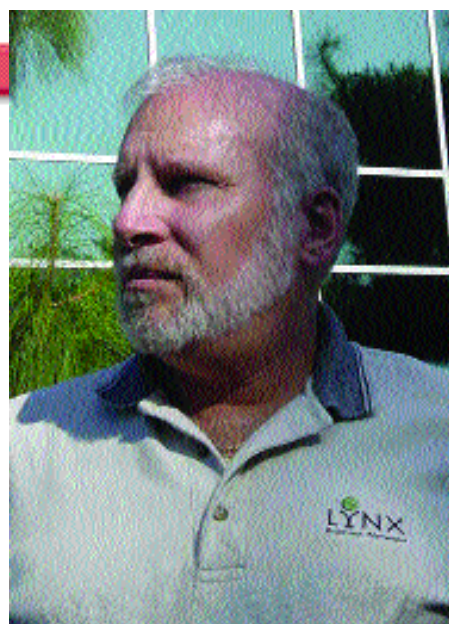
After less than two years at TI, I moved

to Teledyne MEC (Palo Alto, CA) as a senior engineer responsible for the design of SAW-filter products. In two years, I developed four SAW-filter products, ranging in bandwidth from very narrow (0.05%) to very wide (10%). Unfortunately, MEC could not manufacture competitively and exited the field. I went job-hunting again.

A former TI colleague recruited me to the Rockwell Science Center (Thousand Oaks, CA), a well-equipped corporate research laboratory with a terrific library located in a beautiful and safe community two miles from home, and with all the research toys a scientist could desire. The friend who recruited me taught me more engineering than anyone else in my career.

Ventures in optoelectronics

After two more years in SAW-device research, I moved into optoelectronics and became responsible for prototype packaging of lasers and detectors developed in our laboratory. I learned about manipulating fibers, packaging and assembly (by hand!), and working as part of a team to produce commercial prototypes. The results were promising, and this program became the start of a large laser-manufacturing business



Ernie Hutchins

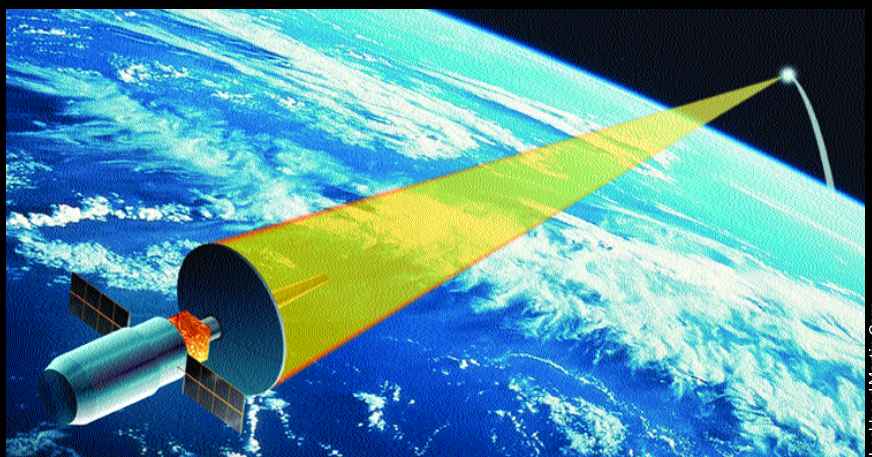
for Rockwell, based in Dallas. Several team members moved on to promotions, other jobs, and university positions. So I went "up-periscope" once again.

In 1982, I heard of plans to start a robotics group at the Science Center. I saw an opportunity to develop robotic sensors based on fiber optics and acoustics, and a chance to learn new skills. Companies were competing for major pieces of the Space Station, and robotics and automation would be a centerpiece of this superproject. Research money was available.

Robotics was hot then, and I attended the major conferences. This eventually led to a stint as an associate editor for sensors for the IEEE Journal of Robotics and Automa-



TRW



Lockheed Martin Corp.

Figure 1. As part of the Strategic Defense Initiative (Star Wars), the author was recruited to support development of a space-based hydrogen fluoride laser coupled to an optical beam control-and-projection system.

tion. I was already an associate editor for sensors on the board of the IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control.

Eventually, the prime contracts for the Space Station went to a competing company, and robotics assumed a lower profile. I became a group manager, first for robotics and automation, then materials evaluation, then sensors and systems.

Around 1992, I settled into an interesting optics project for three years. The Allen-Bradley encoder division of Rockwell asked for our advice on a proposed evolutionary design to improve its position-sensing products. A group of us from the Science Center suggested a radical innovation, using technologies such as fiber optics and compact discs. The encoder division soon asked our team to propose a design that would be based on fiber optics, remove all electronics from the sensor head, operate at 120 °C, and read absolute and incremental position at 6,000 rpm with a resolution of better than 64,000 counts per turn.

It was a thrilling challenge to adapt and extend optical physics to develop a commercial hardware product from within an R&D laboratory. The success of the program depended on cost, return-on-investment, and performance, but always with cost foremost—strange concepts in research. These were difficult enough criteria to satisfy. Yet a necessary ingredient was missing: commitment from the top. A relocation and reorganization of the encoder division led to a change of management, which had no sense of ownership in the development of a radically new product.

Star Wars

After 18 years at the Science Center, I accepted an opening at Rockwell's Rocketdyne division to work on laser and electro-optic systems. Management was looking for high-caliber people to address some major issues on classified projects. The people I worked with were serious, dedicated, and professional. In two years, I delivered the first unit of my project to the customer.

In 1997, I was recruited by a former Rocketdyne colleague to Schafer Corp., a

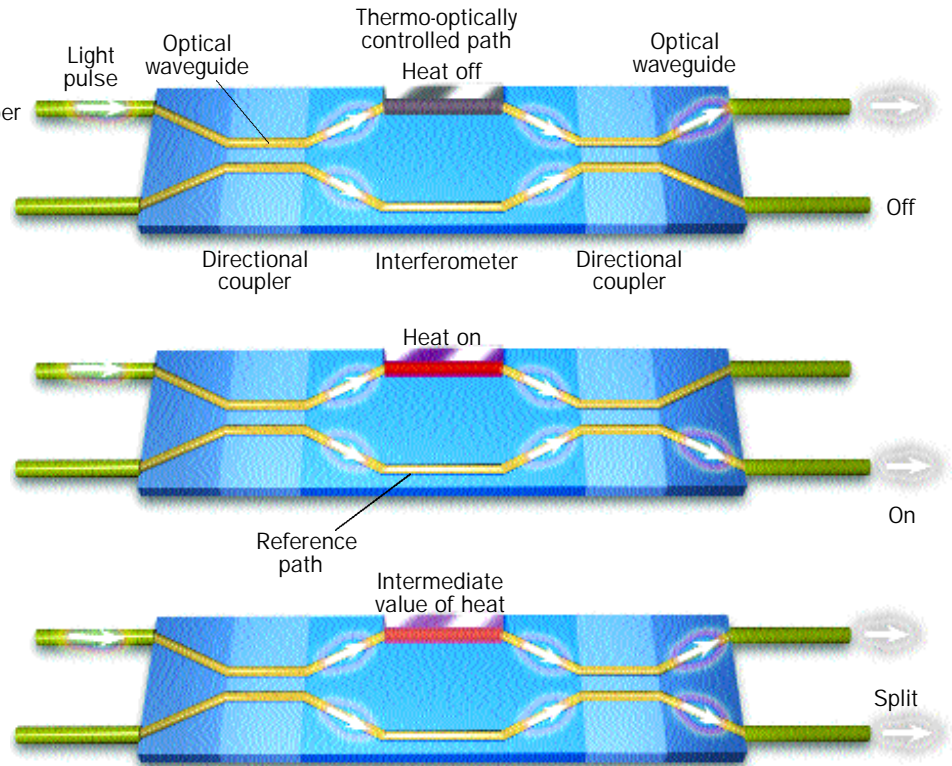


Figure 2. Light from an optical fiber (left) enters a waveguide at the edge of the optical wafer and goes through a 50/50 split in a directional coupler. One branch goes through a thermo-optically controlled path while the other goes through a reference pathway. With the heater off, the interference pattern in a second directional coupler diverts the pulse in the lower path to the upper path, so the light in the lower path is “off.” With the heater on, the upper path changes optical length and the interference pattern diverts the light from the upper path to the lower path, which is then “on.” With any intermediate value of heat, the path length is not changed as much and we get a split anywhere from 0/100 to 100/0.

consulting firm, to support development of the space-based laser for the Strategic Defense Initiative, popularly known as Star Wars. Work on the space-based laser at that time was focused on the feasibility of coupling a huge hydrogen fluoride laser (power classified, but dangerous) to an optical beam control-and-projection system (Figure 1). Our task was to validate the optical subsystems in a large chamber that could be evacuated to simulate space conditions and eliminate atmospheric beam absorption. The beam projector was a telescope with a 3-m primary mirror. Eventually, this design was to be adapted to fit into a launch vehicle and placed in orbit.

This project required teamwork and a big team. The pace alternated between methodical leisure and intense flurries,

leading up to major tests, which took place in San Clemente, California. Beachside hotels, the ocean, and good restaurants compensated for the commutes that most team members made weekly—from San Francisco, Los Angeles (like myself), Atlanta, and Denver. I was at the test site two or three weeks a month.

Landing in chaos

After two years, the routine wore us down. Program management shifted from one agency to another. Several of my colleagues at Schafer began to look elsewhere: three joined optical telecommunications start-ups in the first half of 2000. Two went into Internet start-ups, and one moved to a reliable “old-economy” firm.

One colleague went to a company trying

to integrate polymers and microelectromechanical systems to create compliant MEMS. He alerted me to an opening there. The chief executive officer met me on a Saturday, and asked me to return during the week to meet other executives. I was imme-

diately offered the position of director of systems engineering. I would not get full disclosure of the company's intellectual property until I started working and signed a nondisclosure agreement as part of my employment conditions. I understood the

meaning in that message only in hindsight.

Still, I made a decision: it was time to take risks for potential rewards. The pay was good, the stock options looked very good, and the job was close to home. But after joining the company, I learned that its bank account was down to two paydays.

The place was in chaos. The company was struggling to determine what optical telecommunications product it could build and how to build it. It had to rely on the company's intellectual property, which was not robust, or it could be in violation of other patents. Two weeks later, the components director resigned. So did a process scientist. Two weeks after that, the process manager resigned. I became the de facto director of all engineering functions, reporting to the president. Things looked messy, but a round of funding was closed just in time to meet the payroll.

I decided to stay for a year. If we succeeded, our options would be worth something. If we didn't, I could put the experience on my resume and move on. Management had other ideas. After four months, they decided that I was not a good fit for their organization, and in two hours on a Friday morning, I was packed and gone.

By the end of the day, I had my resume posted on the Web and a job interview arranged for the following Monday. In the next five weeks, I fielded about 300 Web-site hits, mostly from headhunters, which produced all of three interviews. The best results clearly came from personal contacts. These resulted in four interviews. In the end, it was a lead from a former Schafer colleague that brought me to my current position as chief physicist for U.S. operations of Lynx Photonic Networks (Rosh Ha'Ayin, Israel).

Lynx had just opened a sales and marketing office in California to be closer to its U.S. customers. Its development center is in Israel, where the company started in 1998. I inquired if there was even a need for a high-level technical person in the United States, because all of Lynx's listed technical jobs were in Israel. It turned out that they were looking for a U.S.-based physicist to interface

with the technical staffs of customers, vendors, and researchers in Israel. Communication skill and technical knowledge were of particular importance.

I was invited to interview the following day. Coincidentally, the investors and top Israeli management were in California for a board meeting. What started out as a two-hour interview with the president and vice president for customer applications and support turned into a four-hour interview with the entire top management, and an invitation to dinner with all of them. The chemistry was good. I notified my wife and prayed that I wouldn't say anything stupid or spill anything on myself.

One year later, the honeymoon is still on. The all-optical planar lightwave switch that the company makes is a real, working product (Figure 2) and the technical staff in Israel is outstanding. The California office is run by a small team of highly congenial people who take great pride in the company. And the president and my boss, a vice president, are terrific people. We are complementary in our skills and share a similar outlook and sense of humor. The hours are long, but they are far from tedious or burdensome. I was amazed to be traveling so often; but it is a happy labor.

Lessons learned

What have I learned from all these years and experiences? Good communication skills are as important as a specific technical competency. Breadth of experience improves the balance in your judgment. Not all people are meant to head large working groups or big organizations—including me. Honesty is a great deal easier to live with than deception, even when you lose a battle here and there. It is better to be part of a championship team than to be on a team of champions. 📧

B I O G R A P H Y

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