Health care is a world that's constantly changing. Medical research and technological discoveries combine to form a steady stream of new diagnostic tools, new techniques, new drugs, new procedures—even unmanned robotic surgery. But 21st-century medicine isn't all about the hardware.

It's also about those caring and highly trained health-care professionals who keep you healthy—the people your insurance company calls “providers.” As the approximately 76 million baby boomers in the United States continue to age, nearly every health care–related field predicts a shortage of these professionals.

Students at the University of Hartford who have an interest in health care can choose from a wide array of programs and degrees at both the undergraduate and graduate levels. This special section highlights some of the ways in which the University is preparing students for careers in this booming field.
According to the U.S. Department of Labor, the allied health professions will grow faster than any other occupation in this country over the next decade. This growth creates a need for trained professionals at all levels of the health-care system.

“Right now, we have around 100 health science majors, which is an increase of about 25 percent over our numbers for the last four or five years,” says Peg Ciarcia, director of the health science program. “Applications are way up for fall 2009, probably by close to 30 percent.”

The University’s Department of Health Sciences includes a wide array of undergraduate majors in the health professions, including four-year programs in clinical laboratory science, radiologic technology, and respiratory care as well as a health science major that prepares students for professional careers or graduate study in health-related fields such as dentistry or optometry. The bachelor’s in health science also is a good choice for graduates of hospital-based or community college programs who wish to earn a bachelor’s degree.

Academically outstanding students with an eye on a medical professions career often major in one of the department’s combined bachelor’s/dotoral programs offered in association with affiliated professional schools of chiropractic medicine, dentistry, optometry, osteopathic medicine, and podiatry. The accelerated 3+4 curriculum allows qualified students to enter professional school after completing their third year of undergraduate study. Course credits earned in the first year of graduate study also complete students’ undergraduate degrees at the University of Hartford. Majors must maintain an overall 3.0 to 3.5 grade point average, depending on program requirements, and take three one-credit premedical advising courses in which faculty guide students in becoming strong candidates for admission to their chosen schools.

Ashish Patel ’04, who chose the department’s bachelor’s/doctoral program affiliation with the NYU College of Dentistry in New York, tells why the program worked so well for him.

“I chose the 3+4 program for many reasons,” says Patel, an oral and maxillofacial surgery resident at NYU Medical School/Bellevue Hospital. He is also completing two years of medical school to get his MD. “I knew I wanted to be an oral and maxillofacial surgeon, which required me to complete both dental school and medical school as well as several years of residency. I took the health science 3+4 program as an opportunity to get a head start since I knew I’d be in school for a long time.

“I also knew that I wanted to complete my medical training in New York City, so the University of Hartford program was perfect for me. I felt very well prepared for dental school and was at the top of my class of 350 people. Within the three years at Hartford, I completed all of my prerequisites for dental school as well as the suggested nonrequired courses and still had plenty of time to take non-science courses. Even though my course load was heavier than my colleagues’, I didn’t have to worry much about getting into dental school since I was in the program.”

In 2007 the University also established an articulation with the Ross University School of Medicine in Dominica and the Ross University School of Veterinary Medicine in St. Kitts. Under these agreements, students complete four years of study and obtain a bachelor’s degree before matriculating for either the MD or DVM degree.

Hippotherapy
Hippotherapy (from the Greek hippo for horse) was first used in modern times to treat polio patients in Europe after World War II. It reached the United States in the 1960s and became popular as therapists recognized its effectiveness in treating people with disabilities. The benefits of hippotherapy are legion—including improved balance, posture, and muscle tone.

Donna Snodron (far right), an adjunct professor of physical therapy at the University, has been conducting a horse therapy program for the past five years for children at the American School for the Deaf in West Hartford, Conn. Shown here with one of her therapy horses, Rocket, she is training students in the physical therapy program in hippotherapy at her farm in Stafford Springs, Conn. Student Michelle Granger gives Justin Mackay a “high five” at the completion of his lesson.
Students Casey Coutu (left) and Theresa Bakaitis Glover (center) make adjustments to a prosthetic leg worn by patient Stephen Fuller.

The Age of Bionics
UNIVERSITY TO OFFER MASTER OF SCIENCE IN PROSTHETICS AND ORTHOTICS
BY KAREN HUNTER

South African sprinter Oscar Pistorius, a double amputee who wears custom-made running “blades” when racing, captured the world’s attention when he challenged officials for his right to compete in the 2008 Beijing Olympics. That’s the Olympics, not the Paralympics. Officials argued that Pistorius’s prosthetics gave him an unfair edge over able-bodied athletes. Eventually, he won the right to compete but missed the 400-meter qualifying time by a mere 0.7 seconds.

In forcing the world to reconsider “ability” versus “disability,” Pistorius’s story as the “fastest man with no legs” illustrates in the extreme just how far technology has pushed prosthetic devices beyond the wooden legs first whittled from barrel staves for amputees during the Civil War.

Innovation is offering dramatic benefits to people who require artificial limbs and to those who use orthotic, or supportive, devices because of weakened or injured joints and muscles. Bionic knees controlled by microprocessors allow patients to have a more normal gait. Braces equipped with Bluetooth devices send electronic signals to nerves. Prosthetic hands with individually powered fingers can pick up coins, type, and dial a cell phone.

Just as the technology has advanced, so has the challenge of training professionals in the prosthetics-and-orthotics field.

That’s where the University of Hartford comes in.

The Department of Physical Therapy and the Newington Certificate Program in Orthotics and Prosthetics (NCP) have developed a cutting-edge, two-year Master of Science in Prosthetics and Orthotics program that will provide academic, research, and clinic opportunities for prospective students.

“The move is a reflection of the expanded body of knowledge, skill set, and core competencies required,” says Catherine Certo, chair of the physical therapy department. “It is also the result of the management of complex medical pathologies and multiple diseases seen in today’s populations.”

Prosthetics and orthotics (P&O) professional organizations expect the number of patients using orthoses and prostheses in the United States to reach nearly 9.7 million by 2020. In 2008 the American Board for Certification in Orthotics, Prosthetics, and Pedorthics reported that only 5,538 practitioners were board certified.

Although the American Academy of Orthotists and Prosthetists reports that the employment rate is currently 100 percent for graduates of P&O educational programs in the United States, a 2006 “Workforce Demand Study” predicts that if practitioners continue to enter the field at the current rate, a number of factors—including aging baby boomers and an increased number of diabetics who have lost limbs due to their disease—could cause the demand for practitioners to overwhelm the supply.

Acknowledging the increased demands, the National Commission on Orthotic/Prosthetic Education in 2004 mandated that training programs in the field be elevated from postbaccalaureate certificates to master’s degrees by 2012 and that all new programs be offered at the master’s level starting in 2010.

Robert S. Lin, chief orthotist and prosthetist at Connecticut Children’s Medical Center in Hartford, Conn., and founder of NCP, approached the University in 2006 about developing such a graduate degree program.

“I had a long relationship with the University’s engineering school,” says Lin. “I approached Dean Lou Manzione, who was very enthusiastic, but when we looked at the curriculum for biomedical engineering, we didn’t find much crossover. When we looked at physical therapy, we found a good fit.”

The program will be taught on the University’s main campus and at Hanger Orthotics and Prosthetics, Inc., a manufacturer of prosthetic and orthotic devices in Newington, Conn. The interaction between physical therapy and biomedical engineering students will be a strong element for the clinical and research component of the program.

The first cohort will begin classes in the summer of 2012. The program will offer two paths. One will be the traditional master’s pathway, in which a prospective student with a bachelor’s degree applies to the two-year professional program. The other is a 3+2 program, in which students will earn a Bachelor of Science in Health Science and the Master of Science in Prosthetics and Orthotics in a five-year program. Both paths include a post-graduate, two-year residency requirement as a prerequisite for the board certification exams.
“I’m Sleeping Beauty,” Sammie announces in a clear voice to her teacher and me as we walk through a classroom at Soundbridge Early Learning Center for Hearing-Impaired Children in Wethersfield, Conn.

Her purple and pink crown and pink satin skirt match a twinkling device attached to her ear. When her teacher, Michelle Comporesi ‘08, asks Sammie to show me the technology that has allowed her to hear for the past three years, the preschooler plucks a transmitter from a tangle of hair behind her right ear and holds it out for me to see, before popping it back in and skipping off to play with another princess who is dressed in blue.

If not for the twinkling cochlear implant, I wouldn’t have suspected that the 4-year-old was hearing impaired. It seems nothing short of a miracle that a child who was born profoundly deaf can speak so articulately and listen so easily. The implant differs from a hearing aid in that it bypasses damaged portions of the cochlea, which normally processes sound, to directly stimulate the auditory nerve.

At Soundbridge you get the sense that the remarkable is happening every day. The school uses a team approach to teach spoken language to children with hearing loss. The emphasis is on the latest technology in hearing devices, including hearing aids and the implants. Parents, classmates who can hear, audiologists, administrators, and teachers all play a part in giving hearing-impaired children at Soundbridge the opportunity to learn to talk by listening.

Since 2007, graduate students in the Department of Education and Human Services have also played a role. The master’s program in aural habilitation and education of hearing-impaired children is designed for certified teachers who are inspired by the possibilities technology offers hearing-impaired children. It is the only master’s program preparing new professionals in auditory-oral deaf education in Connecticut and one of two in New England. Soundbridge provides a learning and teaching laboratory for the master’s students.

Masters program trains teachers to work with hearing-impaired children

BY KAREN HUNTER

A grant from an anonymous foundation allows the University to offer substantial scholarships to candidates who qualify.

Marietta Paterson is an associate professor of deaf education and coordinator of the partnership between the University and Soundbridge. “Sammie’s ability to listen to her peers when they talk to her,” Paterson tells me, “is going to affect her socialization as well as her spoken-language development. That’s what makes us different. We are training our teacher-candidates as interventionists and teachers. Our [graduate] students get a lot of knowledge about technology. To be effective, they must understand how all these technologies work and apply that knowledge in interactions with audiologists and in teaching the individual hearing-impaired child. There’s a shortage of professionals who are trained to do that.”

Soundbridge, which is part of the Capitol Region Education Council in Connecticut, serves nearly 650 deaf and hearing-impaired children and their families throughout the state.

Comporesi was among the first graduates of the deaf education program. As she explains it, the master’s program found her. After earning her bachelor’s degree in early childhood education at Central Connecticut State University in New Britain, Conn., she was looking for a master’s program while teaching a child whose learning difficulties were thought to be the result of hearing loss. As it turned out, the child’s hearing was not the problem, but the exposure to deaf education piqued Comporesi’s interest.

Nearly two years later, Comporesi juggles the seedlings sprouting in her students’ window gardens with routines that ensure that everyone’s hearing devices are in working order. It’s a demanding job, but Comporesi tells me the rewards are obvious.

“The University of Hartford program was intense. But then you are here in the classroom with the children and it’s amazing. With intensive work, the children make fantastic progress, just like Sammie. Next year she’ll be thriving in a regular class in her home school district.”
Eye-opening Experiences Outside the Classroom

According to the U.S. Census Bureau’s Census 2000, Hartford, Conn., is the second-poorest city in the United States, based on the percentage of people (31 percent) living below the poverty line. Project Horizon works to bring the University of Hartford’s resources to community residents in need.

A community outreach program in the Department of Nursing, Project Horizon seeks to improve the quality of life for residents of impoverished urban neighborhoods in Hartford. Designed in 2002, the program subsumed under one umbrella organization all the free community health and education services that had been carried out through the nursing department for more than 25 years.

Project Horizon brings nursing faculty and students to homeless shelters, soup kitchens, schools, neighborhood centers, and transitional living centers, where they learn firsthand about the local health and social concerns of poor families. With a focus on developing educational programs on wellness, the program includes community members in its research in order to design effective interventions.

Karen Breda, associate professor of nursing and director of Project Horizon, says working with the poor and the homeless is a stretch for many of the nurses, who find themselves in a setting very different from the familiar. “All of the myths about the people who are homeless or poor are just dismantled one by one. They [the nurses] are no longer afraid of the environment,” she says.

Registered nurses who are completing their Bachelor of Science in Nursing degrees at the University make more than 2,000 contacts within the community annually.

Where’s My Nurse?
UNIVERSITY ADDRESSING NATIONAL NURSING SHORTAGE

“W e’re facing a major crisis in the nursing profession today,” says Mary Jane Williams, chair of the Department of Nursing at the University of Hartford. Williams is referring to the shortage of nurses in the United States as well as the equally concerning shortage of nurse educators. Faculty shortages in nursing programs are limiting student capacity at a time when the need for nurses continues to escalate.

Williams is working diligently, both inside and outside the University, to meet these critical needs.

As chair of government relations for the Connecticut Nurses Association, Williams has a major leadership role in Connecticut. “W e’re working closely with the state legislature to develop innovative programs that will make it easier to recruit and educate new nurses and continue the education of nurses prepared at the associate’s-degree level,” says Williams.

The Department of Nursing, in collaboration with the University’s Center for Professional Development and the Nursing Career Center of Connecticut, has received several grants that focus on enhanced mobility for nurses. The goal is to increase the number of nurses moving into bachelor’s and master’s programs.

“The United States will need more than 800,000 new nurses in the next decade as millions of baby boomers retire,” continues Williams. “W e’ll need thousands of qualified nursing educators to prepare nurses to succeed and prosper in a health-care system that’s becoming more complex every day.”

Currently, the Department of Nursing offers a Bachelor of Science in Nursing, for those who already hold their RN licenses, and a Master of Science in Nursing with specializations in community/public health nursing, nurse education, and nurse management.

“We’re looking at ways to encourage experienced nurses to become educators so they can pass their knowledge and experience on to the next generation,” says Williams. “The University of Hartford has wonderful programs to educate nurses at the baccalaureate and master’s levels,” she continues. “Graduates of our master’s program with a specialty in education are well prepared to assume teaching roles in hospitals and/or community colleges.”
While Professor Jacob Harney was completing his PhD in reproductive physiology at the University of Florida, his grandmother was diagnosed with Alzheimer’s disease. It was a tragic development, but it inspired Harney to turn his attentions to brain development and physiology, foundations of the field of neuroscience, which expanded dramatically during the 1990s.

Harney joined the faculty of the University of Hartford in 1997, attracted by the opportunity to contribute to a graduate program in neuroscience. Now chair of the program, he says, “The master’s in neuroscience program was started in the 1970s by Professor Robert Wallace. It was initially housed in the Department of Psychology but moved to the Department of Biology in the late 1990s, reflecting increasing emphasis on brain physiology research during that decade.”

One year after Harney arrived at the University, another family health problem compelled him to shift his research focus again. His infant son was diagnosed with juvenile diabetes. For most of the past decade he has been investigating the effects of high-fat diets on brain energy metabolism, seizure susceptibility, and blood-sugar regulation in both diabetes and epilepsy.

The neuroscience program emphasizes opportunities for students to do hands-on research with real-world applications in Harney’s and other professors’ laboratories. David Butler M’04, PhD, is currently doing research on pharmaceuticals for the treatment of Alzheimer’s disease at the University of Connecticut and will soon accept a postdoctoral appointment at Harvard University.

While in the program, Butler worked with Harney on drugs for the treatment of seizure disorders like epilepsy. “It was a great learning experience,” he says. “I wanted to do research on brain behavior, and Jake provided a really meaningful opportunity. I learned things that still have direct applicability to my research.”

While many neuroscience students enroll in graduate programs with the goal of obtaining a doctorate, Harney notes that the University’s program gives master’s graduates the advanced knowledge necessary to find rewarding careers in both academic and industrial research laboratories.

We live in a complex world. Add in the stresses of the current economic situation, and the results are predictable. According to the Gallup-Healthways Well-Being Index, 58 percent of Americans reported having trouble coping at the end of 2008.

The University’s Graduate Institute in Professional Psychology (GIPP) offers a doctoral program that addresses the growing need for doctoral-level psychologists in our communities.

“I knew early on that I wanted to stay in Connecticut and work with the Latino community. The PsyD program was local, offered a full range of clinical training opportunities, and prior to my internship, I was able to complete work with Latino child and adult populations in high-need and economically impoverished urban areas,” says Michelle Silva PsyD ’05. “As a result, when I left for my one-year internship, I felt prepared to work in community mental health settings and with a historically underserved population.”

Silva is now associate director of the Connecticut Latino Behavioral Health System, a collaborative of 13 agencies primarily in the New Haven, Conn., area, working to promote culturally competent mental health and addiction treatments. She is also an associate research scientist in the Department of Psychiatry at Yale University.

The PsyD program, now more than 20 years old, is the only one of its kind in Connecticut and one of three in all of New England. It is offered through GIPP, which is part of the Department of Psychology. This year GIPP received more than 200 applications to the program and interviewed some 90 applicants before accepting the 24 most qualified students for admission in 2009.

“The PsyD program places primary emphasis on preparing students for the clinical practice of psychology in settings in both the private and public sectors,” says John Mehm, director of GIPP. He adds that the program is fully accredited by the American Psychological Association.
With his long hair, stud earring, and love of rugby, Albert “Skip” Rizzo ’77 is not your typical clinician or academic. But once upon a time, before he built his first virtual therapeutic world, this University of Hartford alumnus was a traditional clinical psychologist.

Rizzo, who received his PhD from SUNY-Binghamton, was working as a neuropsychologist at a California brain-injury rehabilitation center in 1990 when his career took a surreal turn. He was struggling to persuade a young male patient to do the pen-and-paper drills needed to retrain his brain.

“I couldn’t get this kid to do more than 15 minutes of traditional cognitive rehabilitation, but he spent every second of break time playing on his Game Boy,” Rizzo recalls. “He was a real Tetris warlord. That’s when I first realized how powerful game-based therapy could be.”

Now, after two decades of exploring the nexus of psychology and game technology, Rizzo is developing virtual worlds to distract sick children in pain, train psychiatrists, and treat veterans with posttraumatic stress disorder (PTSD).

“Virtual reality is no longer science fiction or an expensive toy,” says Rizzo, who is a research scientist and professor at the University of Southern California Institute for Creative Technologies. “It’s a great tool for teaching, diagnosing, and treating.”

His success using virtual worlds to help people with Alzheimer’s disease and children with attention deficit disorder led Rizzo to consider their therapeutic potential for veterans returning from Iraq and Afghanistan.

PTSD is an anxiety disorder that can develop after exposure to traumatic stressors like combat or physical assault. Symptoms include flashbacks, hyperarousal, sleep problems, nightmares, and emotional numbness.

A 2008 study by the RAND Corporation found that 20 percent of veterans of Iraq and Afghanistan experience PTSD or major depression. Of those, about half won’t seek treatment, mostly due to fear of being stigmatized.

Rizzo created the first Virtual Iraq prototype in 2004 by adapting a USC-developed video game, Full Spectrum Warrior, designed for the military to teach soldiers about leadership and tactics. Several versions later, Virtual Iraq is a three-dimensional computer simulation that allows a participant wearing virtual-reality 3D goggles to patrol an Iraqi market town or drive a Humvee down a desert highway.

A trained clinician can add other sensory elements to the visual experience—the sound of a baby crying, the vibrations from a tank, or the smell of diesel fuel—to gradually recreate the environment in which the patient’s trauma occurred. This approach, called exposure therapy, helps the patient recall, relive, and work through emotions caused by the trauma.

Clinicians at the Naval Medical Center in San Diego, Calif., found that 16 out of 20 veterans diagnosed with PTSD who underwent exposure therapy with Virtual Iraq had overcome their diagnosis after five weeks of treatment. Researchers also found that many service members who said they would not seek out formal psychological help said they would be willing to participate in virtual reality sessions. Rizzo hopes it will also become a standard postcombat assessment tool to identify people at risk of PTSD.

Virtual Iraq is now being used to treat about 100 veterans and active military with PTSD at 32 sites across the United States, Rizzo says. An Afghanistan version of the program is under development, as well as retooled versions for use by other NATO countries.

When he enrolled at the University of Hartford in 1974, Rizzo planned to study engineering and join the family business. But all that changed after his first semester. He credits the close-knit psychology department for nurturing his love of the field, giving him a sound academic foundation and encouraging a lifelong love of research.

And the strong liberal-arts curriculum enabled him to blend his scientific training with his love of the arts, especially photography.

“My appreciation for both art and science began at the University,” Rizzo says. “I got a good education, definitely, but more importantly, the University of Hartford made creativity a permanent part of my mental toolbox.”

His success with Virtual Iraq is proof of that.
Biomedical engineers are the people who bring us much of the new health-care technology. Pacemakers, insulin pumps, and prosthetic limbs are just a few examples. Thriving at the intersection where medicine meets engineering, biomedical engineers combine knowledge of both fields to offer health-care professionals and patients the latest options.

The University’s biomedical engineering program was launched in the mid-1990s. “We saw a growing need in the health-care field for qualified engineers,” says Associate Professor Michael Nowak, who directs the program. “We created a program to train the biomedical engineers of the future. Our program was approved by the Accreditation Board for Engineering and Technology in 2003,” continues Nowak. “It was the third collegiate program approved in New England, the first in Connecticut.”

The course work is challenging. All students are expected to have a strong foundation in basic engineering before concentrating on the specifics of biomedical engineering. Students study anatomy and physiology, joint mechanics, prosthetics and orthotics, biofluids, and a host of other related topics. In their senior year, they put their knowledge to work in internships at nearby health-care facilities such as the U.S. Veterans Medical Center in Newington, Conn., and Connecticut Children’s Medical Center in Hartford, as well as at medical-device manufacturing facilities. In their required senior capstone project, they design an actual device to address a medical need.

As her senior project, Sara Zajac ’04 worked on a device to test tissue properties in the feet of patients with diabetes. Many diabetics suffer injuries to the soles of their feet that go undetected due to loss of feeling in their extremities. These injuries, if left untreated, can lead to amputation.

Now a development engineer at Texcel, Inc., a Massachusetts contract manufacturer of medical devices, Zajac credits the program with preparing her well for her current position. “I loved the biomedical engineering program. We worked on many different projects and there were lots of hands-on application opportunities.”

Hemchandra Shertukde gives his wife, Rekha MPA’96, credit for changing the focus of his research, a change that has led him to the world of stem-cell research.

“I asked him to use his knowledge and expertise in a positive way to help people,” she says.

A professor in the Department of Electrical and Computer Engineering, Shertukde has been developing a technique to help researchers identify a stem cell’s stage of differentiation. Stem cells are unspecialized cells that over time develop into specific types of cells with very specific characteristics.

The need to properly identify stem cells as they differentiate into specific cell types has become critical because the implantation of misidentified cells can lead to disaster. For example, if a stem cell has begun developing the characteristics of a liver cell but is implanted in the heart, the result can be a tumor.

Because a time frame for stem-cell maturation has not been established, scientists around the world have used different methods to measure the amount of DNA in a stem cell’s nucleus. The amount of DNA is an indicator of where the cell is in its growth cycle.

“The problem,” says Shertukde, “is that currently used techniques have a success rate of only around 65 percent. Our identification accuracy is about 85 percent, with specificity and sensitivity numbers very close to 90 percent.”

Using a near-infrared camera (NIC), Shertukde is able to take digital images of stem cells in a much more microscopic condition. Markers corresponding to different proteins within the cells generate specific light frequencies that can be used to more precisely determine cell differentiation.

To avoid negatively impacting the University’s federal funding due to prohibitions set up by the Bush administration on stem-cell–related research, Shertukde has been working off campus. His current lab space is at his wife’s company, Diagnostic Devices, Inc. (DDI), in Simsbury, Conn., which develops diagnostic devices for the electrical power industry. Thus far, DDI has been investing in the work he began in 2005.

“Thanks to President Obama’s rescinding of restrictions on stem-cell research,” says Shertukde, “I think we will see a huge blossoming of different types of stem-cell identification research that will lead to many medical miracles.”

A Type II diabetic himself, Shertukde says he has a personal interest in helping to advance the successful use of stem cells.
Fighting the Odds
ENGINEERING STUDENTS DEVELOP TOOLS FOR PREEMIES

A month to six weeks. It’s not much time. But for babies developing in utero in the final trimester, it is the difference between prematurity and full-term development. And it can define their chances of survival. Babies born before 37 weeks of gestation arrive early for a host of reasons and often suffer from health problems that are much less likely to afflict full-term babies.

For example, since ‘preemies’ have low birth weights, they have insufficient body fat to keep themselves warm. Their brains and autonomic nervous systems are also underdeveloped, putting them at high risk for apnea, the cessation of breathing.

Through the Center for Life Support and Sustainable Living (LSSL), students from the University of Hartford and several other area colleges and universities have been involved in developing a device that could save the lives of premature infants with apnea.

“Babies with apnea may stop breathing several times a day,” says Dr. Leonard Eisenfeld, a professor of pediatrics at the UConn Health Center who practices medicine at Connecticut Children’s Medical Center (CCMCC) in Hartford, Conn. “In a neonatal intensive care unit (ICU), nurses are alerted by sensors when a baby stops breathing, and they gently massage the baby so that it will resume breathing.”

Those facts are not lost on Ron Adrezin, former professor of mechanical engineering at the University and now a professor of mechanical engineering at the U.S. Coast Guard Academy in Groton, Conn. Adrezin met Eisenfeld when his own son, Peter, was born prematurely and hospitalized at CCMC, where he suffered from apnea. The two men began to discuss the need for special equipment to enhance care for babies with apnea.

Those 2001 discussions were the inspiration for the LSSL center.

“The device we began working on is a sensor that will detect when babies stop breathing,” explains Adrezin, who continues to be involved with the center. “It will then gently vibrate, reminding the baby to breathe.”

“Most of the time when these tiny babies stop breathing, you don’t have to actually wake them,” adds Eisenfeld, “although that often happens when nurses touch them in neonatal ICUs. Our device vibrates at about the frequency at which nerves fire—not enough to awaken the baby, but enough to cause resumption of respiration.”

In the ensuing eight years, many engineering students at the University have contributed to the development of a prototype for the device. If it survives government safety testing, the team hopes it could be produced within the next few years.

But the sleep apnea monitor is not the only product for premature babies that students in the LSSL are working on. Another useful tool is a prototype stethoscope that allows health-care professionals to monitor premature infants’ bowel sounds more effectively. By monitoring these sounds, hospital staff can determine whether the baby is hungry, the amount of food received, and whether health issues, such as a bowel obstruction, are present.

“Right now there is no specialized stethoscope for this purpose,” says Jonathan Hill, associate professor of electrical and computer engineering at the University and a collaborator and technical advisor to the center. “The project presents several significant challenges. The frequency range of infant bowel sounds is very different from that of adults. The stethoscope needs to be able to detect those sounds and filter out the ambient noise of neonatal ICUs. It also needs to actually attach to the baby, but that’s a challenge because preemies have extremely delicate skin.”

“My experience in the Center for Life Support and Sustainable Living was extremely valuable,” says Shalane Regan ’07, who spent two years in the center as a team leader on both the apnea and bowel-sounds projects, which provided the information for her senior thesis.

Now a project engineer at Air-Lock, Inc., in Milford, Conn., Regan adds, “The work I did on those projects was very valuable when I was looking for a job.”

Dr. Leonard Eisenfeld (far left) tests the special stethoscope on a surrogate “baby” held by Jonathan Hill, associate professor of electrical and computer engineering. Shalane Regan ’07 (far right), a graduate student in mechanical engineering, holds the amplifier for the stethoscope developed to boost preemie bowel sounds. Steve Charry ’10, wearing headphones, demonstrates that medical staff could monitor bowel sounds from another site.