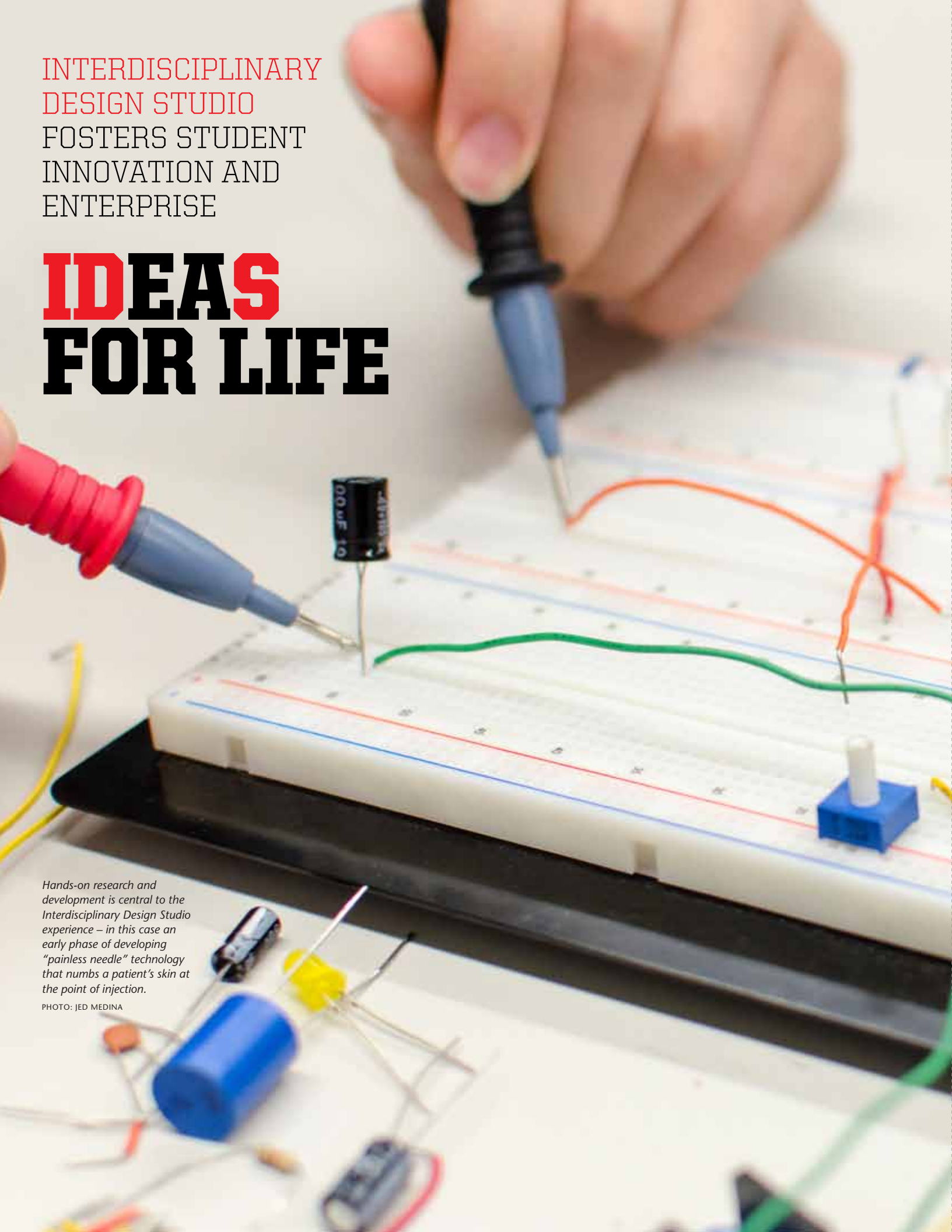


INTERDISCIPLINARY
DESIGN STUDIO
FOSTERS STUDENT
INNOVATION AND
ENTERPRISE

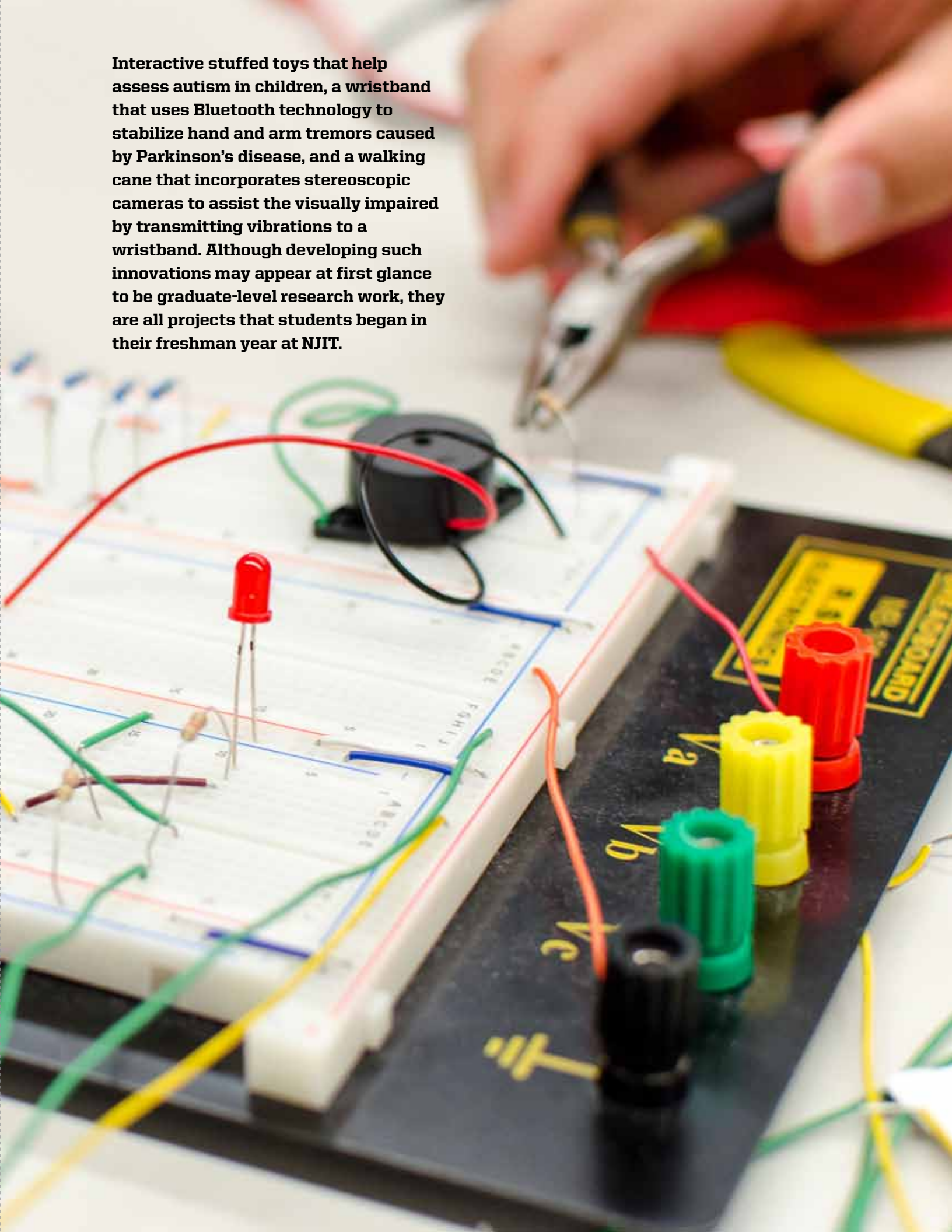
IDEAS FOR LIFE

Hands-on research and development is central to the Interdisciplinary Design Studio experience – in this case an early phase of developing “painless needle” technology that numbs a patient’s skin at the point of injection.

PHOTO: JED MEDINA



Interactive stuffed toys that help assess autism in children, a wristband that uses Bluetooth technology to stabilize hand and arm tremors caused by Parkinson's disease, and a walking cane that incorporates stereoscopic cameras to assist the visually impaired by transmitting vibrations to a wristband. Although developing such innovations may appear at first glance to be graduate-level research work, they are all projects that students began in their freshman year at NJIT.



**"IT'S TAUGHT ME BOTH HOW TO RESEARCH
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THESE DAYS, YOU CAN'T BE SUCCESSFUL
UNLESS YOU KNOW HOW TO DO BOTH."**

— Amira Essegghir '13

The Interdisciplinary Design Studio (IDS) at NJIT provides Albert Dorman Honors College students with an opportunity to develop ideas with wide-ranging economic and societal impact. In the course of the four-year program, students develop virtual companies with complete business and financial plans that are critiqued by instructors and mentors who include internationally known faculty, prominent industry experts, and successful entrepreneurs from the private sector.

Launched in 2011 by Distinguished Professor of Electrical and Computer Engineering Atam Dhawan, the program kicked off with 20 students divided into five teams; it has since grown to 64 students divided into 17 teams. Students obtain funding from the National Collegiate Inventors and Innovators Alliance, a nonprofit group, as well as from Albert Dorman Honors College.

Dhawan, who also serves as executive director for undergraduate research and innovation at NJIT, has established an IDS External Advisory Board comprised of business leaders who have taken a personal and professional interest in the student teams. The board is chaired by Michael E. Smith '95, chief digital officer for Forbes Media LLC and president of Forbes.com. Smith, who received a 2013 NJIT Alumni Achievement Award, hosted an IDS student project showcase at the Forbes Galleries in New York City.

"Teaching students how to found start-ups and become entrepreneurs while they are still undergraduates is very impressive," Smith says. "And the work they are doing is excellent."

Other Advisory Board members include Brian Kiernan, a retired senior vice president at InterDigital who is an angel investor; Manish Patel MS '97, president of The Think Cloud Inc.; and Nish Parikh, chief executive officer of the Web Team Corporation. Along with the Honors College, they offered \$20,000 stipends to two IDS teams: TouchCare™, a four-member team that is developing a painless hypodermic needle; and AutisMind, a four-member team designing "smart toys" that help assess the cognitive abilities of



CLASSROOM PHOTOS: RICKY KHARAWALA

children with autism spectrum disorders. The stipends allowed the two teams to spend the summer researching and developing their technologies at NJIT campus facilities.

IDS Advisory Board member Leon Baptiste '91, whose firm, LB Electric, is located in NJIT's Enterprise Development Center (EDC), is mentoring an IDS team designing fuel cells that convert household and organic waste into sustainable energy. The team, which already has a patent pending for its technology, is comprised of one civil engineering major, two biology majors and a mechanical engineering major, each of whom works on the section of the project related to his or her major.

For example, the civil engineering student focuses on installing the electrical system in households; the mechanical engineering student designs the mechanics; and the two biology majors study the catalysts that break down organic waste. All four team members collaborate on developing their business plan and presentation.

MORE REAL-WORLD INNOVATIONS

Many IDS projects incorporate cutting-edge technologies that have wide-ranging, real-world implications spanning all age groups. Geneo, a painless, bloodless glucose meter for diabetics, originated from research conducted by Dhawan, whose own invention, the

The AutisMind team is developing an interactive toy that utilizes sensor technology to analyze the cognitive abilities of children with autism spectrum disorders. The team is partnering with an outside firm to commercialize this technology and has received industry funding for their research. From left: Kamran Asif, Amira Essegghir '13 and Livia Kuruvila.

Nevoscope, is widely used by physicians to scan skin lesions and detect skin cancer.

The glucose monitoring device, which clips onto a patient's ear, offers diabetics a noninvasive way to check their glucose levels. Another IDS team is integrating three-dimensional organ printing technology that stimulates tissue growth in patients with severe burn injuries. The technology, called QuikGraft, uses individual skin cells rather than a large amount of skin from the donor site and infuses a layer of antibiotics that helps to prevent infection.

NJIT recently signed a collaborative agreement with WebTeam Inc. for iLearnNEarn2, a gaming model for children with autism spectrum disorders. And with the growing number of older adults as its target population, another IDS team is developing SmartGuardian, a physiological monitoring system that collects, organizes, and stores patient data including blood-pressure and heart-rate readings that can be implemented in both home and assisted-living environments.



PHOTO: JED MEDINA

BEYOND IDS

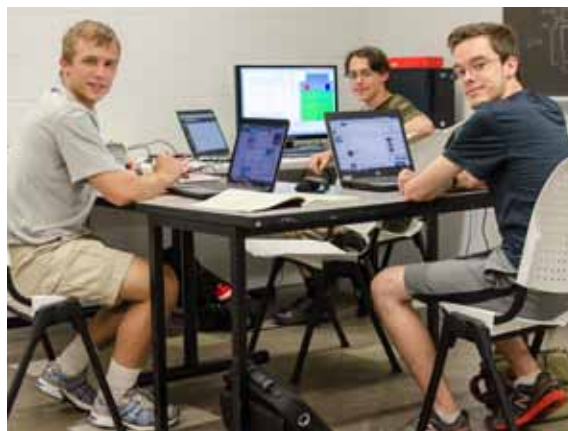
In their senior year, students in the IDS program make a comprehensive final presentation of their accomplishments at an Interdisciplinary Design Workshop that is judged by an external panel of experts with representatives from industry and business as well as the EDC. The teams also learn about the possibility of obtaining federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) funding and, if relevant solicitations are identified, can apply for those grants.

The SBIR program encourages small businesses in the US to engage in research and development that has the potential for commercialization. STTR is another program that expands funding opportunities in the federal innovation research and development arena.

IDS teams are attracting the attention of local and statewide organizations. Last year, the fuel-cell team won two second-place awards – Best Pitch and People's Choice – at the Annual New Jersey Entrepreneurial Network poster session held at Princeton University. The AutisMind team also participated in the contest and was recognized for its technology.

IDS students Kevin Ly '13, who led the Geneo glucose meter team, won first place while Asim Zaman, a civil engineering major from the fuel-cell team, won second place in the 2011 Capital One Bank Newark Innovation Acceleration Challenge. In this entrepreneurial contest co-sponsored by Capital One Bank, students from local universities present their business plans to a panel of Capital One executives, investors, and venture capitalists. The initiative is an extension of Capital One Bank's efforts to invest in economic opportunities for individuals, families and businesses throughout New Jersey.

Ly and Zaman each received \$3,000 fellowships from Capital One. The fellowships paid for their teams to conduct research at the EDC. TouchCare™, SwimSafe and AutisMind



TOP TO BOTTOM: The AutisMind and TouchCare teams received funding to continue their work over the summer. Members of the TouchCare team are shown here with Jerry Chu (far left), co-founder of The Think Cloud, LLC; Nish Parikh (fourth from left), CEO of the Web Team Corporation; Manish Patel '97, president of The Think Cloud Inc. and a member of the IDS Advisory Board; Brian Kiernan, a retired senior vice president at InterDigital and an angel investor; and IDS Program founder Atam Dhawan (far right).

Members of the "painless needle" TouchCare team. From left: Isaac Daudelin, William Heberling, and Brian Taylor. Not pictured: Jeremy Jen.



The IDS fuel-cell team, which already has a patent pending for their technology, conducts research in NJIT's labs. From left: Margaret Christian, Nevedha Rajan '13, Lindsey Oh and Asim Zaman.

teams were awarded first, second and third place, respectively, in the 2012 competition. SwimSafe is a wristband that can detect when a swimmer is in trouble, alert a lifeguard via a smart communications device such as a tablet or phone, and guide the lifeguard to the swimmer's location.

Earlier this year, Mariam Selevany of the AutisMind team placed first in the General Category of the Campus CEO Challenge. Additionally, an IDS team that designs emergency-response systems and another that designs hydroponic systems for urban gardens have partnered with two EDC companies, which are sharing their technologies and managerial skills with the students.

IMPROVING SOCIETY'S TECHNOLOGICAL FABRIC

Amira Esseghir '13, who graduated from NJIT's accelerated biological sciences/DMD program in May, led the AutisMind team as an undergraduate. Esseghir, who is beginning

her studies at New Jersey Dental School this fall, is continuing to work on the team, which has filed an invention disclosure to protect its technology and has received industry funding for its research.

She said that her IDS experience not only showed her how to develop a research project, but also how to improve her leadership and management skills.

"It's taught me both how to research a technology and how to form a business to market that technology," Esseghir said. "These days, you can't be successful unless you know how to do both – research and market your research."

Dhawan predicts that IDS program graduates have the potential to become successful future leaders in the global marketplace. "What these students have accomplished in such a short time is nothing short of amazing," he says. "I'm so proud of what they've done and I know that after they graduate they will improve the technological fabric of American society." ■

<http://honors.njit.edu/ids/index.php>

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