

# FOCUS

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## REVERSING RESISTANCE TO ANTIBIOTICS

Long gone are the bad old days before penicillin when people died of infections. Or are they? Nowadays, antibiotic resistance is threatening to return us to those dark times, when the efficacy of the wonder drugs – among the most important utensils in the medical toolbox – is compromised by the evolution of the very bacteria they are designed to combat.

Antibiotic treatment has two conflicting effects: the desired, immediate effect of inhibiting bacterial growth and the undesired, long-term effect of promoting the evolution of resistance.

Prof. Roy Kishony, the Marilyn and Henry Taub Professor of Life Sciences, recently joined Technion's Faculty of Biology from the Department of Systems Biology at Harvard Medical School. His research team, at Technion and Harvard, is studying microbial evolution with a specific focus on antibiotic resistance. They aim to understand how bacterial pathogens evolve resistance to antibiotics within the human body during infection and how combinations of drugs can be used to slow down and perhaps even reverse this process.

They recently published some fascinating results in *Science*, in January 2016. The researchers review what can be done by using combinations of antibiotics to circumvent bacteria's evolutionary strategies. Resistance to one drug may cause sensitivity to another, the effectiveness of two drugs can be synergized by a resistance mutation, and some negative drug interactions that they discovered may even select

**"Our strategies of combatting resistance must also evolve to remain one step ahead."**

diagnostics that reads the genome of the pathogen and anticipates its evolutionary potential for resistance thereby better directing treatment. "This is an ongoing battle," says Kishony, "and we can be certain bacteria will adapt to our treatments. Our strategies of combatting resistance must also evolve to remain one step ahead."

against resistance. Novel unique drug combinations, therefore, may provide some answers to the quest for successfully overcoming bacterial infections.

The authors further argue for the need for a new type of

## A CORNERSTONE IN CHINA

Technion Launches Israel's First University in China

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## Viterbi Vision

Andrew Viterbi, co-founder of Qualcomm and inventor of the Viterbi Algorithm, names the Faculty of Electrical Engineering (EE)

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## FROM THE PRESIDENT



(l-r) Mortimer Zuckerman and Technion President Prof. Peretz Lavie at the launch of the Mortimer B. Zuckerman Scholars Program in STEM Leadership, New York.

On December 16, 2015, we held the cornerstone-laying ceremony for the Guangdong Technion-Israel Institute of Technology (GTIIT) in the city of Shantou, China. Shantou is situated in the east of Guangdong Province, which is located in southeast China and is one of the wealthiest provinces. I was proud to read out the groundbreaking scroll, which was placed in a time capsule and buried inside the cornerstone. It stated:

"We are honored to lay the cornerstone of the campus of the Guangdong Technion-Israel Institute of Technology in Shantou, Guangdong Province, People's Republic of China. Born of a partnership between two great and ancient nations; Inspired by the noble pursuit of knowledge, wisdom, and discovery; Dedicated to education, research, and innovation; Established for the benefit of the people of China, Israel and all humanity."

There was unprecedented representation of Chinese leadership, including three Vice Ministers of the Federal Government who came from Beijing to attend the event. They joined Hong Kong business leader and philanthropist Li Ka-shing, who delivered an inspiring speech at the ceremony. Our guests of honor included Shimon Peres, former president of Israel, and Minister of Science, Technology, and Space, Ofir Akunis, who both spoke at the event.

The ceremony, held in the arena filled with more than 5,000 participants, generated an impressive buzz. In addition to the dignitaries and our guests, members of the Shantou community watched a Technion film screened using 360° technology.

The entire experience was both moving and inspirational.

We expect to inaugurate the campus by the beginning of 2017, depending on the progress of construction. The campus will maintain the same high academic standards of education, research, and innovation for which the Technion is renowned world-over.

I believe that the combination of the innovative and entrepreneurial spirit of Israel and the unbelievable scale and resources of China will result in a great partnership. Together we will create a major research institute that will help not only China and Israel, but also humanity in general.

Here in Haifa, plans are well underway for the new BSc degree in Mechanical Engineering to be offered in English through Technion International that will kick off this August. To this end, we are also reaching out to potential candidates among U.S. high school students, and encouraging them to submit their applications. The program provides students with a strong base in the engineering

sciences alongside project-based laboratory and design experiences, to develop their independence, creativity, and leadership in an era of incredibly rapid technological change.

Another exciting development is the launch of the Mortimer B. Zuckerman Scholars Program in STEM Leadership. Made possible by a generous gift to four Israeli universities, this will provide the much-needed means to recruit top postdoctoral researchers and new faculty in science, technology, engineering, and mathematics to our ranks.

The Program, slated to begin in October 2016, is key to the future of Israeli higher education.

Mort Zuckerman's bold vision will not only help improve scientific research at its highest level, but will also serve as a new and important pillar supporting the foundation on which the ties between Israel and the United States will continue to prosper.

We celebrated the Program's launch in New York on January 25, which coincided with *Tu B'Shvat*, the Jewish New Year for Trees. It was *Tu B'Shvat* in 1925, when Technion officially marked the opening of academic studies. In the 91 years since, Technion has led the way in promoting scientific excellence and training the engineers who built Israel and continue to propel it forward. There is no more fitting anniversary at which to celebrate this transformative philanthropic gift that promises to support future generations of scientific leaders and nourish academic exchange between the United States and Israel for the benefit of all humanity.

## Technion Nano Bible Becomes U.S. National Treasure

### FOCUS

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#### NOTICE OF NONDISCRIMINATORY POLICY AS TO STUDENTS

The Technion admits students of any religion, gender, race, color, national and ethnic origin to all the rights, privileges, programs, and activities generally accorded or made available to students at the school. It does not discriminate on the basis of religion, gender, race, color, national and ethnic origin in administration of its educational policies, admissions policies, scholarship and loan programs, and athletic and other school-administered programs.

In October 2015, Technion President Prof. Peretz Lavie ceremoniously presented Smithsonian Institution Secretary David J. Skorton with a Nano Bible at the National Museum of History in Washington, D.C.

The Technion Nano Bible – the world's tiniest version of the Old Testament and the first in the United States – will share "shelf space" in the Smithsonian Libraries collection with rare copies of Galileo, Copernicus, and Newton books.

Lavie said, "The Nano Bible is a fascinating confluence of history, culture, and cutting-edge science, making it, I believe, a perfect fit for inclusion in the Dibner Library of the History of Science and Technology."

Prof. Uri Sivan of the Faculty of Physics and the founding director of Technion's Russell Berrie Nanotechnology Institute (RBNI), reports that the Smithsonian's Nano Bible is the third in a series of three copies. The first was given by Israel's then president, Shimon Peres, to Pope Benedict XVI during His Holiness' 2009 historic visit to the Holy Land, and is stored in the Vatican Library. The second copy is displayed at the Shrine of the Book in the Israel Museum, next to the Dead Sea Scrolls.

Conceived of and first created by Prof. Uri Sivan and Dr Ohad Zohar as part of RBNI's outreach program in 2007, the Nano Bible is a gold-plated silicon chip the size of a grain of sand on which the entire Hebrew Bible is engraved. "The text, consisting of over 1.2 million letters, is carved on the 0.5 mm<sup>2</sup> chip by means of a focused ion beam," Sivan explains. "The beam dislodges gold atoms

**"The Nano Bible is a fascinating confluence of history, culture, and cutting-edge science."**



(l-r) Technion President Prof. Peretz Lavie and Smithsonian Institution Secretary David Skorton examine the Technion Nano Bible presented to the Smithsonian.

from the plating and creates letters, similar to the way the earliest inscriptions were carved in stone."

To read the text it is necessary to use a magnifying glass capable of 10,000-times magnification, and requires an electron microscope. "This technological marvel is not, of course, meant for reading," says Sivan, "but rather to demonstrate the wonders of miniaturization, known as nanotechnology."

This educational project, says Sivan, "was meant to inspire everyone, and particularly youngsters, to reflect on the vast world that exists down there, invisible to our senses, and encourage them to imagine the vast potential of manipulating matter on the scale of Nature's fundamental building blocks."

The term "nano" derives from the Greek word for "dwarf," and the nanometer is inconceivably small – one billionth of a meter.

"The smallest practical manmade bits of information are still about ten times larger than Nature's," notes Sivan, "but we can already manipulate matter and construct functional objects, such as drug delivery agents, that measure only a few nanometers."

*Prof. Uri Sivan holds the Bertoldo Badler Academic Chair*



# Schulich Leader Scholarship Program

Rewarding academic excellence, nurturing innovation and strengthening the community

HADEEL ABU ASAAD

JULIETA ARAKELIAN

ORI MICHAEL

By Roberta Neiger

Whether they plan to address subjects as diverse as climate change, medical technology, the food crisis, space travel – or others – Schulich leaders are united by a single desire: to change the world.

Scholastic merit, pioneering, and public service: the Schulich Leader Scholarships program rests on these three pillars. Bolstering exceptional young people who both embrace Science, Technology, Engineering and Mathematics (STEM) fields, and demonstrate great leadership, the scholarship rewards excellence throughout Israel and Canada.

Launched in 2012, the program funds 50 undergraduate scholarships each year in Israel and another 50 across Canada. The largest program in both countries to target undergraduate STEM students, the scholarship bears the name of Canadian philanthropist Seymour Schulich, for whom the Technion Faculty of Chemistry is named.

At Technion, Schulich Leaders come from various backgrounds, geographically, ethnically, financially and academically.

For example, 19-year-old Hadeel Abu Asaad is an Israeli Arab from Nazareth. A first-year student, Abu Asaad comes from modest circumstances and must assume complete responsibility for her expenses. “For me,” she says, “this scholarship makes the difference between studying and not studying.”

Enrolled in the Faculty of Biomedical Engineering, Abu Asaad is motivated by making a contribution, along with the drive to succeed. “In my department we can reveal new phenomena, and in turn, make changes that can change the course of disease.”

Committed to the community, Abu Asaad has consistently put her beliefs to practice. She has volunteered for both Hands of Peace, which encourages peace-building and leadership among Israeli, Palestinian and American teens, and Bridges of Understanding, which fosters relationships between the American people and people of the Arab World – partially through youth programs. Bridges chose Abu Asaad from all candidates throughout the Arab world, to visit Washington, D.C.

Closer to home, Abu Asaad takes part in local environmental activities.

At Technion, Abu Asaad’s older sister, Hiba, is also a student, at the Faculty of Architecture. “We wouldn’t be here now without the encouragement of our parents,” Hadeel says. “I want to be successful for them so they can be happy and proud of me.”

Ori Michael, a new father, is looking towards the next generation. “I can now concentrate on my studies, without worrying about working,” says the 25-year-old mechanical engineering student whose first child, a son, was born just three days before this interview. “You can just imagine what this award means to me and my wife,” he says.

“Also, in terms of personal mission and responsibility, the scholarship enables me to do my maximum for Israel, in my field, mechanical engineering. My dream is to work for a company like Rafael.”

On a civic level, Michael volunteered as a math tutor in his hometown, Kiryat Shmona, to junior high schoolers, the children of Ethiopian immigrants. “This served as the basis for their *bagrut* (matriculation) tests and future academic achievement,” says Michael.

Michael, now in his second year at Technion, also volunteers with *Paamonim* (bells), a group that helps families with economic hardships balance their household budgets. “We check how much enters, how much goes out, and how much of this is critical,” says Michael. “In short, it’s about being responsible with your expenses.”

“The scholarship gives me the financial freedom to concentrate on my studies,” says Roi Sinoff, 25, from Haifa. “It introduced me to high-quality, interesting people, and has acquainted me with different voluntary organizations.”

**“[The Program] introduced me to high-quality, interesting people, and has acquainted me with different voluntary organizations.”**



ROI SINOFF

**“I want to help people in need stand on their own two feet.”**

Before Technion, Sinoff’s ‘giving back’ mainly took the form of music. An accomplished pianist, he played for Holocaust survivors, children and at a rally for IDF soldiers abducted by the Hezbollah. Now, as a third-year student in the Faculty of Electrical Engineering, he plays the piano at Technion ceremonies.

As a Schulich Leader, Sinoff volunteers in the SpacEL program, which uses space travel to stimulate youngsters’ – particularly girls’ – interest in math and science. Additionally, he has served as a “big brother” to a high school student. “Teaching is my fantasy,” says Sinoff. “I want to influence young people the same way my best high school and college teachers motivated me.”

“Receiving the Schulich Leader Scholarship was a great honor,” says Julieta Arakelian, a fourth-year computer science student. “On a day-to-day level, the financial advantages are obvious, and allow me to dedicate all my time to study,” adds the Argentinian-born student.

Socially, the scholarship has also benefited Arakelian. “There are great side benefits, like gatherings for the recipients. This group includes many different types of people; these connections have become very important to me.”

Arakelian, 25, ultimately wants to make her contribution by developing medical technology.

Meanwhile, she takes part in SpacEL, a nonprofit organization working to land the first Israeli spacecraft on the Moon. Through this mission, SpacEL seeks to inspire the next generation to consider careers in STEM subjects.

Summarizing the sentiments of all Schulich Leaders, Ori Michael says, “I want to help people in need stand on their own two feet.” Looking toward his own future, Michael is determined to contribute “the maximum of imagination and creativity.” Now, he adds, “is just the beginning.”

# GROUNDBREAKING NEW<sup>IN</sup> YORK

New York City Mayor Bill de Blasio and former Mayor Michael Bloomberg were joined on Roosevelt Island by hundreds of dignitaries on June 16, 2015, to mark the commencement of construction of the Cornell Tech campus, home of the Joan and Irwin Jacobs Technion-Cornell Institute.

Cornell Tech is a revolutionary model for graduate tech education, developing pioneering leaders and technologies for the digital age. In December 2011, Cornell and Technion won New York City's competition to build an applied sciences institution in partnership with the City. The partnership was provided with land on Roosevelt Island and \$100 m. in City capital to build the tech campus, the first phase of which will open in summer 2017. The campus will be one of the most environmentally friendly and energy-efficient campuses in the world. Classes began in January 2013 at the temporary campus in Google's Chelsea building. Dual degree Master's

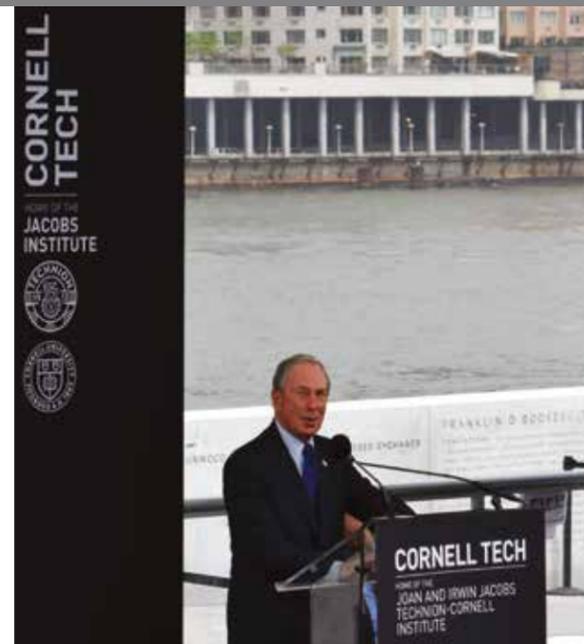
programs (awarding both a Technion degree and a Cornell degree) currently offered by Jacobs Technion-Cornell Institute include the MS in Information Systems, with a concentration in Healthier Life or in Connective Media. In addition, the Runway Startup Postdoc Program ushers recent PhDs in digital technology from an academic mindset to an entrepreneurial outlook. A \$100 m. gift from Bloomberg Philanthropies will help fund construction of the campus.

**"It will be one of the most modern and advanced research institutes in the world – a citadel of innovation."**

"This gift holds special meaning because Mayor Bloomberg first envisioned the Applied Sciences initiative and has seen this project through since its inception in 2011," said Cornell

University's then President David J. Skorton.

"Cornell Tech, which is the home of the Joan and Irwin Jacobs Technion-Cornell Institute, will be one of the most fascinating campuses ever built. It is extremely gratifying



Former Mayor of New York City Michael Bloomberg speaking at the groundbreaking ceremony for Cornell Tech, home to the Jacobs Technion-Cornell Institute on Roosevelt Island.

to know that the Technion is part of it. It will be one of the most modern and advanced research institutes in the world – a citadel of innovation," said Technion President Prof. Peretz Lavie. "I congratulate Mayor Michael Bloomberg for his vision and for his extraordinary gift that will help make this vision a reality."

*Michael Bloomberg will be honored with a Technion Honorary Doctorate in March 2016. David Skorton, now secretary of the Smithsonian Institute, will be similarly honored in June 2016.*



Rob Cook, Vice President of Advanced Technology, Pixar, delivering a talk on Cartoon Physics at the Technion Faculty of Computer Science.

By Amanda Jaffe-Katz

Oscar-winning Rob Cook, a Cornell Tech Fellow and Vice President of Advanced Technology, Pixar, came to Technion in January 2016. Cook is one of only two people ever named to both the Academy of Motion Picture Arts and Sciences and the National Academy of Engineering.

On this, his first visit to Israel, he commented, "I'm really blown away by Technion and Israel. You built this country out of nothing. It's super impressive."

Cook, co-architect and primary author of Pixar's RenderMan software, gave two standing-room-only talks in the Faculty of Computer Science as a guest speaker of TCE (Technion Computer Engineering center) and Bronica Entrepreneurship Center. In 2001, Cook and two colleagues received the first Oscar ever awarded for software.

At Lucasfilm, Cook pioneered programmable shading, which is now an essential part of GPUs and high-end renderers, and introduced Monte Carlo techniques to computer graphics, which allowed computer-generated imagery to match the motion blur and depth of field of live-action footage.

His first talk, on Cartoon Physics, focused on the technology that makes the visuals of the virtual world possible. Pixar's animated films are created using computer graphics, so the characters are constructed and animated in a virtual 3-D world. Manipulating that world involves using physics and

**"Everything we do is in the service of the artist – to get the look they want."**

"It takes about five years to make a movie," Cook told the rapt audience of undergraduates, graduate students, faculty,

technical and administrative staff. The filmmakers start with the story, and then introduce traditional materials such as line drawings, before starting with computerization. "There is a lot of preparatory work."

His talk on Creative Teams addressed how making a Pixar movie involves hundreds of people from widely different disciplines using a lot of sophisticated technology. The scale and complexity of the process make it challenging to create a cohesive story that audiences find moving.

Prof. Adam Shwartz, director of Jacobs Technion-Cornell Institute said, "Rob Cook's visit was part of a trip by a group of Jacobs Board members that included Cornell Provost Michael Kotlikoff and Cornell Tech Dean Dan Huttenlocher, for a board meeting at the Technion. This yearly trip is an essential part of building the relations between the institutes: 'The personal contact is indispensable, even in our technological age,' as Dean Huttenlocher remarked."

## CARTOON Physics

math for everything from sculpting the shapes of objects to animating the characters, lighting the scenes, texturing the surfaces, and simulating the motion of clothes and hair.

## Cornell Candids

A pilot group of nine students attending Jacobs Technion-Cornell Institute (eight in the Connective Media specialization and one studying Health Tech) came to campus for a study tour in January 2016. They participated in workshops and labs, company visits, field trips, sightseeing, and got a taste of life on campus.

Brandon Plaster and others commented on the very impressive nanoelectronics facility and clean rooms on campus. Naveen Parthasarathy, a computer science major at Cornell Tech who joined the delegation, said that he had not realized that Haifa is such a beautiful and diverse city. Student leader Shawn Bramson said of their visit to ReWalk®—the company led by Technion alumnus Dr Amit Goffer that makes robotic exoskeletons for paraplegics – "it was great to see an offshoot that came directly from Technion."



(l-r, back row) Technion graduate student Eden Saig, Shawn Bramson, Rohit Jain, Daniel Levine, Brandon Plaster, and Naveen Parthasarathy; (l-r, front row) Xiaoyang Ma, Muhammad Khadafi, Alap Parikh, Joanna Zhang, and Yanbo Li

# A CORNERSTONE -IN- CHINA

Technion broke ground in December 2015 to launch construction of the Guangdong Technion-Israel Institute of Technology (GTIIT) in Shantou, China. Located in Guangdong Province, this new research university, the product of a historic partnership between Technion and Shantou University, will offer high-level, innovative undergraduate and graduate education. Technion received a \$130 m. gift from the Li Ka Shing Foundation in 2013 to support its participation in the joint venture. The campus is being built on land granted by the Guangdong Provincial Government and the Shantou Municipal Government, which are also funding its establishment.

"Our unprecedented collaboration will be truly transformational for the Technion, Shantou, and Chinese education," said Technion President Prof. Peretz Lavie. "Together we will create a major research institute that will help not only China and Israel, but also mankind in general."

GTIIT will offer Technion degrees at all levels, from bachelor to doctoral. The school plans to enroll an initial class of 300 students for BSc degrees in Chemical Engineering (with a minor in Environmental Engineering), Biotechnology and Food Engineering, and Materials Engineering. It will eventually expand to 4,000 undergraduates and 1,000 graduate students. Some teaching staff will come from Technion faculty and others will be recruited globally.

GTIIT will create not just a new academic facility, but also a new era of cooperative research between Israel and China. Two additional agreements were signed: a Twin City agreement between Haifa and Shantou, and an agreement to establish a joint Israel-China fund to support joint scientific programs on the part of the

Chinese and Israeli Ministers of Science. An industrial park planned adjacent to the GTIIT campus will serve as a foothold for graduates and Israeli companies to enter key markets in China.

Leading the groundbreaking ceremony were Shimon Peres, former president of Israel; Hong Kong business leader and philanthropist Li Ka-shing; Technion President Prof. Peretz Lavie; GTIIT Chancellor Li Jiange; GTIIT Vice Chancellor, Technion Distinguished Professor and Nobel Laureate Aaron Ciechanover; and Ofir Akunis, Israel's Minister of Science, Technology and Space.

Shimon Peres said that, "the establishment of a Technion campus in China is more proof that Israeli innovation is breaking down geographic borders. I hope that the economic cooperation between these two countries will continue to expand, as both countries have much to share with, and learn from, one another."

Ciechanover said that at GTIIT, "Technion will contribute its extensive experience in training engineers who know how to apply what they have learned, and turn their knowledge into commercial products that focus on science and technology."

"In this day and age, no one has an iota of doubt that technological innovation underpins a country's ability to create collective wealth, and that it is the key impetus to individual success. Creativity is the defining centerpiece of our time — powering us into the future," said Li Ka-shing. He also said that GTIIT will be home to the wise and the innovative.

Li Jiange, inaugural chancellor of GTIIT, who has long served in China's government, academic and financial spheres, said, "I want to thank the Israeli Government

**"This is an unprecedented achievement for Israeli academia."**



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Guangdong Technion-Israel Institute of Technology Chancellor Li Jiange (r) and Vice Chancellor Prof. Aaron Ciechanover (l) bury a time capsule at the December 2015 groundbreaking ceremony in Shantou, China.

and the partners at Technion, for facilitating the progress of human civilization through science and technology that has been the common aspiration of China and Israel. GTIIT will continue the fine tradition of Technion in Shantou, Guangdong Province so as to build the 'Silicon Valley' in South China."

"This is an unprecedented achievement for Israeli academia," said Minister Akunis.

China has eight joint universities with foreign counterparts.

The GTIIT logo represents the cultural origins of every one of the partners, as well as the harmonious collaboration between them. The Hebrew letter "tet" represents Technion, the red flower stands for Shantou, and the phoenix for Shantou University.



© Government of Guangdong Province

(l-r) Shimon Peres, former president of the State of Israel; Hu Chunhua, secretary of the CCP Guangdong Province Committee; and Li Ka-shing, founder of the Li Ka Shing Foundation.



Prof. Shiri Azenkot of Jacobs Technion-Cornell Institute delivers a lecture at Technion on designing technologies for people with disabilities.

By Amanda Jaffe-Katz

Shiri Azenkot, an assistant professor at Jacobs Technion-Cornell Institute, specializes in designing technologies for people with disabilities. She is particularly interested in wearables.

## COOL TOOLS FOR ASSISTIVE TECHNOLOGIES

**"It's all about providing equal access at equal speed, and equal accuracy."**

Azenkot is inspired by the egalitarian, open-plan atmosphere at the New York institute, where she finds herself sitting next to a graduate student and the associate dean.

"I like that the Jacobs Technion-Cornell Institute is new and focused on real problems. They have a broad idea of impact, not just within the academic community but also, for example, to get the software out, via outreach, or by establishing companies. This is not only supported but expected," she comments. "And the relationship with Technion is a bonus."

With a PhD in computer science, Azenkot says, "We need more diversity in computer science. Many existing assistive technologies are very disempowering for users with disabilities, who, of course, experience stigma. I find new, enabling ways to use the existing technology." It's all about providing equal access at equal speed, and equal accuracy.

Azenkot herself has low vision, a disability that makes it difficult to see even with glasses.

In October 2015, Azenkot featured in a CBS interview about gaming technology that she and her doctoral student, Yuhang Zhao, have adapted as a cool tool for visually impaired people.

The prototype technology, dubbed CueSee, utilizes visual cues to facilitate product search for people with low vision when shopping.

Shopping is an important daily activity for an independent life, yet locating a specific product on a grocery store or pharmacy shelf is a major challenge for low-vision people. CueSee is an augmented reality method designed to run on a head-mounted display that expedites product search on a shelf by recognizing the product automatically and using customizable visual cues to orient the user's attention to the product.

Azenkot is optimistic that the software can be adapted to work with more stylish options, such as regular glasses.

# Seiden Science

## Generations of the Seiden family promote scientific exchange and academic excellence at Technion

Norman Seiden, Deputy Chair of the Technion Board of Governors and a leader of the American Technion Society (ATS) New York Metropolitan Region, was honored at the Technion in December 2015 for three generations of support to the university, much of which has focused on – and pioneered – optoelectronics and nanotechnology.



(l-r) Vice President for Academic Affairs Prof. Hagit Attiya, longtime Technion supporter Norman Seiden, and recipient of the inaugural Norman Seiden Award for Academic Excellence, Prof. Jacob Rubinstein.

Norman Seiden was joined by his sons, Mark and Stephen, and their wives, Diane and Sharon, at dedications of the Mark and Diane Seiden International Workshop in Nanoscience and Nanotechnology (to be held in 2016) and the Pearl Seiden International Meeting in Life Sciences, named for Norman's daughter Pearl. Ceremonies were held for the Norman and Barbara Seiden Family Prizes for multidisciplinary undergraduate projects in optoelectronics, microelectronics, and nanosciences, and the new Norman Seiden Prize for Academic Excellence, established by Norman Seiden's children in honor of their father's 90th birthday.

The first Pearl Seiden International Meeting in Life Sciences: From Synthetic Biology to Discovery and Applications took place concurrently. The meeting brought together speakers who use quantitative biological approaches with synthetic biologists to see where synthetic biology approaches can advance quantitative biology research and vice versa. The ultimate goal: to foster collaborations that will lead to discovery by finding ways to combine synthetic biology approaches with quantitative research techniques for the cross-fertilization of both disciplines.

Prof. Roy Kishony, the Marilyn and Henry Taub Professor of Life Sciences and a co-organizer of the Seiden Workshop, thanked the Seidens for their foresight in "helping to proactively bring top researchers to the Technion and exposing our community to their science as a way to greatly enhance our own work."

Technion President Prof. Peretz Lavie noted that 70 years ago, Norman Seiden graduated from Purdue University in Mechanical Engineering and to commemorate this event, his parents gave a gift to the Technion. Norman continued the tradition, and became a pillar of the ATS. And now, his children Mark and Steven continue the family tradition: Three generations who support the

Technion. "This is the strength of the Technion," Lavie said. "You made the Technion what it is today."

Lavie also noted that Seiden has the rare ability to identify scientific issues that are of top importance and that will lead the future, such as optoelectronics. Similarly, Norman was the dynamo behind Technion's Russell Berrie Nanotechnology Institute. "And now, the subject of the workshop today, Synthetic Biology. I believe this is one of the important areas of research for the future," Lavie said.

Norman Seiden said of his support for Technion, "It is probably the single most important thing I have done through my life. I have great satisfaction knowing that I have been able to do just a little part of what you are doing today."

In her absence, Stephen Seiden read a message from his sister Pearl in which she thanked her father "for continuing the link between us, the third generation, and the Technion."

Mark Seiden said, "We are truly blessed to have Dad as our mentor both as a father and as a philanthropist. You have instilled in us how important Technion is."

The inaugural recipient of the Norman Seiden Award for Academic Excellence is Prof. Jacob (Koby) Rubinstein, an applied mathematician who served as dean of the Faculty of Mathematics between 2009 and 2012.

Rubinstein described some of his recent work, which applies mathematics to medicine. One project – just completed – introduces advanced mathematical tools into the urological oncology clinic at Bnai Zion Medical Center. "Together with Prof. Sarel Halachmi, we are developing mathematical methods to predict prognosis of bladder cancer patients," Rubinstein reported.

Rubinstein demonstrated his multifocal spectacles to the audience, to illustrate a specific product of his previous research, done jointly with Prof. Gershon Wolansky, also from the Technion Math Faculty. Their design is based on a Technion-developed algorithm and computer code that were transferred to a kibbutz company, Shamir Optical. "An independent consumer report says that these lenses are the best in the world," Rubinstein said. "I benefit from my own invention every minute, and derive satisfaction that the IP was sold to an Israeli company."

**"[My support for Technion] is probably the single most important thing I have done."**

"I will use this award for my visual optics research in collaboration with the ophthalmology department at Rambam Medical Healthcare Campus," Rubinstein thanked the Seidens, referring to several ongoing projects – with Prof.

Eytan Blumenthal and Dr Britannia Fleming – to better understand the eye as a visual organ and cure pathologies in ophthalmology.



(l-r) Mark and Stephen Seiden at the inauguration of the Pearl Seiden International Meeting in Life Sciences, named for their sister, Pearl.

## YAHOO TECHNION

Dr Ron Brachman, Head of Yahoo Labs and Chief Scientist of Yahoo, visited Technion in November 2015. Brachman was escorted by Dr Yoelle Maarek, VP Research at Yahoo, who earned her PhD at the Faculty of Computer Science.

Brachman commented after his visit, that included a tour of the Faculty of Computer Science, "My childhood vision of a futuristic science center was not disappointed, and in fact, I was stunned at the natural beauty of the campus. It felt like a hilltop oasis – a perfect place for contemplation, study, research, and intellectual challenge. A wonderful

combination of the highest-tech and peaceful symbiosis with nature."

Brachman also learned about the concept of the Jacobs Technion-Cornell Institute in New York City – a venture close to home for him. "The vision of the Jacobs Institute was inspiring, and being aware of the competition set up by Mayor Bloomberg, I had known how special a place it had to be in order to have prevailed over other amazing bids. As a leader in industrial research, I am particularly excited about the clear vision of collaboration between academia and industry that the Jacobs Technion-Cornell Institute represents – there is so much to be gained on both sides of the equation, and very few institutions have focused exactly on that interaction. I have great hopes that it will be a beacon for future educational and entrepreneurial efforts, in the U.S., in Israel, and for the whole world."

Brachman concluded, "I have had a great deal of experience in working closely with the world's best universities. The Technion does Israel proud, and is right up there with the



At the Faculty of Computer Science (l-r) Prof. Shaul Markovitch, Adi Omari, Dr Yoelle Maarek, Prof. Benny Kimelfeld, Dr Ron Brachman, and Prof. Irad Yavneh, dean.

very best in the world. Many of our very best scientists and engineers in Yahoo have come from the Technion, and in many cases, they are our intellectual leaders and scientific trendsetters. Definitely the elite. I felt honored and excited to be able to meet such great people during my visit, and see and talk about some of the really interesting advanced work being done there in computer vision and other areas. What an inspiring visit!"

*Dr Yoelle Maarek is a member of the Technion Board of Governors and the Technion Council.*



(l-r) Caryn, Alan, and Andrew Viterbi

# Viterbi Vision

Technion's "Viterbi Day" feted digital luminary Dr Andrew Viterbi on December 8, 2015, during the Jewish Festival of Lights – Hanukkah. Highlights included ceremonies to name the Andrew and Erna Viterbi Faculty of Electrical Engineering and the Erna Finci Viterbi Plaza, and the awarding of the Technion Medal to Viterbi.

The plaque bearing the new name of the Faculty was unveiled with the participation of Viterbi, his son Alan and daughter-in-law Caryn, Technion President Prof. Peretz Lavie, the Technion management and EE alumni.

In June 2015, Andrew Viterbi announced an extraordinary \$50 million gift to name the Andrew and Erna Viterbi Faculty of Electrical Engineering. Viterbi said then, "To meet the challenges, aggressive faculty recruiting is necessary to grow the department to a level necessary to reduce the student-faculty ratio and to cover evolving research areas. Among the key targets of these newly created teaching and research positions should be those engineers and scientists who have achieved success abroad but would rather return home to contribute to this critical need when the opportunity arises. These are the goals which the Technion and faculty administrations have wisely established and which I am confident and proud that our gift will facilitate."

Viterbi is the creator of the Viterbi Algorithm, a mathematical formula used in many of today's mobile devices. This algorithm allows rapid and accurate decoding of overlapping signals, helping to eliminate signal interference. It is used in all four international standards for digital cellular telephones, as well as in data terminals, digital satellite broadcast receivers and deep space telemetry.

Viterbi's pace-setting contributions to the advancement of theoretical and practical aspects of Code Division Multiple Access (CDMA) have supported the development of the most advanced and innovative communication systems. Viterbi's ties to the Technion date back to 1967, when he gave a series of lectures here while on sabbatical from the University of California, Los Angeles. Thus started a powerful relationship that carried forward to the next millennium. He is a member of the Technion International Board of Governors, and in 2000 he was named a Technion Distinguished Visiting Professor of Electrical Engineering.

"Viterbi and communications are synonyms, and you can't mention one without the other," said Distinguished

Prof. Jacob Ziv, who, together with Prof. Avraham Lempel, developed the Lempel-Ziv data compression algorithm, which has played a key role in Internet communications. "Prof. Viterbi is a true pioneer in the fields of electrical engineering and computer engineering. The Viterbi Algorithm underlies many of the technologies currently being developed in the fields of communications and information."

"The Viterbi family's gift guarantees that we will be able to continue to be a center of academic excellence and fulfill our rule of advancing the State of Israel's security and prosperity," said Prof. Ariel Orda, dean of the Faculty.

"Prof. Viterbi gave us another gift, whose value is far greater. It is a rare combination for a Faculty to be affiliated with the name of a scientific and technological giant while teaching his scientific contributions in advanced courses of its curriculum."

"It is impossible to imagine Israel's transformation into a world leader in science, technology, and innovation without the Technion, and in particular the researchers, students and alumni of its Faculty of Electrical Engineering," wrote Minister of Education Naftali Bennett to Prof. Viterbi.

Technion President Prof. Peretz Lavie awarded Prof. Andrew Viterbi the Technion Medal – the highest accolade granted by the Technion for lifetime achievement.

Lavie described Viterbi as "A brilliant scientist and engineer... entrepreneur... and devoted

professor, who invented one of the most important mathematical concepts of the 20th century... Throughout his inspiring life journey, from a young boy fleeing fascist Italy with his family, to the devoted professor, to the famed and decorated innovator and tech giant, Andrew has always been a man of family." In addition to blood family, Lavie noted, "there is your family here at Technion, and in the Faculty that you are naming today, the Faculty that is your home away from home."

Viterbi responded, "Electrical engineering has led the scientific and engineering community to lower the silos, to break down the barriers between fields." He continued, "I am most proud of being an electrical engineer and having the electrical engineering department in one of the world's

great universities named after me and my beloved late wife, Erna."

This long-term partnership is now sealed with a transformational gift that will guarantee Technion's continued inclusion among the world's top 10 electrical and computer engineering departments. Generations of Technion students and graduates of the Andrew and

Erna Viterbi Faculty of Electrical Engineering will honor the Viterbi vision, carrying forth the proud heritage of pioneering innovation.

**"Viterbi and communications are synonyms, and you can't mention one without the other."**

- Distinguished Prof. Jacob Ziv



The Technion Medal comprises a silver relief depicting the premier Technion (and Haifa) buildings. Dr Andrew J. Viterbi was awarded the Technion Medal in December 2015, "in recognition of his decades-long devotion to the Technion as a distinguished visiting professor imparting his pioneering insights; in gratitude for his support of graduate students, postdoctoral scholars, and the recruitment of new faculty members; and with appreciation for his transformational gift to the Faculty of Electrical Engineering which will secure and enhance the Technion's leadership position in electrical and computer engineering in Israel and globally and will ensure that the high-tech innovation that is vital to Israel's economy and defense continues for generations to come."

# TORONTO MEETS EILAT @ TECHNION ROBOTICS WORKSHOP

∞ | Campus

By Amanda Jaffe-Katz

Rabbi Lee Buckman, head of Tanenbaum Community Hebrew Academy of Toronto (TanenbaumCHAT Jewish High School), led a group of 13 students in November 2015 who had just started learning robotics this school year, to get hands-on practice and advanced knowledge at Technion. The group teamed up with 12 Israeli pupils from Goldwater High School in Eilat, and participated in a 3-day experiential learning workshop on “Robotic Models in Science and Engineering” spearheaded by Prof. Igor Verner at Technion, and at MadaTech – the Israel national Museum of Science, Technology, and Space, where they also engaged with a humanoid robot.

One group, taught by Dr Dan Cuperman at the Center for Robotics and Digital Technology Education in the Faculty of Education in Science and Technology, worked on designing, constructing, and programming robots that model biological systems. To this end, they studied snake robot locomotion.

A second group practiced spatial ability with robots in the Robotics and Computer Integrated Manufacturing

Lab in the Davidson Faculty of Industrial Engineering and Management. Instructed by lab engineer Sergei Gamer, the students learned to visualize and program rotation of a numbered cube to fit a puzzle board.

Verner said that spatial ability represents a huge barrier for many, including Technion novice students of engineering. He devised a way to teach this skill via robotics that leads to an improvement of many percentage points in students’ measured spatial ability.

The method, using the principles of CDIO (Conceive, Design, Implement, Operate), serves as a bridge between theory and practice. Building on the educational opportunities afforded by human-in-the-loop robotics, Verner’s team focused the learning of novice students to help them understand the principles of robot operation, foster spatial skills, and raise awareness of their importance in industrial robotics.

Canadian participants Jacob Beallor and Adam Gropper said that they enjoyed the workshop. Beallor added that

the experience enabled him to perform hands-on testing of whether he wants to study engineering at university.

The delegations were accompanied by teachers and interns, who described the Israel experience as “enriching and educational for the kids.”



(Pictured above and below) High school participants learn spatial ability with robots in the Robotics and Computer Integrated Manufacturing Lab in the Davidson Faculty of Industrial Engineering and Management.



## A Day in the Life of StudentTechnion

The “StudentTechnion” series began spontaneously as a visual diary of the events and challenges that accompany Technion studies, seen through the eyes of Yuval Pnueli – a second-year undergraduate student of Mathematics and Computer Science and a participant in the Technion’s Program for Excellence – the Rothschild Scholars Program. The 18 illustrations of the StudentTechnion exhibition, curated by Anat Har-Gil, are currently on display in the Ullmann Teaching Center.

Pnueli, 24, believes that even though the pictures are drawn from his own personal experience, any student or alumnus can identify with them.

Pnueli also draws in pastels and acrylics, but pen and pencil are his favorite tools. “The beauty of sketching is the ability to quickly capture the essence of a person, an animal, or a place,” he says. “The sketch need not

be as realistic as a photograph, but should capture the essence of your interest and convey your feelings as an artist.”

Many renowned scholars and success stories have emerged from the Excellence Program. Most recently, Noa Gantz won second place in the David Azrieli Prize competition for projects by Israeli architecture students for her work, “Minus 400: Rethinking the meeting between man and the environment at the Dead Sea.”



Yuval Pnueli, second-year undergraduate student of Mathematics and Computer Science, participant in the Rothschild Scholars Program, and caricaturist.

