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PRESIDENT’S REPORT 2012
It starts here.
Cover: Artistic impression of a non-repeating quasicrystal pattern showing fivefold symmetry. Quasicrystals were discovered by Technion Distinguished Professor and Nobel Laureate in Chemistry 2011, Dan Shechtman.
All great ideas start with a silent, creative space in which inspiration is born. In 1912 there was no state of Israel, there were no universities in the Middle East, and there was no infrastructure. But there were dreams of courageous noble endeavor and the power of inspiration. 100 years ago, on April 11th, 1912, that big idea found form in a cornerstone – of the first university in the Middle East: Technion – Israel Institute of Technology. Israel’s first and greatest start-up was born.
Welcome to this centennial edition of the President’s Report. One hundred years ago, we started at ground level. There were no buildings, few engineers, no funds for salaries or equipment and no reason to believe that anything would come of such an ambitious enterprise. The slow and difficult development of the Technion traversed two World Wars, the founding of the independent State of Israel, and many more regional wars, in which the Technion relentlessly adhered to its vision of scientific leadership while dedicating itself to the development, health, and security of the State of Israel and humankind.

Today, Technion, with over 70,000 graduates, has impacted millions of scientists, students, entrepreneurs and citizens worldwide. Of the 300 non-American NASDAQ companies, 72 are based in Israel, and of those, two-thirds have Technion graduates at the helm. A flood of innovations has originated from Technion: memory sticks; the Ziv-Lempel data compression algorithm; Azilect®, for treating early-stage Parkinson’s; deciphering the secrets of the ubiquitin protein degradation system, or the exotic structure of quasicrystals.

Technion graduates not only start businesses, they also manage and lead them. Of Israel’s top 125 business leaders, one third are Technion graduates.

Technion-educated pioneers lead nine of Israel’s top ten exporting companies, which account for nearly half of Israel’s $45 billion in annual exports. Together, investment in the Technion gives a remarkable 76 percent return, according to a recent study by Technion Profs. Shlomo Maital and Amnon Frenkel, published in Technion Nation.

Technion’s Electrical Engineering and Computer Science faculties led the birth and growth of Israel’s high-tech industry. It is no surprise that industrial giants such as Google, Microsoft and Intel are so deeply involved with Technion, employing many students even before they finish their studies. To maximize this success, the two faculties joined forces this year to form the Technion Computer Engineering Center (TCE), designed to build on this global leadership.

Technion reaches its centennial year with the blessing of a new Nobel laureate – the third Technion scientist to receive the world’s highest honor in seven years. In many ways, Distinguished Prof. Dan Shechtman exemplifies all that is Technion. His discovery of quasicrystals – a new form of matter – showed scientific authenticity and the courage to pursue that which is entirely ‘out of the box’ relative to conventional understanding. His insistence on his discovery...
in the midst of rejection and his recruitment of scientific allies shows a spirit of determination and collaboration. Throughout the years Dan’s dedication to students and his cultivation of a grounded, entrepreneurial spirit through a synthesis of networking, innovation and passion to make Israel strong, exemplifies the ingredients of Technion’s global success.

In December 2011, the world’s eyes turned once again to Technion with the announcement that Technion and Cornell University had been chosen by NY Mayor Bloomberg to launch the Technion-Cornell Innovation Institute (TCII) in New York City. This unprecedented venture is a new paradigm in education. TCII is positioned to energize the economy of New York. It also represents Israel’s first step into academic globalization, and the impact of this new cornerstone will be felt worldwide.

This year, I joined Israeli students on a visit to the site of the concentration camps of Auschwitz-Birkenau in Poland. Together with those talented young people – the bright minds of the future – in that desolate place, we were able to feel and say to our ancestors: “It’s OK. We did it. We won.”

Enjoy the 2012 centennial issue of the President’s Report. I hope you will join us in creating the hope, inspiration and excellence for centuries to come.
On December 10, 2011, Technion Distinguished Prof. Dan Shechtman became Israel’s 10th Nobel Laureate. Israel has four Nobel Laureates in Chemistry, of which three are Technion faculty. Sole recipient of the prize, Shechtman closed a circle of scientific discovery, isolation, progress and triumph resulting in a change in the classical laws of crystallography to include a new form of matter – quasiperiodic crystals. In his speech, after receiving the Nobel medal from Swedish King Carl XVI Gustaf, the 70-year-old chemistry professor said it is a scientist’s duty to promote education, rational thinking and tolerance.
April 8, 1982. While on sabbatical at the National Bureau of Standards in Maryland, Dan Shechtman discovered the icosahedral phase that opened the field of quasiperiodic crystals. Today, he says, he is joined by hundreds of enthusiastic scientists worldwide. “Without these dedicated scientists the field would not be where it is today.”

“Science is the ultimate tool to reveal the laws of nature, and the one word written on its banner is ‘truth’.”

-Dist. Prof. Dan Shechtman, in his acceptance speech, December 2011
Today, 2011 Nobel Laureate in Chemistry Dan Shechtman calls them quasicrystals, but back in the ’80s when the new class of matter was accepted only by a few, it was dubbed “Shechtmanite,” after the man who guided the field through conception and infancy. The name “Shechtmanite” embodied the risk of humiliation if the material would indeed turn out to be a kind of “twinning,” as Shechtman’s opponents claimed.

Revealing a new kind of crystalline order, Shechtman demonstrated a clear diffraction pattern with a fivefold symmetry. The pattern was recorded from an aluminum-manganese (Al-Mn) alloy which had been rapidly cooled after melting. Shechtman’s discovery was initially viewed with skepticism. “I feared for my scientific and academic career,” says Shechtman.

*NIST was known as the National Bureau of Standards at the time.*
In November 1984, Physical Review Letters published Shechtman’s discovery in a scientific paper co-authored with three other scientists: Ilan Blech (Israel), Denis Gratias (France) and John Cahn (USA). Wider acclaim followed, mainly from physicists and mathematicians, and later from crystallographers. Pioneering contributors to the field of quasicrystals are Prof. Dov Levine of the Technion Faculty of Physics and Prof. Paul Steinhardt of Princeton University. Levine and Steinhardt made the connection between a theoretical tenfold symmetry model proposed by Prof. Alan Mackay and Shechtman’s diffraction pattern, and developed the mathematical model for the structure of non-periodic icosahedral phases found in metallic alloys.

Today, over 40 scientific books have been dedicated to quasiperiodic crystals, and the International Society of Crystallography has changed its basic definition of a crystal, reducing it to the ability to produce a clear-cut diffraction pattern and acknowledging that crystallographic order can be either periodic or aperiodic.

The Faith of Good Science

Dan Shechtman was born in Tel Aviv on January 24, 1941. His dream, while still in high school, was to study at the Technion. “In 1962, I commenced my studies in Mechanical Engineering at Technion. I graduated in 1966. There was a recession and no work, so I opted to continue for a master’s degree.”

Today, Shechtman is a Distinguished Professor. He holds the Philip Tobias Chair in Material Sciences, and heads the Louis Edelstein Center for Quasicrystals and the Wolfson Centre for Interface Science in the Department of Materials Engineering.

He instigated the Technion course in Technological Entrepreneurship in 1986, referring to it as “my baby,” and has overseen it annually ever since. Shechtman is invited to lecture worldwide about the Technological Entrepreneurship course, arousing much interest. He considers himself a missionary, “I coordinate the course with pleasure. I do it for Israel.”

Between 2001 and 2004, Shechtman served as chairperson of the sciences division of the Israel Academy of Sciences and Humanities. Today, he continues to oversee the translation of the Nobel Prize scientific posters into Hebrew, and their annual distribution to schools throughout the country.

Shechtman has a favorite picture of a line of a dozen German Shepherds. In front of them, with self-assured insouciance, walks a serene cat. “I felt like that cat,” he recounts. But his loyalty to his discovery never wavered. “A good scientist needs faith.”

“The system here encourages originality. We are free thinkers. This is the Israeli spirit. Free thinking encourages successful scientists.”

- Dan Shechtman, Distinguished Professor and Nobel laureate

“The most important thing about the quasicrystals is their meaning for fundamental science. They have rewritten the first chapter in the textbooks of ordered matter.”

Prof. Sven Lidin
Professor of Inorganic Chemistry, Lund University
Member of the Nobel Committee for Chemistry
December 19, 2011: All eyes focus on New York City and Haifa as a new paradigm of higher education is born. In a dramatic press conference given by New York City Mayor Michael Bloomberg, it is announced that Technion – Israel Institute of Technology and its Ivy League partner Cornell University have won a New York City contest to build an applied science campus with a grant of land on Roosevelt Island and $100 million for infrastructure improvements. TCII – the Technion-Cornell Innovation Institute is born.
“Today will be remembered as a defining moment... In a word, this project will be transformative.”
- NYC Mayor Michael Bloomberg

“The Technion was founded in 1912... 100 years later we come to New York to close the historic circle... The impact of this new cornerstone will be felt worldwide for centuries to come.”
- President Peretz Lavie
“The Technion is among the world’s leaders in turning science into careers and into products.”

- Prof. David J. Skorton, President, Cornell University
Google CEO Larry Page announces the company’s commitment to be the interim home of the Technion-Cornell New York City partnership.
centennial celebrations
Technion’s three Nobel Laureates in Chemistry, Distinguished Professors Dan Shechtman, Avram Hershko, and Aaron Ciechanover, were guests of honor at the festive concert of the Shalom Zielony Technion Choir and Orchestra, marking the official opening of the cornerstone centennial celebrations.
world class.
“Attracted to Technion by the Lorry I. Lokey Interdisciplinary Center for Life Sciences and Engineering and the pioneering research of Prof. Shimon Marom at the Network Biology Research Laboratories, Sebastian Reinartz from Germany is just one of the hundreds of graduate students at Technion immersed in life sciences and engineering research. Reinartz has an ambition to control a single neuron within a living network and establish a method for studying the processes in neuronal networks that govern learning and memory.

“I was attracted by the creative concepts that were published by the group of Prof. Marom, and his open-minded way of dealing with his students,” says Reinartz.

“It is always advantageous to break walls. Some questions, especially when it comes to complicated issues like the brain, can only be solved by combining different scientific fields…”

Generally speaking, this place of intense multidisciplinary cooperation can stand as a role model for the future of science.”

“I will leave some excellent colleagues and great friends when I finish my degree, with relations that will hopefully remain my whole lifetime.”

- PhD student Sebastian Reinartz
belief
experience
risk
consequence

The clicking paradigm
Can you predict and change human behavior? Prof. Ido Erev of the Davidson Faculty of Industrial Engineering and Management says “yes.” With a background in psychology, Erev is pioneering the multidisciplinary field of Cognitive Science, to set up models for decision-making and patterns behind behavioral risk taking.

Erev’s research focuses on the effect of low probability events. An undesirable event would be having a car accident as a result of risk-taking on the road. A desirable event might include winning the lottery. His research shows that people exhibit oversensitivity to rare events when they respond to a description of the incentive structure and when they plan their behavior, but they exhibit the opposite bias when they gain experience.

The results of his research have been applied to improve compliance rates of safety and hygiene regulations in factories and in hospitals.

“In factories, it’s not enough to publicize safety instructions.” Rule enforcement is particularly effective when it implies a high probability of gentle punishment. Field studies demonstrate that when a new policy was implemented, compliance with safety procedures increased from 50 percent to 95 percent.

Erev’s research has been applied in factories and at the Rambam Health Care Campus.
get virtual
Advanced virtual tools will be a game changer in the buildings of the future. At the Les and Eileen Seskin Virtual Reality and Controlled Construction Laboratory of the Ecological Engineering Systems Center, researchers are applying innovation to create better building construction methods for the development of smarter, greener buildings.

The lab also supports communication between architects, engineers, and builders, bringing the advanced tools needed to create digital representations at all stages of the building process, and to simulate real-world performance.

One benefit of such methods is less waste in actual construction, the removal of costly design errors and conflicts between building systems, and greater degrees of component prefabrication, such as complete plumbing.
The science of healing

Prof. Beth Murinson
For new recruit from Johns Hopkins University Prof. Beth Murinson, the science of pain is a critical part of medicine. Her research is focused on chemotoxic and traumatic injuries to the nervous system, and her aim is to decrease the pain factor as much as possible in nerve injuries and injuries to the back. “We’re hoping to find a methodology that may prevent nerve injuries from becoming painful, as well as to develop neuroprotective strategies, as some drugs can do damage to the nerve system.” Murinson is an attending neurologist at the Technion-affiliated Rambam Health Care Campus with a clinic specializing in painful neuropathies and nerve injuries. She teaches and mentors Israeli and American medical students in the Rappaport Faculty of Medicine.
The energy revolution starts here.

Dr Carmel Rotschild
Sunlight Reclaimed

New recruit at Technion Dr Carmel Rotschild is leading a multidisciplinary team at the Faculty of Mechanical Engineering to develop innovative applications to maximize the energy we can harness from the sun.

On the one hand we have sunlight – an infinite source of energy – with a broad spectrum of every bandwidth in creation. On the other, we have silicon – an abundant material made from sand and the front-runner as the material most likely to be used in photovoltaic cells for solar energy panels. Between the simplicity of silicon and the broad spectrum of sunlight, falls the innovation.

As oil reserves deplete and energy prices rise, solar power is emerging as an essential source of clean, affordable energy. The scientific searchlights are on for new discoveries that could make solar energy competitive to fossil fuels.

Dr Carmel Rotschild – who arrived at the Faculty of Mechanical Engineering from MIT in August 2011 – has a dream to increase the efficiency of photovoltaics by around 20 percent, by developing efficient appliances to convert the lost rays of the sun that silicon is unable to process.

This involves the fusion (or up conversion) of infrared solar radiation to make that power accessible to silicon, and the fission (or down conversion) of radiation in the blue range to near infrared radiation, which could double the quantum efficiency of photovoltaics. The highly multidisciplinary approach includes the design and fabrication of nano-scale optical materials within an optical cavity, and Rotschild and his multidisciplinary team draw on expertise in nonlinear optics, materials engineering, and energy transfer in molecules.

“...limits efficiency, is the mismatch between the broad solar spectrum, and the narrow spectral response of photovoltaics. For example: silicon is very effective at one micron wavelength, but light with a longer wavelength cannot be converted into electricity by silicon solar cells. It would be nice to look at nonlinear optics as a toolbox for converting inefficient parts of the solar spectrum into emissions where solar panels can be more efficient.”

Rotschild’s reception as a new recruit has been excellent, he says. “Everyone is enthusiastic to help and it’s really good to be here. The students are great; the collaboration is great. The system really supports you.”

Rotschild has a personal passion for creating cleaner, more efficient ways to power our world: he lost a friend to cancer and is concerned that air pollution was a chief culprit. And his belief in the urgency of the need to advance energy research in Israel is shared by the Grand Technion Energy Program (GTEP) and the Russell Berrie Nanotechnology Institute (RBNI) who are jointly supporting his work.

“The energy revolution is already here,” says Rotschild. “If you include the cost that we as a society pay for using petrol, coal and fossil fuels in terms of health and pollution, we are reaching an era where solar energy becomes affordable for society.’

Rotschild says that multidisciplinary programs such as GTEP are powerful platforms for attracting scientists to Israel. “Energy is a key part of the Technion vision, and my lab is evidence of that,” he says.
“The energy revolution is already here.”
- Dr Carmel Rotschild

Here Comes the Sun

Technion’s GTEP has launched Israel’s I-CORE for solar fuels – a national scientific center of excellence to develop the alternative energy supplies of the future.

Led by GTEP Director Prof. Gideon Grader, top Israeli scientists from Technion, Ben-Gurion University of the Negev and the Weizmann Institute of Science are pooling resources and brainpower to pioneer the energy solutions of tomorrow in the form of solar fuels. The Israeli consortium includes 27 senior researchers and is to expand to include returning Israeli scientists from the world’s top universities.

The Center of Excellence in Renewable and Sustainable Energy will conduct research on fuel production through the use of sunlight, focusing on fuel production from plants (such as algae and various agricultural crops), breaking down water to generate hydrogen, and breaking down carbon dioxide for the production of fuels. The Center will provide unparalleled opportunity to advance this field on a national scale, through fruitful cooperation among institutions, and to leverage the research in Israel and abroad.

The subject of alternative fuels is high on the global scientific and industrial agenda as expanding populations, increasing standards of living and depleting oil reserves has created an urgent need to unlock new sources of energy. Helping to find solutions at the global level and reduce the world’s dependence on oil will have a positive impact on Israel’s security and status, whether or not those solutions are implemented in Israel itself.

Research in this field in Israel is still in its preliminary stages, but has tremendous potential to lead to significant breakthroughs, which the Technion-led I-CORE will facilitate. This Center of Excellence is an important step towards the development of alternative fuels and reducing global dependence on oil. A key component of I-CORE will be the establishment of central laboratories to bolster intramural synergies and promote team endeavors across Israel. This in turn will contribute to the development of patents and commercial ventures in various spheres. I-CORE will also expand cooperation with partners in the United States and consortia led by the European Union.

Fossil Smart

With the discovery of offshore natural gas, and the new promise of offshore oil shale, Israel is entering a new era of energy production and consumption. To make the most of new resources, Technion initiated a new research and education infrastructure in natural gas and petroleum studies to train experts, in particular engineers. GTEP now offers a graduate degree in natural gas and petroleum (NG&P) engineering taught in cooperation with Haifa University’s Department of Marine Geosciences. Initially, many of the courses will be conducted in English as experts will be brought in from leading international institutions. Technion is coordinating this initiative with the Ministry of National Infrastructure.

The Master of Engineering degree is available to graduates of civil, chemical, mechanical and aerospace engineering. It spans a study period of 15 months plus three months’ project work, which will be implemented in the industrial sector.
According to prize-winning computer scientist Prof. Hagit Attiya, despite the revolution in computing and communications experienced worldwide, the basic principles remain the same. Attiya is researching distributed computing—the principles that govern systems with many computing entities. The work of Attiya and her colleagues allows your quad-core PC to multitask despite the vast number of conflicts that occur during a typical session or the distributed servers at the heart of Internet business to replicate vast amounts of data and still provide a consistent view of it.

Much of this unseen complex activity is taking place at distant servers where data is stored not locally on your PC or smart phone but at a remote facility reached through the Internet. “There are ‘farms’ of computing or storage servers – which are big, physical warehouses hosting numerous servers,” explains Attiya, whose research studies how such computing entities communicate with one another and the degree of ‘agreement’ needed between them. “My specialty is how they coordinate their functioning, for example, creating a consistent order of updates, without agreeing – in situations where ‘agreement’ in the strict sense is impossible, due to asynchrony and failures,” says Attiya.

As one of few female computer science faculty members in Israel, Attiya is eager to encourage other female scientists to realize their potential. “I believe in role models,” she smiles. “Technion students are terrific: really smart, innovative and on top of that, they are real fighters.”
How could basic research into microbes found in our oceans impact humankind’s exploration of the outer precincts of space?

Groundbreaking biological research by Prof. Oded Beja at the Emerson Family Life Sciences Building has uncovered that 10 percent of available energy reaching planet earth is harvested by marine bacteria.

“Scientists are seeking new ways to harvest energy that go beyond regular photosynthesis,” says Beja.

Regular photosynthesis requires a multitude of genes, whereas the biological research unveiled by Beja shows that one single protein can accomplish the same job.

Totally grounded on planet earth, Beja and his team of students are unravelling the mysteries of how the oceans of the world harvest the energy of the sun, through focused field trips to gather live samples from the photic zones of the Mediterranean, the Sea of Galilee, the Red Sea and the Dead Sea – which it turns out is not so dead after all. “The main focus is metagenomics in which you look at the entire population of microbes at once, by collecting samples...” says Beja.

Even within our bodies, the majority of bacteria is uncultured. “This makes it hard to investigate them... in order to understand what bacteria are doing in their environment – we need to collect live samples. Photosynthesis is very important to the ecosystem of the planet... just as the oxygen we breathe. About 50 percent of it is done by oceans and 50 percent of this by cyanobacteria.”

The lab is now focusing on photosynthesis genes found in cyanophages (viruses that infect cyanobacteria) and on uptake and utilization of organic phosphates in different marine microbes.
Oceans of science.

“Photosynthesis is very important to the ecosystem of the planet.”

- Prof. Oded Beja
innovation
starts here

“T³ understands the challenges of the entrepreneur. They know how to balance the needs of the entrepreneur and the academic perception.” - NanoSpun CEO, Ohad Ben Dror

NanoSpun introduces a revolutionary platform for the fabrication of hollow and monolithic fibers and the encapsulation of elements such as enzymes, bacteria cells and drugs.
**T³ Means Business**

Cutting-edge innovation at the frontiers of multidisciplinary science, a streamlined, in-depth approach to technology transfer from the laboratory to the marketplace, and a powerful spirit of entrepreneurship that persists through the often turbulent process of making a raw innovation commercially viable: these are the known factors behind a university’s success – and something else whispered in the halls of the successful: People. You need good people… team players.

**NanoSpun: Keep it Pure**

“Success is all about people,” says Ohad Ben Dror, founder of NanoSpun, which after two years of intense groundwork was incorporated as a company in April of 2011. “We have a promising technology and a strong team that can drive the company to success.”

Backed by prominent investors, the versatile, hollow nanofiber innovation first emerged from the laboratory Prof. Eyal Zussman at the Russell Berrie Nanotechnology Institute. Unique in structure and cost-effective in fabrication, the fibers can be tailored for applications in cleantech (water treatment), medical devices, solar energy, textiles, and packaging.

“We have received positive feedback from the market,” says Ben-Dror.

At the forefront of the young company’s agenda are applications in water
treatment – where there is a global demand for advanced and efficient systems for filtration and purification.

Based in the Gutwirth Science Park in Technion City, NanoSpun has already won international acclaim. In 2011, in Italy, the race was on at the Nano/Polymer Challenge as Nano entrepreneurs from across the world presented their innovative nanotechnologies, business plans, and long term vision to an international panel of judges. NanoSpun won the day, with first place in the Polymer category and a prize of €300,000.

Regenerate

“If you get a traumatic injury to the knee, very few treatment options are available,” says Prof. Dror Seliktar, giving an example of one use of the innovative biodegradable hydrogels being marketed by a company he founded, Regentis Biomaterials.

“A replacement knee may eventually be required if the progression of the injury is not contained. If you are injured at age 25, it can be pretty daunting to know that at age 55 you may need a knee replacement. We can alleviate the progressive degeneration with a therapy that actually helps repair the tissue – intervening early on and preventing further degeneration.”

Established in 2004, Regentis Biomaterials is commercializing innovative biodegradable hydrogels for the local repair of damaged cartilage and bone. The platform technology is a family of hydrogels called Gelrin™. These gels can be injected or applied to a specific local site.

“The company is pretty unique in Israel, and also in the world,” says Seliktar. Regentis recently secured an additional investment of $10 million to establish its European presence and to expand its ongoing clinical efforts of Gelrin™.

All Eyes on Super Resolution

An unblurred example of the dynamic process of technology transfer at the Technion is the start-up BETTERview – slated to revolutionize the quality of HD imaging. Taking advanced algorithms all the way from the research of Prof. Michael Elad at the Faculty of Computer Science (see page 38) straight to your TV, PC or smart phone, the patented innovation promises to break the “glass ceiling” of existing imaging technology, says the company. Among its services, BETTERview can convert and upgrade old and cloudy video material – such as those pre-war wedding shots of grandma, YouTube material, or even recent TV programs filmed originally in Standard-Definition (SD).

The process in which several low-quality images are fused into a single, higher-resolution outcome is known as Super-Resolution (SR). While conventional methods use conversion techniques to “blow up” or stretch the SD video onto an HD display, BETTERview increases optical resolution of a video stream, generating an HD stream of vastly superior quality.
“Technion has a rigorous academic atmosphere while being an innovative technological university. Questioning authority is welcomed here, because the Technion aims at giving students an independent and confident mind.”

- International student, Yuting Wang
International student Yuting Wang was among five freshmen students to get on the President’s List. All the students had an average of 91 percent or higher and are in the top three percent of their class.

Opened in 2009, the Technion International School of Engineering (ISE) is expanding rapidly, offering a full BSc program in Civil and Environmental Engineering, and a variety of study options. “Life here is amazing, especially if you are willing to spend some time exploring other cultures,” says Sifang Shan.

“The small classes have helped me develop a close relationship with the other members of the program and the personal attention from the teachers and tutors has helped my academic skills,” adds Ari Teger from the U.S.

Part of the mission of the International School is to achieve academic excellence while introducing students to Israel.

“ISE makes it a top priority to acquaint students with this unique country, which is as rich in history as it is in scientific advances,” says Academic Head Prof. Amnon Katz. “Through field trips, lectures and programs, students are immersed in Israel’s past and present, becoming closely connected to this dynamic nation.”
the scientist behind innovation
What goes through the mind of Computer Science Prof. Michael Elad when the photographer arrives to photograph him for the Technion 2012 President’s Report?

“He could definitely use my algorithms,” laughs Elad, “One day, all this will be completely avoided. One day soon I will be able to synthesise any image of myself without taking more than one photo.”

It is hard to believe that scientific progress will ever ring the death knell of the photographer’s art – yet it might revolutionize the craft. The innovative research of Elad into signal processing, image processing, and computer vision was listed in 2010 by Thomson Reuters Science Watch. In 2012 he received the honor of becoming a Fellow of the IEEE – the world’s largest association for the advancement of technology. “It is mainly because of the terrific luck I had in my research – into sparse representations – which became such a huge topic.

I caught this ‘wave’ and it took me with it. In the beginning, nobody cared much about it. But then it caught on, and today everybody is working on it.”

Elad founded his own start-up, as well as spending some years in industry including at the HP labs in Technion City, but he says he prefers basic science. He lets those with entrepreneurial passion apply his pioneering algorithms.

“I really love the Technion,” says Elad, “This is my home.” Indeed, Elad turned down an offer at Harvard in order to return to Technion. “I am thrilled to be part of a university that is leading worldwide and that is also Israeli. I believe that we are really excellent in science and I’m proud to be part of it.”

Elad is a member of the Technion Autonomous Systems Project (TASP).
From the pure mysteries of basic research, through to medicine, biotechnology, genetic and environmental science, and the development of new diagnostic and therapeutic tools, the Lorry I. Lokey Center for Life Sciences and Engineering is Israel’s meta center for research into life sciences.

Attracting top students from across the Technion faculties, scientists at the Lokey Center are joining together to unlock the mysteries of life, understand and heal disease, and apply knowledge for the benefit of all humankind.

“For Israel, the Lokey Center represents the birth of a new form of life sciences,” says Center Director Prof. Yuval Shoham, “After the vision, comes the implementation: the scouting for top new faculty, the building of structures and unique laboratories, the organization of the clusters, and the empowerment of teaching.”

One of the key attractions of the Lokey Center, for new recruit Prof. Amit Meller, was that he saw the opportunity to integrate two sides of himself – basic science and applied engineering.

“We are living in extremely exciting times with respect to how science is to be done,” says Meller, who has nine patents in life sciences to his name, seven of which are already licensed.

“We want to be both useful and exciting. The combination of basic and applied science makes the experience of research much more enriching and interesting. Students from the biophysics side will always be challenged by the engineers… who know they can do it better. And when an engineer presents a better method – for example, for reading an RNA transcript, the scientist will challenge him with ‘where is the question?’ I really enjoy this kind of multidisciplinary intellectual interaction – a positive tension – among colleagues in the same group.”

“My hope is that the way disease will be diagnosed in the next decades will be different from what we have been doing so far,” says Meller, a global pioneer leading two labs at the Lokey Center at Technion and at Boston University.

“We will have the research tools and knowledge to look at a person’s genome and to choose the right drugs.”

- Prof. Amit Meller
Great minds think different

“The applications of today rest on the foundations of several decades of basic science research.”

- Prof. Naama Brenner
Superior Synergy

From the advanced frontiers of the emerging science of nanomedicine, through to hands-on practical services such as those offered by the Bioinformatics Knowledge Unit (BKU) that offers life scientists customized computing tools, the Lokey Center is quietly seeding a scientific revolution.

One example of the multidisciplinary groups thriving at the Lokey Center is at the Network Biology Research Laboratory. “It’s important to keep in mind that the applications of today rest on the foundations of several decades of basic scientific research,” says Prof. Naama Brenner of the Faculty of Chemical Engineering.

And the grounded progress and investment in the science of tomorrow continues unabated at the Emerson Family Life Sciences Building. The year 2012 will see the establishment of the new Technion Center for Structural Biology (TCSB). The center, headed by Dr Hay Dvir, will offer facilities for macromolecular crystallography unrivalled anywhere in the Middle East – making Technion a magnet for life sciences worldwide.

The job done by the state-of-the-art X-ray diffractometer to be housed at the Center once would have needed a Synchrotron – a giant facility that would demand half the space of Technion City. “Nowadays, a revolution in brightness allows home-source beams to provide quality comparable to 2nd generation synchrotrons,” says Dr Akram Alian, “This is a huge advancement in what we can do and in the quality of data we can obtain. With the investment of Mr. Lokey, Technion is now taking life sciences in Israel to a whole new league.”
“My dream is to create a start-up,” says French-born Deborah Cohen (pictured above), a graduate student in an elite Electrical Engineering program sponsored by the Meyer Foundation, Cohen has already delved into a variety of multidisciplinary projects. Working with Prof. Yonina Eldar on signal processing, the two are tackling a theoretical question with many applications in the field of telecommunications.

Cohen’s focus is to overcome the effects of noise by means of signal cyclostationary detection. This she presented recently at an international conference in Puerto Rico. “People from outside this research area told me that they now understand what ‘sub-Nyquist barrier’ means,” she says.
“The Technion – Israel Institute of Technology is one of the cornerstones of Israel’s development…”

- David Ben-Gurion, 1st Prime Minister of Israel
SOME TECHNION FIRSTS

1st cornerstone of a university in the Middle East.
1st to integrate Hebrew as the official language of teaching.
1st class of engineers and architects in the Middle East.
1st female engineer in Israel.
1st student strike.
1st Department of Aeronautical Engineering in Israel.
1st to decode the ubiquitin system in living cells.
1st student-built microsatellite in space – Gurwin TechSat II.
1st to revolutionize data compression.
1st to launch the Israeli high-tech revolution.
1st isolation of human embryonic stem cells with University of Wisconsin-Madison.
1st in self-assembly with the “live” electricity conducting wire.
1st discovery of quasicrystals.
1st in worldwide research on solitons and light tunneling in quasicrystal arrays.
1st in 3D face recognition.
1st Nobel Laureates in science in the State of Israel.
1st pioneers of nanoscience and technology in Israel.
1st multidisciplinary center of energy science and technology in Israel.
1st institute of technology to enter the New York City Tech Campus.
This is the story of how one stone can change the world…

This is Technion: Israel’s first university and a temple of transformation. This is the place that showed the world that if you want it, it is not a dream.

Technion: the rock on which the State of Israel is built, and whose impact is felt in all areas of our lives – from internet technology, to clean drinking water; from live images of Mars, to the flash drives to store them; from energy innovations, to nanoscale discoveries to revolutionize medicine.
20th Century Dreamers

1901 The Zionist dream for a Technikum
Theodor Herzl envisioned Haifa as "a great park... with an overhead electrical train... a city of magnificent homes and public institutions all made possible by applied science, engineering and technology." By the Fifth Zionist Congress in 1901, the pressure was on to address "the question of founding a Jewish university."

1912
In the year of the Titanic, and a rare, total solar eclipse, the cornerstone of the new Technikum was finally laid. On April 11, 1912, under the auspices of the occupying Ottoman Empire the local Jewish community turned out in honor of the festive cornerstone laying ceremony.

The Architect
Alexander Baerwald came with the first ever designs for a building of higher education in the Middle East. Baerwald – who used to play cello in a string quartet with Albert Einstein – was sought out to blend European form with Eastern elements.

Jewish skilled labor
Applied skills were in short supply but construction continued through the power of dedication. Dynamite was imported to open a well to 100 meters depth – which would supply water to the whole city and transform Haifa, and provide a source of income for the young, impoverished Technikum.

Good language gave way to insult as Hebrew faced its first and most critical test in an emotional debate about the teaching tongue of the new Technikum: Hebrew or German?
WWI would decide the outcome of the ‘Battle of the Languages’ in Haifa. With Germany’s defeat, the powerful German influence on the new Technion also waned. *Pictured right, occupied Technion building.*

1923 Albert Einstein who heard of the postwar financial straits of the nascent Technion came to Haifa to signal his support. He visited workshops and planted a now-famous first palm tree in front of the new building. He returned to Germany to chair the world’s first Technion Society.

1924 Doors open as the Technion enrolled its first students. The official opening ceremony took place in 1925. Its first class had 17 students (including one woman), who majored in civil engineering and architecture. It immediately became a center of skills for the Jewish people in the Holy Land.

Technion gets a steam engine as energy issues were already paramount in pre-state Israel. Technion expertise was sought by citizens of the new city of Tel Aviv to provide electricity. Technion became the power behind new roads and infrastructure connecting scattered populations.

1930s It’s all or nothing as the Technion began absorbing large numbers of engineers and scholars fleeing the rising antisemitism in Europe in the 1930s. Technion staff walked the talk of independence by agreeing to work for nothing to ensure the institute’s survival.

WWII While many Technion students volunteered to join forces with the British in their battle against the Third Reich, the Technion building became an active center providing technology for defence and hosting the Jewish underground – notably, the Haganah.
1948 The State of Israel is born
The declaration was celebrated by a Technion student body of 680. Shortly afterwards, three powerful new faculties were added: electrical engineering, mechanical engineering and aeronautical engineering.

1950s As the original building in midtown Haifa had become too small, Prime Minister David Ben-Gurion selected a 300-acre site on Mount Carmel for a new campus. In 1953, the Institute began its move to Technion City on Mount Carmel. The Technion student body exceeded one thousand.

1960s Reaching out with wisdom, Technion could now open its doors to hundreds of students from the developing countries of Africa and Asia. Scores of Technion faculty members provided technological assistance to countries worldwide, often under the auspices of United Nations agencies.

1967 with the unification of Jerusalem after the Six Day War, Technion skills were in high demand. By now, Technion experts knew that to make a vision hold, you need to fortify it with skill and application. Here, Technion experts help fortify Judaism’s most sacred site: the newly reclaimed Western Wall or Kotel in Jerusalem.

1970s Heal the world The opening of the faculty of medicine in 1969 meant that Technion became home to one of the few medical schools worldwide to be affiliated with an institute of technology. The embryonic power of Technion’s future impact on world medical technology, biotechnology and life sciences could already be felt.

1980s The digital revolution From the birth of fiber-optics and the development of optoelectronics, Technion graduates were seen to be at the local forefront of technological innovation. Technion’s Faculties of Computer Science and Electrical Engineering – ranked among the world’s best – would lead the way in the high-tech revolution.
Technion is home to three Nobel Laureates (l-r): Prof. Dan Shechtman (Chemistry 2011), Prof. Avram Hershko and Prof. Aaron Ciechanover (Chemistry 2004).

With its Ivy League partner Cornell University, Technion is to bring its penchant for manifesting vision to the world stage, with the foundation of the Technion-Cornell Innovation Institute (TCII) in New York City.

**1990s**

**Incoming brainpower** after the collapse of the Soviet Union in the early 1990s, the student population rose dramatically from 9,000 to 10,500. Technion established technological incubator companies and structures to ensure that the talent of incoming scientists could be put to use.

**Students in Space** in 1998, Technion’s Asher Space Research Institute (ASRI) successfully launched the “Gurwin TechSat II” microsatellite, making Technion one of five universities worldwide with a student program that designs, builds, and launches its own satellite.

**Meta Faculties** Pioneering multidisciplinary science, Technion was first to establish a new paradigm of education – through the Russell Berrie Nanotechnology Institute (RBNI), the Grand Technion Energy Program (GTEP) and the Lorry I. Lokey Interdisciplinary Center for Life Sciences and Engineering.

*Pictured: Nano Bible - the world’s smallest bible.*

**2012**

**Cornerstone Centennial**

Technion is home to three Nobel Laureates (l-r): Prof. Dan Shechtman (Chemistry 2011), Prof. Avram Hershko and Prof. Aaron Ciechanover (Chemistry 2004).

With its Ivy League partner Cornell University, Technion is to bring its penchant for manifesting vision to the world stage, with the foundation of the Technion-Cornell Innovation Institute (TCII) in New York City.
From Generation to Generation

A tribute to those who have led the institute throughout the decades, from the struggle of its foundation, through its expansion and vision.

'24-'25
Arthur Blok, Principal

'25-'27
Eng. Max Hecker

'27-'29
Shmuel Pewsner

'30-'31
Prof. Aharon Tcherniaisky

'31-'50
Dr Shlomo Kaplansky

'51-'65
Lt. Gen. (res.) Yaakov Dori

'65-'73
Alexander Goldberg

'73-'82
Maj. Gen. (res.) Amos Horev

'82-'86
Prof. Josef Singer

'86-'90
Dr Max Reis

'90-'98
Prof. Zehev Tadmor

'98-2001
Maj. Gen. (res.) Amos Lapidot

2001-2009
Prof. Yitzhak Apeloig

2009 - present
Prof. Peretz Lavie
Honorary Degrees & Awards

Dr Alan Hoffman, 1986
Prof. Simon Ostrach, 1986
Dr Arno A. Penzias, 1986
Prof. Louis D. Smullin, 1986
Dr Jacob M. Geist, 1985
Dr Richard E. Smalley, 1984
Prof. Jacob Willem Cohen, 1984
Prof. Alberto P. Calderon, 1984
Prof. Richard M. Karp, 1989
Prof. Sir Aaron Klug, F.R.S., 1989
Prof. Richard Goldstein, 1994
Prof. Mildred S. Dresselhaus, 1994
Prof. Harold A. Scheraga, 1993
Prof. Peter Haasen, 1993
Prof. R. Byron Bird, 1993
Prof. Angelo Miele, 1992
Prof. David Bohm, 1992
Prof. Yakir Aharonov, 1992
Prof. Seymour Rabinowitz, 1991
Prof. Rolf W. Landauer, 1991
Prof. Marcus Karel, 1991
Prof. Michel Jouvet, 1991
Prof. Michel Jouvet, 1991
Prof. Bernard Budiansky, 1995
Prof. Karl Ludwig Kompa, 1995

HONORARY DOCTOR OF SCIENCE
Prof. Roald Hoffmann, 1996
Prof. Robert E. Lucas, Jr., 1996
Prof. Robert S. Langer, 1997
Prof. Barry M. Trost, 1997
Prof. Haim Brezis, 1998
Prof. Barry M. Trost, 1997
Prof. David Bohm, 1992
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Prof. Rolf W. Landauer, 1991
Prof. Marcus Karel, 1991
Prof. Michel Jouvet, 1991
Prof. Michel Jouvet, 1991
Prof. Bernard Budiansky, 1995
Prof. Karl Ludwig Kompa, 1995

HONORARY ARCHITECTURE
David Ben Gurion, 1962

HONORARY ENGINEER
Joseph W. Wunsch, 1946
Alexander Konoff, 1949
Elias Fife, 1955

HONORARY FELLOW
Col. Jehiel R. Elyachar, 1953
Arthur Blok, 1954
Max Hecker, 1954
Sir Louis Sterling, 1956
Sir Isaac Wolfson, 1956
Samuel Fryer, 1959
S. J. Birn, 1965
Dr Jacob Isler, 1970
Ing. Aharon Goldenstein, 1971
Leo M. Harvey, 1972
Maurice M. Rosen, 1972
Barrett Shine, 1972
Jacob W. Ullmann, 1972
Alexander Whyte, 1972
Abel Wolman, 1972
Jacobs K. Javits, 1973
Ludwig Jesselson, 1973
Eliyahu Sacharov, 1973
Victor Tabah, 1973
Samuel M. Bernstein, 1975
Horace W. Goldsmith, 1975
Alexander Hassan, 1975
Michael Kennedy Leigh, 1975
Gen. Dan Tolkowsky, 1975
Arie Carasso, 1976
Avraham Levy, 1976
Leon Lidor, 1976
Joseph Riesman, 1976
Eugene Stearns, 1976
Nathan Goldberg, 1977
Lawrence Harvey, 1977
Nate Sherman, 1977
Isaac Taylor, 1977
Yekutiel Federmann, 1978
Aaron Gutwirth, 1978

Dr Henry Samueli, 2005
Prof. Sir Michael V. Berry, 2006
Prof. Graham C. Goodwin, 2006
Prof. Thomas L. Magnanti, 2007
Prof. Nan Pyo Suh, 2007
Prof. Chi-Huey Wong, 2007
Prof. Israel Gohberg, 2008
Architect Daniel Libeskind, 2008
Dr Igor David, 2009
Prof. Jean Marie Lehn, 2009
Prof. Leonard Kleinrock, 2010
Prof. Anders Lindquist, 2010
Prof. Lev Pitaevskii, 2010

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Prof. Lev Pitaevskii, 2010

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Architect Daniel Libeskind, 2008
Dr Igor David, 2009
Prof. Jean Marie Lehn, 2009
Prof. Leonard Kleinrock, 2010
Prof. Anders Lindquist, 2010
Prof. Lev Pitaevskii, 2010

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Dr Christian Hodler, 1994
Daniel Karp, 1994
Trudy Louis, 1994
Arnold Reich, 1994
Yona Uszip, 1994
Dr Kenneth Alberman, 1995
Alfred Bar, 1995
Moshe Bar-Ilan, 1995
Louis Edelstein, 1995
Alex J. Etkin, 1995
Prof. Asger Lindegaard-Andersen, 1995
Richard Swig, 1995
Joseph Gurwin, 1996
William Marcus, 1996
Yehezkel Nussbaum, 1996
Norton Sherman, 1996
Harry J. Stern, 1996
Mary Weksman, 1996
Dan Wind, 1996
Norman Belmonte, 1997
Jerome Drexler, 1999
Simcha Cohen-Stern, 1999
Joseph Freed, 1998
Tamara Handelsman, 1998
Philip E. Klein, 1998
Samuel Geltman, 1998
Dr Arthur Wein, 1998
Shmuel Rotem, 1998
Dov Tirosh, 1997
Dorothy Kellner, 1999
Jerome Drexler, 1999
Simcha Cohen-Stern, 1999
Jerome Drexlar, 1999
Dorothy Kellner, 1999
Stanley Shirvan, 1999
Haim Stoessel, 1999
Benjamin B. Torchinsky, 1999
Jack Belock, 2000
Michael Frieze, 2000
Doreen Green, 2000
Marguerite Greenberg, 2000
Lawrence Jackier, 2000
Lois Peltz, 2000
Miriam Puckhar, 2000
Joseph Tenenbaum, 2000
Evelyn Berger, 2001
David Dibner, 2001
Edith Fischer, 2001
David Friedman, 2001
Ruth Hoenich, 2001
Prof. Eliahu I. Jury, 2001

Prof. Burkhart Müller, 2001
David Polak, 2001
Jonathan Sohnis, 2001
Stanley Chais, 2002
Prof. Dr Ing. Ulrich Draugelates, 2002
Michael Heller, 2002
Frank G. Meyer, 2002
Morris Rochlin, 2002
El Witt, 2002
Hans Cohn, 2003
Dr Stephen A. Laser, 2003
Dr Hyman Mitchner, 2003
Col. Yitzhak Turgeman, 2003
Zahava Bar-Nir, 2004
Daliah Blech, 2004
David Brecher, 2004
Benjamin Carasso, 2004
Aaron Etra, 2004
Reinhard Frank, 2004
Herbert W. Pollack, 2004
Nina Sabbah, 2004
Jeanette Dankner, 2005
Alan Forman, 2005
Gary Goldberg, 2005
Shmulu Rotem, 2005
Joan Seidel, 2005
Esther Smidof, 2005
Dan Vilenski, 2005
William Wiener, 2005
Yaacov Kotlicki, 2006
D. Dan Kahn, 2006
Yaacov Kotlicki, 2006
Prof. Jacques Lewiner, 2006
Hal Marcus, 2006
Jack Skodnek, 2006
Dr Coleman Caplovitz, 2007
Macabi Carasso, 2007
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Sandro Szego, 2008
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Tzvi Neta, 2009
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Hannah Rechler Rabinowitz, 2009
Chaim Yaron, 2009
Giora Ackerstein, 2010
Michael Fuerst, 2010
Aviva Goldberg, 2010
Ben-Ami Gov, 2010
Michael Klein, 2010
Charles Levin, 2010
Howard Rosenbloom, 2010
Joel Rothman, 2010
Ivan Stern, 2010
Fausta Finzi Carli, 2011
Oscar Davis, 2011
Dr Harry Handelsman, 2011
Sidney Leifer, 2011
Ed Satell, 2011
Rafael Sirkis, 2011
Stanley Sussman, 2011
Albert Sweet, 2011

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Prof. Claude E. Shannon, 1972
Sir Alan Howard Cottrell, 1974
Prof. Gershon Scholem, 1974
Prof. George Klein, 1975
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Prof. Seymour Benzer, 1977
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Prof. Bernard Lewis, 1978
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Prof. Franz Rosenthal, 1984
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Prof. Sir Richard Friend, 2011
Prof. Jüde Pease, 2011

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Samuel Neaman, 1997
Bruce Rappaport, 1998
Haim Rubin, 1998
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Norman Seiden, 2001
Martin Kellner, 2005
Leonard Sherman, 2005
Ben Sosewitz, 2005
Lewis Weston, 2008
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Prof. Daoud Bshouty

DEAN OF STUDENTS
Prof. Michal Green

DEAN OF THE DIVISION FOR CONTINUING EDUCATION & EXTERNAL STUDIES
Prof. Yehudit Dori

MINISTER OF TRANSPORT
MK Israel Katz

MAYOR OF HAIFA
Yona Yahav

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Dr Dan Maydan, USA
Dr Ben-Zion Naveh, Israel
Prof. Eliot Phillipson, Canada

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Avie Arenson, Israel
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Victor Asser, Greece
Eli Ayalon, Israel
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Alfred Bar, Switzerland
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Evelyn Berger, USA
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Harry Bloomfield, Canada
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Lucien Y. Bronicki, Israel
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Pinchas Barel Buchris, Israel
Yoel Carasso, Israel
Joseph Ciechanover, Israel
Elizabeth Corob, UK
Edith Cresson, France
Jacob Dagan, Israel
Jeanette Dankner, Israel
Itsko Danzinger, Israel
Robert Davidson, USA
Uri Dor, Israel
Michaod Dresner, Israel
Dr Alon Dumans, Israel
Ing. Zvi Dvoretsky, Israel
Dr Shimon Eckhouse, Israel
J. Steven Emerson, USA
Ari Erel, Israel
Prof. Juri Estrin, Australia
Aaron Ezra, USA
Irwin Field, USA
Sigal First, Israel
Edith Fischer, USA
Alan Forman, USA
Gideon Fortuna, Israel
Gideon Frank, Israel *
Pearl Gamera, Canada
Jacques Garin, France
David Gat, Israel
Yitzhak Gat, Israel
Edward R. Goldberg, USA
Gary Goldberg, Canada
Prof. Solomon W. Golomb, USA
Ben Ami Gov, Israel
Dr Ehoud Graff, Israel
Doreen Green, Canada
Daniel Gutenber, Switzerland
Gen. (Res.) Shalom Hagai, Israel
Gad Haker, Israel
Louis N. Harris, UK
Michael Heller, UK
Morven Heller, UK
Sandi Hittman, USA
Gen. (Res.) Itzhak Hoffi, Israel
Mag. Gen. (Res.) Shlomo (Burstein) Inbar, Israel *
Gen. (Res.) David Ivy, Israel
Ing. Shaul Ivtsan, Israel *
Dr Irvin Jacobs, USA
Gershon Kaddar, Israel
Dr Shlomo Kalish, Israel
Miri Katz, Israel
Theodore Kenny, Israel
Avi Kerbs, Israel
Moshe Keret, Israel
Dr Joachim Klein, Germany
Yaacov Kotlicki, Netherlands
Kobi Kurzt, Netherlands
Benny Landa, Israel
Yeshayahu Landau, Israel
Mag. Gen. (Res.) Amos Lapidor, Israel
Dr Stephen Laser, USA
Eliaz Lavi, Israel
Ron Lazarovits, Australia
Sidney Leyfer, USA
Isaac-Sakis Leon, Greece
Charles Levin, USA
Dr Daphna Levy, Israel
Prof. Jacques Lewiner, France
Moshe Lichtman, Israel
Prof. Anders Lindquist, Sweden
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Avinoam Naor, Israel
Joseph Tanenbaum, USA
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Ing. Sandor Szego, Brazil
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Joseph Tanenbaum, USA
Gen. (Res.) Dan Tolkovsky, USA
Gideon Tolkovsky, Israel
Itzhak Turgeman, Israel
Oded Tzur, Israel
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Dan Vilenksi, Israel
Dr Andrew Viterbi, USA
Dr Kobi Vortman, Israel
Eyal Waldman, Israel
Prof. Dr Peter Weinberger, Austria
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Stef Wertheimer, Israel
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Avigdor Willenz, Israel
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Shlomo Yanai, Israel
Elisha Yanay, Israel
Chaim Yaron, Israel *
Giora Yaron, Israel
Yehuda Zisapel, Israel
Zohar Zisapel, Israel

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James Deutchman, USA
Brent Dibner, USA
Moshe Dunie, USA
Rita Emerson, USA
Carol Epstein, USA
Rod Feldman, USA
Gill Fishman, USA
Ruth Flinkman-Marandy, USA
Laura Flug, USA
David Friedman, USA
Prof. René Frydman, France
Harold Garfinkle, Canada
Stephen Grand, USA
Dr. Avi Friedman, Canada
Michael Frieze, USA
Dr. Jacob E. Goldman, USA
Nathan Goldman, Canada
Sofia L. de Grimberg, Argentina
Gary Gross, USA
Jordan Gruzen, USA
Willard Hackerman, USA
Jack Hahn, Canada
Homer Harvey, USA
Dr. Michael Helper, Canada
Dr. Christian Hodler, Germany
Charles Housen, USA
Ivoncy B. Ischişte, Brazil
Maggie Kaplan, USA
Nathan Kiruh, South Africa
Stephen B. Klein, USA
Theodore H. Krengel, USA
Ing. Zvi Langer, Israel
Alexander Lidow, USA
Justice Sam Lieberman, Canada
Mitchell J. Marcus, USA
Bernard Marx, USA
Murray Menkes, Canada
Frank G. Meyer, USA
Louis Milgrom, USA
Jonathan Mitchell, USA
Robert Munnoch, France
Parviz Nazarian, USA
Justice Shoshana Netzanyahu, Israel
Prof. Dr. Oswald Novotny, Austria
Samuel Pisar, France
Eugene Riesman, Canada
Morris Rochlin, USA
Barrie Rose, Canada
Daniel Rose, USA
Elihu Rose, USA
Eric Samson, South Africa
Moshe Sanbar, Israel
Dr. Zalman M. Shapiro, USA
Paul Shatz, USA
Sholom Shefferman, USA
Harry Sheres, Canada
Norton Sherman, USA
Emanuel Shimon, Israel
Rannie J. Silbert, USA
Abe Simkin, Canada
Frances Fohs Sohn, USA
Dr. S. Jerome Tamkin, USA
Joseph Taub, USA
Benjamin Torchinsky, Canada
Lucy Ullmann, USA
Yona Uspiz, Israel
Francois Wasservogel, France
Mary Wierskman, USA
Estelle Yach, South Africa
Ruth Ziegler, USA
Robert Zinn, USA

REPRESENTATIVES OF GROUPS
AND ORGANIZATIONS

JEWISH AGENCY
Alan Hoffman

ASSOCIATION OF ENGINEERS
AND ARCHITECTS
Simcha Afek
Amnon Bartal
Emanuel Zvi Libin

ISRAEL ACADEMY OF SCIENCES
AND HUMANITIES
Prof. Mordechai Heilblum

ALUMNI ASSOCIATION
Eyal Kaplan
Dr. Ilana Maor

PROFESSORS
Prof. Michael Aviram
Prof. Moshe Eizenberg
Prof. Baruch Fischer
Prof. Raphael Semiat
Prof. Dan Zilberstein

ASSOCIATE PROFESSORS

SENIOR LECTURERS
Dr. Oren Kurland

TEACHING STAFF UNION
Liad Levy

PROFESSORS EMERITI
Prof. Amos Komornik

FACULTY ASSOCIATION
Prof. Irad Yavneh

ORGANIZATION OF PRACTICAL
ENGINEERS (HANDESSAIM)
Naftali Blau

THE M4 ORGANIZATION: THE ACADEMIC
EMPLOYEES UNION AT THE TECHNION
Moshe Barak

UNION OF THE ADMINISTRATIVE
WORKERS AT TECHNION
Vardit Friedmann

ORGANIZATION OF TECHNION PENSIONERS
Abraham Benmaman

GRADUATE STUDENTS ORGANIZATION
Moshe Apel
Schachar Raz

STUDENTS ASSOCIATION
Masha Friedman
Assaf Zinger
**Facts & Figures**

**Number of Students 2011/2012**

<table>
<thead>
<tr>
<th>Year</th>
<th>Bachelor’s</th>
<th>Master’s</th>
<th>Doctorate</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>2008</td>
<td>8,521</td>
<td>2,362</td>
<td>881</td>
<td>12,314</td>
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<tr>
<td>2009</td>
<td>9,278</td>
<td>2,290</td>
<td>877</td>
<td>12,445</td>
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<tr>
<td>2010</td>
<td>9,401</td>
<td>2,301</td>
<td>963</td>
<td>12,665</td>
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<tr>
<td>2011</td>
<td>9,564</td>
<td>2,351</td>
<td>934</td>
<td>12,849</td>
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<tr>
<td>2012</td>
<td>9,529</td>
<td>2,384</td>
<td>943</td>
<td>12,856</td>
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**Total Degrees Awarded (1924–2012)**

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<thead>
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<th>Type</th>
<th>2011</th>
<th>2012</th>
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<tr>
<td>Bachelor’s</td>
<td>1,789</td>
<td>1,729</td>
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<tr>
<td>MD</td>
<td>115</td>
<td>115</td>
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<tr>
<td>Master’s</td>
<td>741</td>
<td>699</td>
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<tr>
<td>PhD</td>
<td>189</td>
<td>185</td>
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<td><strong>Total</strong></td>
<td><strong>2,834</strong></td>
<td><strong>2,728</strong></td>
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**Total: 2,728**

* including 539 MD 4th-6th year students, 103 of whom are on the Technion American Medical School Program
** including 117 MBA students
*** including graduate students in Autonomous Systems & Robotics; Biotechnology; Design & Manufacturing Engineering; Energy; Polymer Engineering; Nanoscience & Nanotechnology; and Systems Engineering

**Degrees Awarded 2012**

- **PhD**: 185
- **MD**: 115
- **MSc**: 699
- **BSc**: 1,729
- **Total**: 2,728

All data correct to May 20, 2012
**Fiscal Overview**

**Operating Budget**
October 1, 2011 - September 30, 2012

**Income**

<table>
<thead>
<tr>
<th>Source</th>
<th>Thousands of NIS</th>
<th>%</th>
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</thead>
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<tr>
<td>Government Allocation</td>
<td>829,945</td>
<td>69.2</td>
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<tr>
<td>Self Income</td>
<td>169,800</td>
<td>14.2</td>
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<tr>
<td>Tuition Fees</td>
<td>109,000</td>
<td>9.1</td>
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<td>Technion Societies</td>
<td>46,000</td>
<td>3.8</td>
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<td>Deficit</td>
<td>44,847</td>
<td>3.7</td>
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<tr>
<td><strong>Total Income</strong></td>
<td><strong>1,199,592</strong></td>
<td><strong>100.0</strong></td>
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**Expenditure**

<table>
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<tr>
<th>Category</th>
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<th>%</th>
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<td>Staff Emoluments</td>
<td>658,875</td>
<td>54.9</td>
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<td>Pension Payments</td>
<td>211,985</td>
<td>17.7</td>
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<td>Operating Expenses</td>
<td>137,318</td>
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<tr>
<td>Maintenance</td>
<td>97,936</td>
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<td>Student Aid</td>
<td>93,478</td>
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<td><strong>Total Expenditure</strong></td>
<td><strong>1,199,592</strong></td>
<td><strong>100.0</strong></td>
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**Total Income from Technion Societies**

<table>
<thead>
<tr>
<th>Year</th>
<th>Income (Millions of NIS)</th>
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<tbody>
<tr>
<td>2003/4</td>
<td>53.9</td>
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<td>2004/5</td>
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<td>2006/7</td>
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<td>2007/8</td>
<td>89.3</td>
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<tr>
<td>2008/9</td>
<td>86.8</td>
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<td>2009/10</td>
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**Development Expenditure**
October 1, 2010 - September 30, 2011

<table>
<thead>
<tr>
<th>Category</th>
<th>Thousands of SUS</th>
<th>Thousands of NIS*</th>
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<tbody>
<tr>
<td>Buildings, Renovations &amp; Infra.</td>
<td>18,569</td>
<td>46.4</td>
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<tr>
<td>Multidisciplinary Research Cs.</td>
<td>12,516</td>
<td>31.2</td>
</tr>
<tr>
<td>Laboratories &amp; Equipment</td>
<td>8,978</td>
<td>22.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>40,063</strong></td>
<td><strong>100.0</strong></td>
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* SUS1 = NIS 3.55

**Sponsored Research from External Sources**
(Millions of $US)

<table>
<thead>
<tr>
<th>Year</th>
<th>Income (Millions of $US)</th>
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<tbody>
<tr>
<td>2004</td>
<td>34.7</td>
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<tr>
<td>2005</td>
<td>40.6</td>
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<tr>
<td>2006</td>
<td>44.5</td>
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<tr>
<td>2007</td>
<td>50.6</td>
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<tr>
<td>2008</td>
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<td>2009</td>
<td>61.7</td>
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<tr>
<td>2010</td>
<td>65.2</td>
</tr>
<tr>
<td>2011</td>
<td>86.9</td>
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</table>

**Fast Facts 2011/12**

- **Founded**: 1912
- **Student Population**: 12,856
- **Technical & Administrative Staff**: 1,170
- **Research Centers**: 52
- **Academic Departments**: 18
- **Undergraduate Programs**: 50
- **Graduate Programs**: 80
- **Degrees Awarded**: 95,821
- **Buildings on Campus**: 90
- **Built-Up Area**: 464,317m²
- **Dormitory Beds**: 4,442
- **Faculty**: 616

**Development Expenditure**
October 1, 2010 - September 30, 2011

<table>
<thead>
<tr>
<th>Category</th>
<th>Thousands of SUS</th>
<th>Thousands of NIS*</th>
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<tbody>
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<td><strong>40,063</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

* SUS1 = NIS 3.55
Leadership

Schulich Faculty of Chemistry
Prof. Alon Hoffman

Faculty of Civil and Environmental Engineering
Prof. Noah Galil

Faculty of Computer Science
Prof. Eli Bham

Department of Education in Technology and Science
Assoc. Prof. Orit Hazzan

Faculty of Electrical Engineering
Prof. Adam Shwartz

Faculty of Physics
Prof. Noam Soker

Center for Pre-university Education
Prof. Shimon Gepstein

ADDITIONAL OFFICERS
Deputy Senior Vice President
Prof. Daniel Rittel

Deputy SVP for Academic Development of the NYCTech Campus
Prof. Craig Gotsman

Deputy SVP for International Academic Relations
Prof. Anat Rafeali

Assistant to SVP for the Promotion of Teaching
Prof. Daniel Levin

Deputy Vice President for Research
Prof. Yuval Shoham

Deputy SVP for Academic Affairs
Prof. Zalman Palmor

Deputy Director General
Matanyahu Englman

Deputy Director General for Development and Maintenance
Abraham Wilf

Deputy Director General for Operations
Zehava Laniado

Deputy Vice President for Information Systems
Prof. Gershon Elber

Deputy Vice President for Safety Matters
Prof. Yaacov Mamane

Consultant to Director General for Finance and Administrative Matters
Elhanan Oppenheimer

Director, Public Affairs and Resource Development Division
Danny Shapiro

General Counsel
Adv. Dror Goldstein

Marketing Director
Gabriel Stern

Deputy Vice President for Safety Matters
Prof. Yaacov Mamane

Consultant to Director General for Finance and Administrative Matters
Elhanan Oppenheimer

Director, Public Affairs and Resource Development Division
Danny Shapiro

General Counsel
Adv. Dror Goldstein

Marketing Director
Gabriel Stern

Deputy Vice President for Safety Matters
Prof. Yaacov Mamane

Consultant to Director General for Finance and Administrative Matters
Elhanan Oppenheimer

Director, Public Affairs and Resource Development Division
Danny Shapiro

General Counsel
Adv. Dror Goldstein

Marketing Director
Gabriel Stern

Deputy Vice President for Safety Matters
Prof. Yaacov Mamane

Consultant to Director General for Finance and Administrative Matters
Elhanan Oppenheimer

Director, Public Affairs and Resource Development Division
Danny Shapiro

General Counsel
Adv. Dror Goldstein

Marketing Director
Gabriel Stern
Leaders in Science and Technology

LANDAU FELLOWS
Nicholas Crawford  
Faculty of Mathematics

Amos Yarom  
Faculty of Physics

HOREV FELLOWS
Carmel Rotschild  
Faculty of Mechanical Engineering

Amir Yehudayoff  
Faculty of Mathematics

NEW FACULTY APPOINTMENTS

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<tr>
<th>Field</th>
<th>Name</th>
<th>Position</th>
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<tbody>
<tr>
<td>Aerospace Engineering</td>
<td>Yossi Elimelech</td>
<td>Research Associate</td>
</tr>
<tr>
<td>Architecture and Town Planning</td>
<td>Efrat Eizenberg</td>
<td>Lecturer</td>
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<tr>
<td></td>
<td>Michelle Portman</td>
<td>Senior Lecturer</td>
</tr>
<tr>
<td></td>
<td>Efrat Eizenberg</td>
<td>Senior Lecturer</td>
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<tr>
<td></td>
<td>Els Verbakel</td>
<td>Lecturer</td>
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<tr>
<td>Biology</td>
<td>Ayelet Lamm</td>
<td>Senior Lecturer</td>
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<tr>
<td>Chemical Engineering</td>
<td>Viatcheslav Freger</td>
<td>Associate Professor</td>
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<tr>
<td>Chemistry</td>
<td>Lilac Amirav</td>
<td>Senior Lecturer</td>
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<td></td>
<td>Galia Maayan</td>
<td>Senior Lecturer</td>
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<tr>
<td>Civil and Environmental</td>
<td>Oded Amir</td>
<td>Lecturer</td>
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<td></td>
<td>Amir Degani</td>
<td>Senior Lecturer</td>
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<tr>
<td></td>
<td>Barak Fishbain</td>
<td>Senior Lecturer</td>
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<tr>
<td>Computer Science</td>
<td>Mirela Ben-Chen</td>
<td>Senior Lecturer</td>
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<table>
<thead>
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<th>Field</th>
<th>Name</th>
<th>Position</th>
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</thead>
<tbody>
<tr>
<td>Electrical Engineering</td>
<td>Yuval Cassuto</td>
<td>Senior Lecturer</td>
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<tr>
<td></td>
<td>Yoav Etsion</td>
<td>Senior Lecturer</td>
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<tr>
<td>Industrial Engineering and</td>
<td>Ella Miron-Spektor</td>
<td>Senior Lecturer</td>
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<tr>
<td>Materials Engineering</td>
<td>Hovav Perets</td>
<td>Teaching Associate</td>
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<tr>
<td>Mathematics</td>
<td>Nicholas Crawford</td>
<td>Senior Lecturer</td>
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<td></td>
<td>Uri Shapira</td>
<td>Senior Lecturer</td>
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<tr>
<td>Mechanical Engineering</td>
<td>Moran Bercovici</td>
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<tr>
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<td>Dan Mordehai</td>
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<td>Carmel Rotschild</td>
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<td>Yuli Starosvetsky</td>
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</tr>
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<td>Shelly Tzili</td>
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<table>
<thead>
<tr>
<th>Field</th>
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<tbody>
<tr>
<td>Medicine</td>
<td>Imad Abu El-Naaj</td>
<td>Clinical Senior Lecturer</td>
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<tr>
<td></td>
<td>Ricardo Alfici</td>
<td>Clinical Assoc. Professor</td>
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<td></td>
<td>Avraham Avital</td>
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<tr>
<td></td>
<td>Alexander Becker</td>
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<td></td>
<td>Boaz Bloch</td>
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<td></td>
<td>David Blondheim</td>
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<td>Noam Bor</td>
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<td>Daniel Briscoe</td>
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<td>Shemy Carasso</td>
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<tr>
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<td>Dori Derdikman</td>
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<td></td>
<td>Guy Dori</td>
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<td>Simon Duek</td>
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<td>Dana Egozi</td>
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<td>Nael Elias</td>
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<table>
<thead>
<tr>
<th>Field</th>
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<tbody>
<tr>
<td>Medicine</td>
<td>Danny Eytan</td>
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<td></td>
<td>Aharon Frimerman</td>
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<td></td>
<td>Doron Garfinkel</td>
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<td>Yaniv Gelernter</td>
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<td>Mordechai Grupper</td>
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<td>Emilia Hardak</td>
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<td>Yuval Kaufman</td>
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<td>Adi Klein-Kremer</td>
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<td>Anatoly Kreinin</td>
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<td>Arie Lissak</td>
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<td>Beth Brianna Murinson</td>
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<td>Aviram Netzer</td>
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<td>Adi Rachmiel</td>
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<td>Yael Shachor-Meyouhas</td>
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<td>Ido Solt</td>
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<td>Mahmoud Suleiman</td>
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<td>Tamar Tadmor</td>
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<td>Naveh Tov</td>
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<td>Mattitiahu Waterman</td>
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<td>Devy Zisman</td>
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---

*Including medical faculty
Awards & Honors

SELECTED LIST

Distinguished
Prof. Dan Shechtman
Faculty of Materials Engineering
2011 Nobel Prize in Chemistry

Dr Gil Alexandrowicz
Schulich Faculty of Chemistry
Wolf Foundation, 2012 Krill Prize

Distinguished Prof. Yitzhak Apeloi
g Schulich Faculty of Chemistry
Federal Republic of Germany,
Order of Merit

Prof. Hagit Attiya
Faculty of Computer Science
• ACM-EATCS, 2011 Edsger W. Dijkstra
Prize in Distributed Computing
• Yad Hanady (Rothschild Foundation),
2011 Michael Bruno Award

Prof. Emeritus Zeki Berk
Faculty of Biotechnology and Food Engineering
International Association of Engineering and
Food (IAEF), Lifetime Achievement Award

Prof. Eli Biham
Faculty of Computer Science
• 2012 RSA Conference Award
• International Association for Cryptologic
Research, Distinguished Lecturer for 2013

Distinguished Prof. Aaron Ciechanower
Rappaport Faculty of Medicine
Alexander von Humboldt Foundation,
Humboldt Research Award

Prof. Gad Eisenstein
Faculty of Electrical Engineering
Istituto Veneto di Scienze, Lettere ed Arti,
Elected as Foreign Member

Prof. Gershon Elber
Faculty of Computer Science
Dagstuhl Seminar on Geometric Modeling,
2011 John A. Gregory Memorial Award

Prof. Yonina Eldar
Faculty of Electrical Engineering
Tel Aviv-Jaffa Municipality, 2011 Weizmann
Prize in Exact Sciences

Prof. Lior Gepstein
Rappaport Faculty of Medicine
European Society of Cardiology (ESC),
Outstanding Achievement Award

Prof. Michael Glickman
Faculty of Biology
German Technion Society, 2012 Science Prize

Prof. Emeritus David Hasson
Wolfson Faculty of Chemical Engineering
Mifal Hapayis, 2011 Landau Award for
Sciences and Research

Distinguished Prof. Avram Hershko
Rappaport Faculty of Medicine
University of Haifa, Honorary Doctorate

Dr Kinnet Keren
Faculty of Physics
EBSA (European Biophysical Societies’
Association), 2011 Young Investigator’s
Medal

Prof. Ilan Marek
Schulich Faculty of Chemistry
• Royal Society of Chemistry (RSC),
2011 Organometallic Chemistry Award
• 2012 Janssen Pharmaceutica Prize for
Creativity in Organic Synthesis

Prof. Emeritus Shimon Mizrahi
Faculty of Biotechnology and Food Engineering
Israel Food Industries Association,
2011 Lifetime Achievement Award in the
Academia

Distinguished Prof. Mordechai
(Moti) Segev
Faculty of Physics
Israel Academy of Sciences and
Humanities, Elected Member

Prof. Emeritus Edna Shaviv
Faculty of Architecture and Town Planning
American Solar Energy Society, Passive
Solar Pioneer Award

Distinguished Prof. Dan Shechtman
Faculty of Materials Engineering
Israel Chemical Society, 2011 Gold Medal

Prof. Moshe Tennenholtz
Davidson Faculty of Industrial Engineering
and Management
ACM/SIGART, 2012 Autonomous Agents
Research Award

Distinguished Prof. Emeritus
Daniel Weisblt
Faculty of Aerospace Engineering
Ben Gurion University of the Negev,
Honorary Doctorate

Prof. Emeritus Moussa Youdim
Rappaport Faculty of Medicine
• X International Catecholamine
Symposium, Giant Pioneer of
Catecholamine Field
• International College of
Neuropsychopharmacology, 2012 CINP
Pioneers in Psychopharmacology Award

EUROPEAN RESEARCH COUNCIL

Starting Grants
Prof. Roy Kishoby
Faculty of Biology

Assoc. Prof. Shulamit Levenberg
Faculty of Biomedical Engineering

Assoc. Prof. Pini Gurfil
Faculty of Aerospace Engineering

COUNCIL FOR HIGHER EDUCATION

Allon Fellows
Dr Guy Bartal
Faculty of Electrical Engineering

Dr. Amir Yehudayoff
Faculty of Mathematics

Dr Amos Yarom
Faculty of Physics

TECHNION PRIZES

Alexander Goldberg Prize
Prof. Israel Cohen
Faculty of Electrical Engineering

Henri Gutwirth Foundation
Research Grants
The Henri Gutwirth Foundation supports research
grants at the Technion since 1973.

Assoc. Prof. Mark Gandelman
Schulich Faculty of Chemistry

Dr Kinnet Keren
Faculty of Physics

Dr Itai Yanai
Faculty of Biology

Juludan Research Prize
For outstanding research in the application of modern
scientific or engineering techniques to medicine, which
holds the potential of developing processes, products,
or devices having practical application.

Dr Dvir Yelin
Faculty of Biomedical Engineering

Ray and Miriam Klein Research Prize
For an outstanding research work that contributes
to Israel’s industry, technology, security or
scientific standing.

Assoc. Prof. Yair Ein-Eli
Faculty of Materials Engineering

Kurt Mahler Prize in Mathematics
for 2011
For excellence in mathematics including applied
mathematics.

Prof. Michail Zhitomirskii
Faculty of Mathematics

Hershel and Hilda Rich Technion
Innovation Awards
These awards, established in 1992, are presented
to students, faculty members, or employees for
outstanding innovative projects with
commercial potential.

Prof. Gera Neufeld, Boaz Kigel, Noa
Rabinowicz, Dr Asya Varshavsky, and Dr
Ofra Kessler
Rappaport Faculty of Medicine

Prof. Yoram Reiter and Dr Rony Dahan
Faculty of Biology

Dr Avner Rothschild
Faculty of Materials Engineering

Prof. Moshe Shoham and
David Zarrouk
Faculty of Mechanical Engineering
and Prof. Menashe Zarrour
Rappaport Faculty of Medicine

Prof. Nir Tessler and
Ariel Ben-Sasson
Faculty of Electrical Engineering

Henry Taub Prizes for
Academic Excellence
Established in 1986, these prizes recognize faculty
members who demonstrate exceptional achievements
in research, teaching and service to the Technion.

Prof. Oren Bergman
Faculty of Physics

Dr Gil Alexandrowicz
Schulich Faculty of Chemistry

Prof. Michael Glickman
Faculty of Biology

Assoc. Prof. Tamar Ziegler
Faculty of Mathematics

Assoc. Prof. Dovev Lavie
Davidson Faculty of Industrial Engineering
and Management

Yanai Awards for Excellence
in Education
Awarded for the first time in 2011, this prize is
bestowed for a substantial and unique contribution to
the advancement of the academic education of
undergraduate students.

Prof. David Chillag
Faculty of Mathematics

Assoc. Prof. Uri Eliash
Faculty of Mathematics

Assoc. Prof. Ayelet Fishman
Faculty of Biotechnology and Food Engineering

Prof. Alon Gany
Faculty of Aerospace Engineering

Prof. Shimon Gepstein
Faculty of Biology

Dr Sefi Givli
Faculty of Mechanical Engineering

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Wolfson Faculty of Chemical Engineering

Assoc. Prof. Amnon Katz
Faculty of Civil and Environmental Engineering

Assoc. Prof. Eitan Kimmel
Faculty of Biomedical Engineering

Assoc. Prof. Avinoam Kolodny
Faculty of Electrical Engineering

Prof. Avishai Mandelbaum
Davidson Faculty of Industrial Engineering
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Prof. Idrad Yavneh
Faculty of Computer Science
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