

JCT

Perspective

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PROVIDING SECURITY FOR ISRAEL

JCT

Perspective

JERUSALEM COLLEGE OF TECHNOLOGY

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COMMENTARY

Since its establishment in 1969, many people have helped to shape JCT into the bastion of Torah and technology it has become – from **Prof. Ze'ev Lev** – the original visionary, through the tenures of presidents **Yitzchak Nebenzahl**, **Zvi Weinberg**, and **Yosef Bodenheimer**. For the last fourteen years, Vice President **Reuven Surkis** has led the development team and through his vision and guidance, he has not only helped JCT to expand its concrete facilities but has also promoted the concept of making higher education available to all. Reuven established the Ethiopians for Engineers program to enable young immigrants from families with little education, to embark on an academic career. He strove to ensure that JCT would provide everything that these students required in order to succeed – from financial support to psychosocial and personal care. His door was always open and, when needed, he would bang on doors to make sure that these students were helped. His efforts have borne fruit – over 100 graduates of the program are working in high-tech, banking and in technology departments of the IDF. This year 127 Ethiopian students are studying at JCT including over 50 women. Reuven as “father” of this program has earned a great deal of nachas from these children who are role models for their community.

To help JCT in its mission, the staff of the Department of Development and External Affairs work intensively to promote JCT's activities and bring in the funding required for JCT to grow and thrive. Now under the supervision of **Stuart Hershkowitz**, the department is expanding to meet the challenges of the next decade. Recent additions to our team, **Yehuda Aaronson** and **Dorel Abramovitz**, have undertaken the challenge of fundraising in Israel and abroad. JCT has also taken the strategic decision to upgrade its Friends offices in New York and Canada where executive directors have recently been appointed. We wish them all much success in their endeavors.

A campus for Machon Tal is our priority, and many people are working to help ensure that JCT receives the land it needs to build a home for the enormously successful women's college. JCT is also making major strides in promoting research, investing major funds

in a Science Learning and Research Center, building new laboratories and expanding and upgrading others. Pursuing its objective of finding solutions for Israel's social problems, JCT is expanding its programs for Haredi students with new branches and courses opening each year. The Israel Henry Beren Center for Academic Preparatory Studies is due to be completed this summer and will provide JCT with the much needed classroom and administrative space to help these students embark on their professional future.

The cost of housing in Jerusalem is a major concern to potential students, many of whom are already married by the time they start their academic studies. JCT recently broke ground on the first dormitory for married couples on the Machon Lev campus. Due for completion in 18 months, this six story building will house 60 young families at greatly subsidized rents.

It is with deep gratitude that we thank you, our friends and supporters around the globe, for partnering us in our mission. This issue of Perspective magazine was produced to enable us to share with you the fruits of your investments. Although at JCT we are involved on a daily basis with helping the students succeed in their studies, we are not always aware of their progress once they leave JCT. Many of our graduates go on to work in top-secret IDF and security related industries – they are developing the nuts and bolts and are fine-tuning the technology of some of Israel's most advanced research projects. Many cannot talk about their work and only occasionally are we made aware of their contributions when they are awarded prizes or promoted to senior positions. You are a shareholder in their achievement and in ensuring Israel's success. Thank you.

אג פסח כשר ושמח

Rosalind Elbaum

Director of External Affairs

*JCT wishes a
Happy Passover to all our friends
and supporters around the world*

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PRESIDENT'S MESSAGE



Dear Friends,

Pesach, which falls in the spring, is the season of renewal. This is an opportunity to stop and look back on the year and to reflect on our future steps.

We usually conceptualize time as a linear phenomenon: the past is behind us, the present passes rapidly so that we can barely feel it as it drifts away, and the future is ahead. In Hebrew we conceptualize the year as a circle, referring to the passing seasons of the year as Ma'agal Hashana, the Yearly Cycle. Imagine a circular bus line; the bus stops at every station along the line, and after completing the first loop starts anew, stopping at the same stations in the exact same order.

In fact, this is not the case with our Jewish calendar; time passes along a spiral, and every year represents one loop of the spiral. When Rosh Hashana arrives, we ponder over our actions during the previous year, attempting to make “good decisions” in order to improve ourselves for the next year. On Yom Kippur, during Kol Nidre, we utter a prayer that seems to reiterate this concept, “from last Yom Kippur until this one, and from this one onwards to the next one.”

Similar thoughts come to mind when Pesach comes around. At this new point in time, we are able to examine the Pesach from last year's loop and ask ourselves: “What happened? Did we improve ourselves? Have we reached a higher level in our Jewish life?” And, here, at JCT, we wonder: “did we improve the education that we provide for our students?” The traditional question “Why is this night different from all other nights?” can also be read as, “Why is this Pesach night different from previous Pesach nights?” urging us to take this opportunity to re-evaluate our past and look forward to our future.

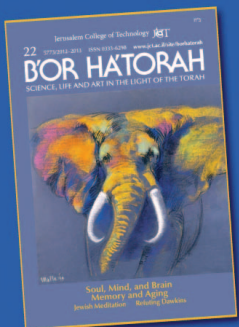
And indeed, when we look back on JCT's achievements during the previous year, we can all be proud of the work performed by its staff and students. Our students' education has improved; the researchers have achieved results on a high level; and, as you will soon discover in this issue of the Perspective, the contribution of JCT's researchers and developers to Israel's security has grown tremendously.


Gd willing, we will continue our efforts to improve the quality of our teaching, the symbiosis of Torah and Science and all the areas where we educate the leaders of the next generation.

Wishing you and your family a wonderful Pesach,

Chag Sameach,

Prof. Noah Dana-Picard





The Jerusalem College of Technology

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Why does G-d need Moshe?

by Rabbi Joel Cohn

The absence in the Hagaddah of Moshe's role in the exodus from Egypt is noted by all the commentators. We generally assume that the reason for this blatant omission is that on Pesach night we wish to emphasize the direct involvement of G-d in the Exodus and therefore refrain from even mentioning Moshe's name, other than the quote of a verse which mentions his name in passing. In the Hagaddah we state emphatically, *"I myself will bring about the Exodus, and not an angel, I myself will bring about the Exodus, and not a messenger."*

The question then is why did G-d appoint Moshe to be his messenger in the first place? If indeed it is important for us to realize the direct involvement of G-d in the exodus, why did the act need to be directed by Moshe?

I believe that this is not my question at all, but rather it is posed by Moshe himself. In the first encounter between G-d and Moshe, G-d has a difficult time convincing Moshe that he is the right man for the job. The very first question Moshe poses is, *"Who am I to go to Pharaoh, and to take the children of Israel out of Egypt?"* G-d responds most cryptically, *"For I shall be with you and this shall be the sign for you, for when you take the children of Israel out of Egypt you will worship G-d on this very mountain"* (Exodus, Chapter 3). At first glance G-d's answer does not address Moshe's concerns. Moshe seemingly is questioning his worthiness to act as the redeemer of the Jewish people and in turn G-d responds that at some future time the Jewish people will return to this mountain.

I believe that Moshe is asking something else of G-d at this critical juncture. He is not simply asking why he is being chosen, but he is asking why does G-d need any human intervention at all in this act. Moshe understands that he grew up in the palace of Pharaoh and that he killed the Egyptian and thus challenged the authority and therefore politically he is in the position to lead an uprising. What Moshe did not understand is why G-d needed a human being to do His work. The plagues could come and would come from above, and then the Jewish people would experience total Divine intervention with the clear message, *"The L-rd took us out of Egypt, not through an angel, not through a seraph and not through a messenger. The Holy One, blessed be He, did it in His glory by Himself!"*

G-d answers Moshe *"you are right"*, for the job of the exodus from Egypt I don't need you at all. However, in the future I will need you very much. You see, at a future point the Jewish people will come back to this very mountain where you now stand, and I will give them the Torah, and for that event, you

Moshe, are indispensable. For if I just give the Torah directly to the people without a Rebbe, a teacher, the Torah will be viewed as a document unfit for mankind. I need you Moshe to be that Rebbe, to show the people that the Torah is very much for them and will bring sanctity and direction to their lives. Moshe needed to represent G-d on behalf of the Jewish people to Pharaoh, in order that he attain the stature and gain the respect necessary for him to receive the Torah and pass its teachings to the nation.

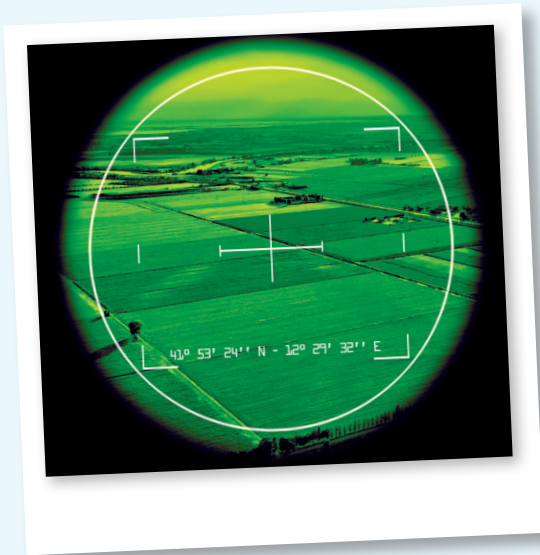
For the Jewish nation to prosper both spiritually and physically human endeavor and leadership are a must. As we continue the arduous and joyous task of rebuilding our nation we dare not lessen our efforts and wait patiently for Divine intervention, but we must all join this historic opportunity with strength and vigor. JCT, as an institution where the Beit Medrash is central and academic study is advocated, serves as a model of what the State of Israel can be. The Rebeim and professors jointly create an environment that allows the next generation to be inspired and to contribute their talents in all arenas of Jewish life. JCT students have the opportunity to interact with a faculty that exemplifies the integration of Torah and academic excellence which in turn will allow JCT graduates to assume leadership positions in all areas of Israeli society.

After serving as principal of SAR Academy, Rabbi Joel Cohn made aliya in 2005. Rabbi Cohn joined JCT as director of the International School in March 2012. Rabbi Cohn and his wife Shulamith reside in Katamon and are the very proud parents of seven children and nine grandchildren k"y



Quietly and Discreetly, on Land, in the Air and at Sea

by **Dan Gerstenfeld**



The Jerusalem College of Technology makes special contributions to the security of the State of Israel every day, as its graduates and faculty members are involved in developing advanced weaponry and defense systems.

At a time when the issue of sharing the defense burden is at the top of the agenda of public discourse, there is a need to focus on those for whom sharing this burden is carried out with a deep sense of mission – those who do more than just fulfill their obligation but invest all their vigor and energy in developing methods that save lives and ensure the State of Israel's military superiority.

Graduates of the Jerusalem College of Technology (JCT) are active in every part of the military – the regular army, the career army and the reserves. Many JCT students attend the college as members of the Academic Reserve program, wherein gifted students defer their army service until after completion of their degree.

The defense establishment's necessary media blackout on most of these developments means that the weighty contributions of the faculty members and graduates of JCT in the development of weapons and defense systems get minimal public recognition.

Several generations of JCT trained engineers and developers, are leaders in the elite units of the IDF and the defense industries. Over the years, the institution's graduates have won numerous prestigious defense awards, and a number of prizes have also been awarded to graduates of the Lustig and Tal Institutes, the JCT's women's divisions, who work for military industries.

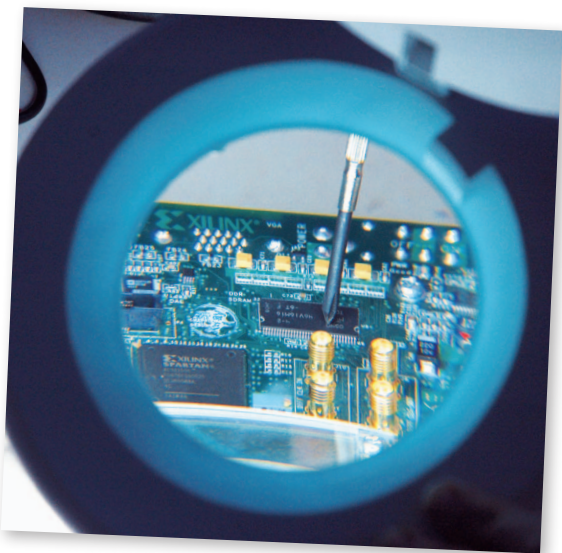
At an annual Israel Navy event two years ago, the Naval Commander's Award for Creative Thinking and the prize for the outstanding brigade project were awarded to four JCT graduates who had studied electro-optics and electronics and now serve in the optronics branch of the Israeli Navy's Combat Systems Development Department.

Lt. Col. Shmuel Ben Ezra, Maj. Elad Nissan and **Capt. Shai Tau** won the outstanding brigade project award for their applied electro-optic research, while **Maj. Dr. Benny Milgrom** won the prize for creative thinking for a project in the field of electro-optics.

At the ceremony honoring the prize winners, the special status JCT graduates have in the armed forces was made clear when then former Israel Navy Commander **Maj. Gen. Elazar Marom**, wondered aloud, "How is it that there are so many religious guys here?" and then answered his own question, "They're probably Machon Lev graduates."

Electronics and Electro-Optics in the Lead

Prof. Yaakov Friedman of the JCT's Mathematics and Physics Department, who also heads the Institute's research and development authority, notes that the most innovative fields in the defense realm are electro-optics and electronics.



"A very high percentage of the staff at the army's development centers are our electro-optics and electronics graduates" Prof. Friedman says. "The Academic Reserve soldiers who complete their studies at Machon Lev are in great demand by all the development units because of their high professional level and their great desire to contribute."

According to **Shai Gilboa**, the JCT's director-general and a graduate who retired from the IDF with the rank of colonel, Machon Lev graduates integrate quickly because they arrive with a strong theoretical engineering background as well as practical experience.

"Our graduates can be found in all the development units of the army and the defense establishment, including in the Prime Minister's Office and the Defense Ministry," says Gilboa. "You can find many of our graduates in the military industries and in Military Intelligence, which has absorbed many of our graduates – guys who attended our yeshiva high school and continued to earn their BA in computers and telecom engineering."

Another area in which JCT graduates are respectably represented is in the Defense Ministry's space program. Israel is one of only eight countries in the world with satellite launch capabilities, and the prestigious space project employs numerous JCT graduates at all levels, including the most senior levels.

There is also a significant JCT alumni presence at Mafat – the Defense Ministry's Weapons and Technological Infrastructure Development Administration, which coordinates Israel's entire security-related R&D. Some 20% of Mafat's staff members are JCT graduates.

Gilboa notes that the primary characteristic of JCT graduates is the high level of devotion to their army service.

"Our alumni see army service as an ideal and are prepared to invest far more than what is required of them in terms of effort and time," he said. "For JCT alumni, military service is not perceived as an obligation but as a privilege, and this is reflected in their work ethic and their readiness to fulfill any assignment. As a result, nearly every year JCT graduates win brigade commander prizes and awards for creative thinking."

Gilboa, who during his military service had many JCT graduates under his command, says, "The alumni I have encountered in the army are of very high quality, excelling in their understanding, creativity, and general contribution to the performance and capabilities of the systems."

The IDF top brass have a very high regard for JCT graduates, he says.

"In the army they understand that whoever finishes here is apparently serious, since he was prepared to devote half a day to Torah study, above and beyond the requirement for his degree," says Gilboa. "In general the army is very happy to take JCT alumni and many of them later undertake a lengthy career army service."

Experts in detectors and sensors

One of the areas in which Israeli defense industries are regarded as especially advanced is the field of detection and sensors, in which JCT alumni serve in a number of key positions. Expertise in this field is not limited to graduates; several JCT faculty members also play an active role in advanced systems development.

For example, the JCT's Electro-Optics Department has received a number of requests from the IDF and the Defense Ministry to develop infra-red applications. **Prof. Michael Manevich**, JCT's Head of the Micro-Nano-Technology Center, and **Prof. Naftali Eisenberg**, were partners in three different projects conducted by Mafat and Rafael Advanced Defense Systems. The projects are based on earlier developments of basic micro-optic technology for infra-red systems that had been funded by the Science and Technology Ministry.

"We are talking about secret, classified projects and we cannot elaborate on them," says Prof. Manevich. "We created the components and we can only guess what they might be used for. These are devices that represent a breakthrough in the field of micro-lens arrays."

"There are very few academic institutions in the world who deal with this field, and we are the leaders,



Maj. Eran Levy

particularly in the field of infra-red technologies," says Manevich. "The JCT's scientists in this field are of top international caliber and the components we developed are considered breakthroughs on a global level."

The team, who in addition to Eisenberg, comprised the late **Jack Broder**, **Dr. Salman Noah**, and **Felix Moshinsky**, used knowledge developed in the JCT's micro nano-optics lab, which specializes in optical materials and physics in micro- and nanotechnology.



Maj. Dr. Benny Milgrom

as the graduates of any other academic institution. Also, Machon Lev has an added value: It is the perfect place to actualize the value of Torah with Derech Eretz [the way of the world]."

Engelberg adds that "Machon Lev graduates provide us with a very strong foundation," noting that at least 20 officers in his unit are JCT alumni.

"The three previous heads of my division were Machon Lev graduates; one of them now holds a senior post at Mafat. In the unit there are other division and project heads who are Machon Lev graduates, and in the past we also had a department head from the JCT," he says.

Rapid development leads to the creation of new threats on the technological front, such as cyber-war, space warfare and the usage of advanced weaponry. JCT graduates will undoubtedly play a major role in maintaining Israel's technological superiority and will continue to do so as they always have quietly and discreetly.

Torah with Derech Eretz

The special status of Machon Lev graduates is attested to by **Maj. Yaakov Engelberg**, who serves in the Military Intelligence Directorate's Technological Unit. Every year, this elite unit generally accepts two Academic Reserve students from the JCT's Electro-Optics Department and another graduate from the Electronics Department.

"The fact that every year we take at least two Machon Lev graduates is evidence of the high level of their professional studies," says Engelberg. "Machon Lev graduates are as good

While there is a military ban on publicity regarding most of the projects initiated by JCT graduates and faculty members, some prize-winning projects have been recently revealed to the media.

The Hidden Periscope – An interesting development by one of the JCT's outstanding graduates, **Maj. Dr. Benny Milgrom**, who heads the electro-optics unit of the Israel Navy, is a periscope that allows naval commandos to see what is happening on the water's surface without exposing themselves. Milgrom received a special citation for his unique contribution to military technology. The system he developed markedly improves the commandos' capabilities and it has already been used in several naval operations.

Advanced night-vision measures: Among those who received the Technology Systems Award for leading officers was JCT graduate **Maj. Eran Levy**, who heads the Systems Engineering Division of the Technology Systems Unit. Levy, who studied in the JCT's Electronics Department in the Academic Reserves program, received the Chief of General Staff Award for Technology Systems for excellence in developing night-vision systems for the ground forces. He received the award from Chief of General Staff **Lt. Gen. Benny Gantz**.

Levy heads a department that develops night sights, lenses, heat-detection systems and other electro-optical systems. Among its other accomplishments, Levy's department succeeded in significantly reducing the size and cost of night-vision binoculars, which has enabled them to be deployed in a large number of military units.

Attesting to the success of the work done by Levy and his teams is the fact that the U.S. Armed Forces chose to equip itself with products produced by his division, preferring them over competing products made in the United States.

Light control systems for naval vessels – A common problem on naval patrol boats relates to the simultaneous use of powerful Xenon spotlights and night-vision binoculars. When the binoculars, which are used to amplify the light coming from the stars, were exposed to the intense light emitted by the Xenon lights, the inner tube of the night-vision glasses would burn out, taking them out of commission.

To resolve this problem, **Sgt. Meyer Malul**, a JCT optonics graduate who serves in the Academic Reserves, developed a mechanism that automatically controls both the Xenons and the night-vision binoculars, synchronizing their work and cutting both equipment and electricity costs. Malul was named the runner-up in the navy's Techno-Logistics Division's cost-cutting competition.

Malul began his studies at Machon Lev at the age of 19, immediately after immigrating to Israel from Morocco without his family. Though, at that time, he knew almost no Hebrew, he completed his studies successfully and is excelling in his military service.

Graduate News

Haredi women graduates of Jerusalem College of Technology branch help develop chip for Israeli defense industry space vehicle

By **JUDY SIEGEL-ITZKOVICH**, The Jerusalem Post

Two ultra-Orthodox women graduates of the Jerusalem College of Technology's Lustig Institute in Ramat Gan have helped develop a microchip produced by Verisense, a leading Israeli semiconductor-design company, for a defense industry company that will place it in a space vehicle. The haredi women, **Tehiya Dayan** and **Lior Halavi**, will receive their bachelor of science degrees in software engineering this week. The purpose of their project was to find out whether this chip designed by Verisense can be produced for operational use.

In recognition of their work, the two received awards from the CEO of Verisense, **Pini Lazovik**, and the project was chosen as an outstanding development project at the Jerusalem College of Technology (JCT).

The project was supervised by **Dr. Dan Buchnik** and involved the development of algorithms and methods for full coverage of the various modes of the microchip that will be placed in the space vehicle.

The purpose of the project was to ascertain whether this generically produced chip can be designed and developed for the simultaneous performance of multiple tasks and to prove that it can be produced for operational use.

According to Lustig Institute director **Dr. Zvi Ilani**, the project is one of many advanced high-tech projects that place its graduates at the forefront of high-tech in Israel and around the world.

In addition, Lustig graduate **Efrat Roth-Kamintzky**, received the Exemplary Project Development Prize from El-Op, another company that develops products for the defense industry. **Efrat Hoffman**, another graduate, received first prize for excellence in information systems from the Migdal insurance company, and

Hadas Tischler won international recognition for her research in the study of computer integration in brain research, the only Israeli research project chosen in the field and one of eight from around the world.

Lustig was established in 1999 as an academic institution for graduates of the haredi girls' seminary network Beit Ya'acov and offers academic degrees equal to those of the other JCT schools, including the Tal Institute for women, whose graduates are mostly modern orthodox.

Its counterpart for haredi men is the Naveh Institute, whose students learn engineering and other subjects in the evening, giving them the the option of studying for an academic degree while continuing their yeshiva studies. This special curriculum enables the haredi community to acquire the necessary tools to be employed at high levels within the workforce, helping them to support themselves and improve their economic situation while decreasing their dependence on state and other social support.



Tehiya Dayan and Lior Halevy

JCT Hosted Families from the South During Operation Pillar of Defense

During Operation Pillar of Defense, rockets hounded so many in the South and, for the first time in many years, also the center of Israel. However, whereas in the center there were many days of calm, in the South, there was barely a respite of one hour without the sound of sirens and everyone having to run for shelter. Soon after the announcement of the operation, JCT rapidly announced that it was opening its doors to anyone from the South who wished to find some solace and spend Shabbat at our Machon Lev campus.

JCT hosted families from the South, providing them with a calm atmosphere where they could escape the rockets and sirens. Together with the Habad house and members of the local community of Givat Mordechai, JCT provided meals and accommodation in order to ensure our guests a worry-free and relaxing break during such a worry-filled time.

We are thankful that our guests have since been able to return to their homes, and are also grateful for the great mitzvah such difficult circumstances allowed us to fulfill.

Henry and Betty Rosenfelder Award for Outstanding Research



This year's recipient is **Dr. Ronit Nossenson** who joined JCT two years ago, after working for several years as a software engineer at Texas Instruments and Flash Networks and as CTO at Exafer. Dr. Nossenson has headed JCT's Computer Systems Engineering undergraduate program and this year heads the MSc program in Telecommunications

Systems Engineering at JCT. In addition, she lectures on wireless networks, an advance networking course at the Technion, at IDC in Herzliya and at the Tel Aviv - Yaffo Academic College.

Dr. Nossenson has over 12 years of experience in the modelling and analysis of web traffic. Since 2005, she has been specializing in optimization and troubleshooting of data traffic over cellular

network, with tier-one operators' real traffic analysis (T-mobile Germany, T-mobile Austria, Omnitel and etc). She provides wireless technology research, consulting and teaching services to R&D departments of various companies, venture capital funds and operators. She holds a PhD on stochastic models for web servers and an MSc on incremental connectivity of a graph, both of which she received from the computer science department at the Technion.

Since moving to academia, Dr. Nossenson has been involved in numerous research projects and has published several papers. A paper which she presented at the Third International Conference on Access Networks in June 2012 was chosen as one of three to receive the Best Paper Award at the conference. This past year she received two research grants from the Chief Scientist through the Magnetron program. The areas of research she is carrying out include self-management of communication networks, resource management of cellular networks, transfer of video traffic over heterogeneous communication networks, routing of large ad-hoc networks large and queuing models for communication networks.

Nursing school graduates receive highest grades

The first two graduating classes of Machon Tal's nursing school have succeeded in achieving highest average marks in the national nursing licensing examinations as well as an overall 100% pass rate. The nursing school opened five years ago, combining the ideal combination of caring and skill to produce the finest nurses, and is already the second largest nursing school in the country.

Meanwhile, a two year upgrade course for the academic BSN level has opened for registered nurses. Over 120 nurses applied for the program which opens this month with a second program opening in September to meet the demand. In addition, some 300 women are studying for a BSN at the nursing school in Jerusalem and 100 women are studying nursing at its branch in Bnei Brak.

Headed by **Dr. Chaya Greenberger**, who formerly was the Director of the Israeli Ministry of Health's Nursing Division Accreditation and Licensing Department, the curriculum includes theoretical and practical studies in a variety of areas, including the latest developments in the healthcare sciences. Unique to the program, is the fact that the students spend a part of their day in Jewish studies courses, resulting in nurses who are not only technically proficient, but are also filled with critical Jewish values and ideas. The school plays a major role in solving the ongoing shortage of qualified nurses in Israel due to an increase in the number of seniors in Israel.



Entrepreneurship at JCT

JCT has initiated an entrepreneurship program funded by the **Friedberg Foundation** of Toronto. This program aims to encourage commercial entrepreneurship among JCT students and assist them in realizing their ideas. Students selected to participate in the program will receive initial funding for their proposed project and will take part in an entrepreneurship course, led by successful entrepreneurs who will also be available for mentoring. The students will also visit leading start-ups and high-tech firms in Israel and receive support for the project in its initial stages in the business world.

The students will be assisted in moving their ideas from the concept stage through development of a business plan, prototype, initial marketing and concept testing. At the end of the program, the projects will be reviewed by judges and those thought to be worthy will be invited into JCTech's accelerator to continue developing their venture. (JCTech is JCT's tech transfer company.) During this period the students will receive a small grant and lab space and will benefit from JCTech's expertise and mentorship to advance their projects.

The Mark Schuman Center for Entrepreneurship has sponsored a series of workshops for students, in which various business, technological, financial and legal aspects of starting a new business venture were discussed. Visiting guest lecturers, including **Yaacov Ben Yaacov**, a graduate of JCT who is both a pioneer in the commercialization of digital photography (founder of Picturevision) and media storage (founder of CatchMedia), have inspired the students with their success stories. Other speakers were **Bob**



Rosenschein, founder and former CEO and chairman of Answers.com; **Moti Hazan**, the head of the Jerusalem Development Authority; **Daniel Schreiber**, founder and CEO of PowerMat and the former Senior Vice-President of Corporate Marketing at Sandisk; **Ed Mlavsky**, founder of the Gemini Fund; **Boaz Arnon**, founder and CEO of Real Imaging, supermarket mogul **Rami Levy** and **Stef Wertheimer**, founder of Iscar.

The annual competition for best student final project, including cash prizes for the winners, took place earlier this year. First prize went to students from Machon Tal, who explored technology currently used in the aeronautics industry in Israel and identified other industries in which the technological capabilities of the project could be beneficial. Their suggestions were adopted by the firm, Siliac Ltd. and, in fact, have already led to the expansion of the firm's customer base. Second prize was awarded to teams both from Machon Tal and Machon Lev. The Machon Tal team dealt with the possibility of expanding the market share of a small banking institution in Israel with regard to the religious and Haredi sectors, whilst the students from Machon Lev examined the opportunities of expanding the market for an internet provider that offers services to the religious community, allowing for an internet surfing experience while blocking inappropriate websites.

As part of its commitment to helping others, the Mark Schuman Center has funded training in social entrepreneurship to Shekel, a NPO that provides services to individuals with physical and mental disabilities. The Center has also recently teamed with the Jerusalem Business Networking Forum and is hosting its monthly events. Recent guest speakers included **Professor Benjamin Lichtenstein**, Entrepreneurship Program Director of the University of Massachusetts in Boston who spoke on *Novel and Effective New Ways to Fund Start-ups*.



Stef Wertheimer addressing JCT students

TINY PARTICLES, MASSIVE POTENTIAL

by Shira Yehudit Djalilmand
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THE WORLD OF NANO HAS ALWAYS BEEN HERE - IT'S JUST SO TINY THAT UNTIL RECENTLY WE DIDN'T HAVE THE TECHNOLOGY TO SEE IT. NOW THAT NANOTECHNOLOGY IS MAKING POSSIBLE THINGS THAT A FEW DECADES AGO WOULD HAVE BEEN SCIENCE FICTION, WILL THE WORLD BE A BETTER PLACE, OR WILL NANOROBOTS RUN RIOT THROUGH THE BIOSPHERE?

In protective white overalls from head to foot, I felt like an astronaut about to enter space. But the world I was about to enter — the “clean room” in the laboratories of Jerusalem College of Technology’s Micro-Nano Technology Center (MNTC) on the Machon Lev campus — is just as awe-inspiring. This room contains the research center’s most precious resource: nanoparticles, which measure just a millionth of a millimeter and are the building blocks of nanotechnology. And the space suit? Not to protect me, but rather to protect the nanoparticles.

Because they are so tiny, the air has to be kept absolutely clean to ensure the nanoparticles are not damaged. **Rabbi Dr. Avi Karsenty**, senior lecturer and researcher at the Micro-Nano Technology Center, who was conducting Mishpacha’s tour of the laboratories, put it into perspective: “For a nanoparticle, being hit by a grain of dust is like having a huge concrete block smashed over your head.”

I had arrived at the laboratories as part of my quest to explore and understand the rapidly developing and fascinating world of nanotechnology. My guide, Rabbi Dr. Karsenty, is both a rabbi and scientist. His rabbinical responsibilities include serving as rav of a kehilla and beis medrash in Jerusalem for over ten years, where he gives many shiurim. His scientific credentials include a double PhD in applied physics, and 22 years working in micro- and nanoelectronics at hi-tech corporations, including 16 years at Intel. He joined JCT in 2011. It is a college, he said, where he can identify with its values — Torah and science, in that order.

TALKING SMALL What, exactly, is nanotechnology? “Nano” comes from the Greek word for dwarf. Nanotechnology literally means the technology of very small things. How small? Almost unimaginably so — a nanometer is one-billionth of a meter, or one-millionth of a millimeter. That means that the nanoscale is a thousand times smaller than the microscopic scale (a millionth of a meter), and a billion times smaller than the world of meters in which we live. To put it in perspective, think of all those astonishingly detailed photos of microscopic creatures we have grown accustomed to seeing — and realize that they are large in comparison. On the nanoscale, we cannot only see the atoms from which everything is made, but also move them around — and in so doing, create all kinds of fantastic new materials, atom by atom.

Playing around with atoms might sound like some kind of science fiction fantasy. But nanotechnology is neither fiction nor fantasy. It’s here today, and it’s all around us. In fact, nanomaterials are already present in over a thousand consumer products in regular use, from cosmetics to cars. And if we look around us, we’ll find that we are literally surrounded by nano products. The microchip in our computers is most likely a nanochip, while our cell phones, digital cameras, and MP3 players also make use of nanotechnology to store photos and songs. We also could be wearing nanotechnology clothes, walking on a nanotechnology rug, or hauling nanotechnology luggage to the airport. All these items are made of fabrics coated with nanowhiskers — tiny surface fibers that are so small that dirt can’t



get past them, which means that our clothes, rugs, and luggage stay clean.

When we step into a bus, we're probably stepping on an anti-slip step coated with a nanomaterial. Both the scratch-resistant bumpers of our cars and the scratch resistant sunglasses we wear while driving are created using nanomaterials.

Many of today's rust-resistant paints owe their existence to nanotechnology, while the self-cleaning glass now used in many homes and offices comes from the same source. Nanotech materials are also

being added to health and fitness products, such as sunscreen and what might turn out to be the 21st century's greatest invention — anti-odor socks.

WHERE THE RULES CHANGE

What makes it possible to build these new materials is a seemingly bizarre feature of the nanoscale, the fact that many substances behave differently in the world of atoms and molecules. "We play with atoms and see how Hashem created the world in the nanoscale," said Dr. Karsenty. "But we don't always get what we expect. You can hypothesize about what a substance will do on the nanoscale, but it might turn out to be entirely different. It's very exciting."

For example, carbon, which is usually very soft, becomes incredibly hard and strong when it's formed into a nanoscopic tube. Gold, usually a solid substance, can be stretched on the nanoscale, while the greenish metal copper becomes transparent. A nanoparticle of silver will stay silver, but changes its behavior due to its infinitesimal size.

If substances behave so differently on the nanoscale, how do

scientists predict their behavior? "Nanoscience is not an Indiana Jones adventure, when you wait for surprises to happen," said Dr. Karsenty. "Everything is well planned and based on mathematical equations and theoretical principles developed and discovered along the years." Yet he admits that there are still sometimes surprises.

Why, though, do the rules change just because things are small — albeit really small? There are various reasons. Gravity has much less effect on such a tiny scale, and so other forces become more important, such as the electromagnetic force between the atoms and the thermal vibrations between them (the energy given off by the atoms' movements).

But the bottom-line answer to why the rules are different on the nanoscale is simply that this is how Hashem created the world. As Dr. Karsenty explained, "You could ask that question about the mega scale too. We all understand that in space the rules are different, for reasons such as the lack of gravitational force from Earth, the vacuum environment, and the huge distances between planets. Thanks to years of research and sending satellites and spaceships, we can discover what's far from us. Now we're discovering new laws in the nanoscale. The world is complex, and even if each part is governed by its own laws, scientists are still trying to discover uniformity across Creation through common principles."

MINIATURE LEGO

It's those bizarre changes in the properties of substances on the nanoscale that make nanotechnology so exciting — and so useful. Building with nanomaterials is the job of the nanotechnologists, and just like any other building job, it requires tools. Instead of cranes and tractors, nanotechnologists' tools of the trade are microscopes — but not the everyday microscopes you'll find in school laboratories. Indeed, I never could have imagined the instruments I saw in the JCT laboratories. Already feeling like an astronaut in my space suit, within the laboratories, surrounded by a mass of machines, each one stranger than the last, with cylinders of frozen nitrogen seeping out dry ice, it wasn't hard to imagine myself within some science fiction fantasy world.

But these machines, which are real, are made to measure not vast distances between planets, but the infinitesimal distances between atoms. The STM (scanning tunneling microscope), the AFM (atomic

FROM SWORDS TO SCANNING

The nano world is nothing new — after all, it's a part of the Creation. In fact, craftsmen in the ancient world created many items using nanoparticles. Damascus steel swords a thousand years old got their renowned strength and sharpness from nanoscale structures within the blades. The ancient Mayans produced rust-resistant pigments by combining nanoparticles of clay and indigo dye, while the metallic luster of Renaissance period pottery was achieved by mixing in nanoparticles of copper or silver.

But these craftsmen, skilled as they were, didn't know that they were working with the nano world. It's only in the last 30 years that man has developed tools capable of both viewing and manipulating atoms and molecules on the nanoscale and the science of nanotechnology has developed.

Although he never used the term "nanotechnology," physicist Richard Feynman first discussed the concept in a lecture in 1959, where he suggested that eventually it would be possible to manipulate atoms and molecules and use them to build machines. The person credited with first using the term "nanotechnology" to describe engineering on the billionth-of-a-meter scale was Eric Drexler in his 1986 book *Engines of Creation*. Although the book was criticized for overdramatizing the possible dangers, it was highly influential since it brought the concept of nanotechnology to a much wider audience.

With the invention of the scanning tunneling microscope (STM) in 1981 by two IBM researchers, for which they received the Nobel Prize in physics, it became possible to actually view atoms on the nanoscale. The nano world was now there for all to see — and for scientists to explore and exploit, hopefully for man's benefit.

force microscope), and the HRTEM (high resolution transmission electron microscope) employ various principles of physics to view, measure, and move atoms on the nanoscale. Both STMs and AFMs possess super-thin probes — just a few molecules thick at the tip — which are used to push the atoms around.

The HRTEM doesn't physically touch the atoms, but sends a beam of electrons that penetrates the atoms and reflects back, thus producing an image of the atoms on the computer screen.

The images on the screens in the JCT laboratories were bizarre, wildly colored and shaped structures — images that might be mistaken for abstract art if not for their absolute precision. Most famously, an STM was used to produce the iconic IBM logo in 1989, where 35 atoms were manipulated to spell out the company's initials.

The super accuracy of these microscopes is essential to the work of nanotechnology, which is to build new structures and is called “nanofabrication” or “nanomanufacturing.” “Imagine you're building a huge skyscraper,” said Rabbi Karsenty. “An error of a few millimeters is not so terrible — but on the nanoscale it would be catastrophic.”

Surprisingly perhaps, building using nanotechnology is not so different from building anything else, be it Lego or an entire city. “It's just like an architect who's planning a big city with skyscrapers and roads, and he has to choose the best materials for each purpose,” explains Rabbi Karsenty.

That plan has to be absolutely exact, with all the right materials in the right amounts. As Dr. Karsenty put it, “If Bubby adds more salt and spice to the cholent, nothing would happen except that the cholent would taste different. It's her personal recipe. But in nanotechnology, if you change the amount of one small ingredient, you can reach a catastrophic situation. Here it's Hashem's recipe.”

After the modeling stage comes the actual building, which is done by moving around atoms to form the required structures. In the JCT laboratories, for example, which concentrate on nano-optics, scientists such as Dr. Karsenty “build” tiny lenses by coating them with a nanolayer of aluminum. A large, oddly shaped machine in the “clean room,” called a vacuum aligner, is used to deposit those layers. After that, the structures are photographed and copied by yet another bizarre machine, the mask aligner, in the “yellow room” — so-called because of its special yellow light; regular white light can damage the sensitive nanoparticles. Aside from these futuristic devices, there are “fridges” to keep the nanoparticles cool and “ovens” to heat them.

These bizarre devices are just some of the many tools of nanofabrication. But building a nanostructure is a little different from building an office block. Unlike a conventional building, which requires a layer of concrete and then a layer of steel, the nanoscale is not so logical and structures can have all kinds of weird and wonderful forms.

ALL IN THE MASTER PLAN All this talk of manipulating atoms, the universe's building blocks, raises a philosophical question: Is man overstepping his bounds by manipulating G-d's world? According to Dr. Karsenty there is no contradiction between Torah and science, which he says are complementary — Torah helps us to understand the natural world, and the natural world helps us to understand the Torah. Nowhere is this shown more clearly than in the field of nanotechnology,

where some of the most successful applications have actually been copied from nature.

For example, Kevlar, a material used for everything from flak jackets to frying pans, gets its superior strength by copying the unique cross-linked molecular structure of natural silk. Lotus leaves have special nanostructures on their leaves that repel water, and because the water carries away dirt with it, the lotus leaves remain spotless; nanotechnologists have copied these nanostructures to produce self-cleaning windows.

Another example is the cyphocilus beetle, famous for its brilliant white color. Scientists discovered that this unique color is thanks to the nanostructure of the molecules within the beetle's scales, which scatters almost all light. By mimicking this structure, nanotechnologists can now produce white paint and paper without the need for the potentially toxic pigment commonly used.

And then there is the gecko lizard. Teams of researchers have turned to geckos and even mussels to develop adhesives that stick to both dry and wet surfaces. They discovered nanofibers in the geckos' foot hairs that allow the lizards to cling upside down to pretty much anything, while mussels use their nanoscale structures to glue themselves to underwater rocks.

Nanotechnologists are brilliant scientists, but even they copy the great designs that are already a part of the blueprint of the world.

STAIRWAY TO SPACE

In the 30 years since nanotechnology was conceived, the number of applications for the technology has gone far beyond even a scientist's dreams. And the future of nanotechnology seems to be even more promising. “Once you can control how atoms work and manipulate them, there is no limit to the applications,” enthused Rabbi Karsenty. In fact, in this case, one could say the sky is definitely not the limit, since NASA scientists have recently proposed that nanotechnology could be used to build a giant elevator stretching all the way from Earth into space. It might sound like science fiction, but the technology is already there. Carbon nanotubes — rod-shaped carbon molecules just one nanometer across — are incredibly strong and can be grown into fibers of any length. Such a “stairway to space,” says NASA, could shuttle equipment and people up and down, eliminating the need for expensive rocket flights.

Factories as we currently know them may also soon be a thing of the past. Researchers are developing methods that would allow nanofactories to produce just about anything. The difference would be that each product would be atomically perfect, with every single atom in exactly the right place — the ultimate in quality control. Once the nanotools are automated, there



would be no need for manual workers. Technicians would simply feed in a molecular blueprint and come back the next day to pick up the product.

An even more fantastic-sounding future use is nanotelepathy. In this synthetic telepathy a nanochip implant in the brain would enable a person to make contact with anyone else who also has had an implant, wherever they were in the world, simply by “dialing” them up like some kind of futuristic cell phone. The implant would also give access to the other person’s emotions and memories — all without exchanging a word. Whether we want it or not, the technology is almost ready. A team of scientists have already successfully created a chip that can be used as a storage device for long-term memories. The scientists were able to record, download, and transfer memories into other people who had the same chip implanted.

THE DANGERS Such “brave new world” inventions inevitably raise questions and red lights. Do we know enough about the potential risks, and do the benefits outweigh those risks? Chemical pesticides weren’t considered dangerous until after many decades of use. Could the same happen with nanotechnology?

There is still a serious lack of research in the area, but some research has shown that nanoparticles are more reactive, more mobile, and more likely than larger particles to be toxic to humans and the environment. Other research suggests that some types of nanoparticles may have effects that can contribute to cancer and cell death. Indeed, some materials have already been proven dangerous.

But it’s not in the laboratories that the real dangers may lie. The ultimate nano nightmare, the risk of “gray goo” first outlined by Eric Drexler, an early pioneer of nanotechnology, presented the frightening image of nanobots — tiny bio-robots running riot through the biosphere, gobbling up every living thing and leaving nothing but “gray goo.”

That scenario may be exaggerated, but the risks are there. For example, no one really knows how stable the nanoparticles used in nano food packaging are. Do they stay in the packaging or could they seep into the food and thus into our bodies, and if so, what damage could they cause? Sunscreens using nanoparticles are feared to be toxic if they seep through the skin and reach living cells — so much so that last year the Australian Education Union forbade their use in all educational institutions. The same goes for all cosmetics. From 2013, EU regulations will require all cosmetics using nanoparticles to say so on the label. But without any real knowledge of the effects of the nanoparticles, the labels may not help.

Nano brain implants have great potential for healing neurological diseases such as Parkinson’s. But the same technology also has terrifying ramifications. It provides an extremely powerful means for exploiting, harassing, and controlling a person’s mind — and the human brain has no “firewall” to shut out unwanted intrusions. “Hearing voices” could become a nightmare reality.

And even those wonderful odor-free socks might not be all that wonderful. Scientists don’t know what happens to the thin layer of silver nanoparticles after the fabric is washed. Will it cause a buildup of toxic waste, or even seep into the person’s skin? We might find out that those smelly socks are better, after all.

NANO IN OUR LIVES



Today, nanotechnology is being used to benefit mankind in almost every area of life, from medicine and food to helping us preserve our environment. Here are just a few of the many examples of applications of nanotechnology.

NANO MEDICINE

Treatment of cancer - Nanotechnology is already being used to treat cancer and a method is being developed where nanostructures can hunt down tumors in the body. Scientists are also working on a form of chemotherapy using nanotechnology that attacks cancerous cells only.

Drug delivery - Drug devices made from nanodiamonds, which prevent medicine from being released too swiftly into the blood stream, can implant months of medication in one go.

Flu diagnosis - A cheap, fast, and accurate method to diagnose flu has been developed, using nanoparticles of gold, which react to the presence of viruses.

Genetic disease testing - In the next decade, there may be tests that employ nanotechnology to show if a person is predisposed to diseases such as cancer and Alzheimer’s — and even correct the faulty gene.

Organ transplant - By using a patient’s own stem cells, with the help of nanotechnology, researchers have already successfully grown human bladders and even hearts.

NANO FOOD

Nanomodification of seeds - Engineering on the nanoscale can enable the DNA of seeds to be rearranged to give plants different properties, such as color, yield, etc.

Food fortification and modification - Processed foods can be fortified with nanoencapsulated nutrients, while fats and sugars can be removed - so much so that even junk food could be marketed as fiber enriched and fat and sugar free.

Smart foods - Companies such as Kraft and Nestle have already designed “smart foods” that can interact with consumers to personalize them, changing color, flavor, or nutrients on demand. Smart food could also sense when someone is allergic to a certain ingredient and block that ingredient.

Smart packaging - Mars has already patented an invisible, edible nanowrapper that envelops food, preventing gas and moisture exchange and thereby extending shelf life.

NANO AND THE ENVIRONMENT

- ✱ Solar-powered robots called Seaswarm that use oil-absorbing nanowire, which are now in development, could clear up an oil spill involving millions of barrels within just one month.
- ✱ The life of batteries and solar panels using nanotechnology can be extended immensely.
- ✱ Wind turbines using nanomaterials are more efficient and cheaper.
- ✱ Nanotech water filters and converters remove pollutants from waste, water and exhausts.

LEARN & EARN

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THE MORNING

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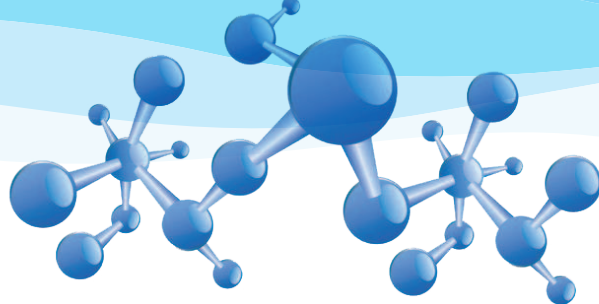


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The Jerusalem College of Technology

On Campus



New Department of Bio – Informatics at Machon Tal

The Department of Bio – Informatics at Machon Tal is to open in October 2013 and will be headed by **Prof. Uziel Sandler** and coordinated by **Dr. Sarah Ganot**. Graduates of the program will receive a BSc (Bachelor of Science) degree.

Bio - informatics is a fairly new field which was initiated when biological data was first entered into a computer. Personnel working in the field of biology incorporated computers and mathematics and personnel working in the field of computer science incorporated biology.

Today there are more algorithms which allow significant information from accumulated data to be generated. For example, scanner software was written for scanning giant databases and produces new information, which is the basis for further research and development. Bio - informatics is a field of biology that uses computational tools to solve problems. Bio - Informatics is multi-disciplinary and is the interface between mathematics, computer science and biology, especially in the field of molecular biology.

Molecular biology is theoretical and experimental science. Mathematics and computer science are analytical sciences and theoretical in nature. The trick is to combine the fields.

Computational biology plays an important role in the process of drug development and in research and development. The

pharmaceutical industry worldwide is growing and becoming one of the largest and most important industries. This industry makes extensive use of Bio-Informatical techniques. In addition there are many other areas related to the research and development of computational approaches.

A research group at the Jerusalem College of Technology has attained impressive achievements in developing bio-informatical methods and they will be responsible for carrying out the bio – informatics curriculum. The curriculum focuses on the logical design of drugs. The program is diverse and will allow students to specialize in cutting-edge science in their undergraduate degrees and continue their research in more advanced degrees in other scientific fields. In addition, the program is suitable for those who find the field of the logical design of drugs interesting and challenging as well as for those looking to combine Computer Science and Life Sciences. The program is also for those who wish to study biology, but wish to finish their schooling with a profession (high-tech) as well as for those who want to learn computers, and simultaneously gain knowledge in biology.

Students can also follow this bio-informatics curriculum as part of Pre-Medicine course requirements before going on to four year medical school programs for those holding graduate degrees.

Nursing Room at Machon Tal Dedicated in Memory of Astrid Dana-Picard z"l

A nursing room for young mothers at Machon Tal was dedicated in memory of **Astrid Dana-Picard z"l**, mother of **Prof. Noah Dana-Picard**, president of JCT. The new room allows young mothers studying at Machon Tal to fulfill the roles of mother and student, both of which are extremely demanding.

The nursing room was made possible thanks to a donation from the Dana-Picard Family. The dedication was initiated by **Carole Dana-Picard**, wife of Prof. Dana-Picard and daughter-in-law of Astrid Dana-Picard. Astrid Dana-Picard z"l was born in France and lived there during the Second World War, at which time she helped her fellow Jews in hiding, and distributed matzot which her father managed to produce on her bicycle. After the war she was involved in the establishment of a youth movement and decided to study law to spend more time with her lawyer husband, Roland. Her children were born during her law studies and early professional activity. She shared her time between her family, taking care of her children and later her grandchildren, and her profession. She was an active volunteer for JNF (the Jewish National Fund) and for various social organizations.

Today, in commemoration of her benevolence and thanks to Carole's generosity, these mothers have a small corner where they can escape the burden of academia and spend a few peaceful moments with their little ones.



From L-R: Carole Dana-Picard, Noah Dana-Picard, Marc Dana-Picard, Frederique Elbeze, Claire-Nadine Dana-Picard

Professor Manuel Trajtenberg's Visit to Machon Lustig

The Planning and Budgeting Committee Chairman of the Council for Higher Education, **Prof. Manuel Trajtenberg**, recently visited Machon Lustig – the first institution for Haredi (Ultra-Orthodox) women to combine religious education and personal progress for the wives of Talmidei Hachamim (Torah Scholars), incorporating an academic education at a high level with the ability to integrate and attain senior positions in the marketplace.

Prof. Trajtenberg met with graduates including **Dr. Hadas Tischler**, who won international acclaim for her research on "The Effect of Magnetic Stimulation on the Normal Functioning and Parkinson's Inflicted Brain." at a prestigious conference on brain research in the U.S. She was the only researcher from Israel to be chosen, and one of eight from around the world. **Efrat Roth** who won the prize for Outstanding Project from the El-Op Company, and works on the development of intelligent optical systems for the defense forces was also present.

Professor Trajtenberg praised the Haredi graduates, wives and

mothers, who reached such a high level of excellence and were able to integrate and attain senior positions in academia, industry and defense.



Rav Dr. Ilani, Head of Lustig Institute with Prof. Trajtenberg

Farewell to Prof. Abba Engelberg.....

Prof. Abba Engelberg, who has been with the Jerusalem College of Technology since its inception, retired from his position as Head of Machon Tal at the beginning of the academic year. Prof. Abba grew up in Cleveland Ohio, where he studied at Telz Yeshiva and later followed in the footsteps of his father, himself a big believer in the combination of Torah and Science, and enrolled at Yeshiva University (YU) in New York. Prof. Abba earned a BA in Mathematics and received his MA and PhD from NYU, while studying to be a Rabbi. When asked why he chose to study Mathematics he replied,

"I wanted a profession that would allow me to learn as much Torah as possible." For his second and third degrees, Abba chose the field of Industrial Engineering, specializing in Operations Research. During the course of his studies he married and served as the Rabbi of a community for a year. In 1982, he and his wife Ruthie decided to make Aliya. They have four sons, two of whom are JCT graduates.

He joined JCT as a lecturer in the Computer department at Machon Lev, which he headed for eight years. After a five year stint at the Bank of Israel, he helped establish the Department of Industrial Management at Machon Lev, before becoming the founding head of Machon Tal in 2000 when it opened in Beit El with only 20 students. Today under his skillful leadership, Machon Tal has over 1,300 women studying in a wide range of programs.

Prof. Abba Engelberg has greatly contributed to the growth and success of the Jerusalem College of Technology and we wish him good fortune, rest and enjoyment in this new chapter of his life.



.....and welcome to Eti Stern

Eti Stern was recently appointed Head of Machon Tal. Eti has a bachelors degree in Tanach and in computer science, as well as an MBA, and has had many years of experience as a senior manager of information systems, most recently at Migdal Insurance where she headed the Software Division. Eti, aged 46, has five children and one grandchild and lives with her family in Givat Shmuel.



Perot Hailan

This year, JCT and the Perot Ha-Ilan Scholarship Fund in memory of **Lt. Col. Ilan Raiz z"l**, continued their tradition of providing scholarships to outstanding students from the Ethiopian community studying in the Atuda (pre-military) program at JCT. The event, at which 33 scholarships were awarded, was held in the Mevaseret Zion Absorption center and included many moving speeches from Knesset members **Lea Shem-Tov** and **Shlomo Mula**, donor **Jack Lahav**, **Lea (Lali) Raiz**, the wife of the late Ilan Raiz z"l and Rachel Adesso, a recipient of the scholarship.

The Perot Ha-Ilan Fund was created in 2009 at JCT and was founded by Ilan's widow, Lea (Lali) Raiz, together with her parents, **Bella and Meir Steiner**. Lali and her parents approached JCT after hearing about our "Education for Ethiopians" program, an initiative intended to support students from the Ethiopian community and assist in the integration of Ethiopian immigrants into Israeli society.

Among the attendees were two Knesset members, Lea Shemtov and Shlomo Mula both of whom expressed the importance of the assistance JCT provides their students from the Ethiopian communities. Lea Shemtov, former chairman of the Absorption and Immigration Committee, and an immigrant herself, reminisced about her own Aliya 33 years ago, and stressed the importance of integrating into the Israeli community and the importance of the assistance JCT provides in order to achieve that goal. The event also brought back memories for Shlomo Mula, former Vice Chairman of the Knesset for the Kadima party, himself an Ethiopian immigrant. Shlomo Mula stressed the importance of the integration of the Ethiopian community, stating that it is education that helps members of the community become leaders for equality, and that JCT's efforts in educating members of the Ethiopian community

plays a large part in achieving equality and integration. Addressing the students, Mula stressed that although their success is a personal one it also serves as a "guiding light" for the Ethiopian community.

Rachel, a student in her third year of Nursing at Machon Tal and a scholarship recipient, was the student representative at the ceremony. She stressed that the scholarships, which allow her and the other students to realize their dreams and ambitions, impact

the lives not only of the students, but also of their families and the community as a whole. She emphasized the importance of these scholarships in "stabilizing the homes we have and in shaping and securing the homes we create." Bursting with emotion, Rachel thanked JCT not only for helping form "our career paths but also our personalities." Last year, Rachel stated she and several others enlisted in order to encourage others from the Ethiopian community to join them on this important

journey in order to realize their dreams and ambitions.

This ceremony was especially moving due to the impact these scholarships have on the lives of our students and since it marked four years since the death of Ilan Raiz z"l. As Lali stated in her speech, in the agricultural world and with regard to Ilanot (trees), the fourth year is that of Neta Revai, in which the fruits reach a stage of maturity and Kedusha (sanctity) and it was in this year that Ilan's oldest son, Itai, reached the age of maturity and Kedusha when celebrating his bar mitzvah. Ilan's absence was deeply felt when Itai and his younger brother Arel (11) recited kaddish.

This year's scholarships were donated by the **Mincha LeMechora Foundation**, **Migdal Insurance**, **Telfed - the South African Zionist Federation (Israel)** and the **Sapir** and **De Haan** families.



Lea Shem-Tov with students



Michal Amit Freedman, CEO Mincha LeMechora



Zvi Green and Roi Sher presenting Rachel with a scholarship on behalf of Telfed

Reuven Surkis retires



Reuven Surkis recently retired as the Senior Vice President for Development and External Affairs at JCT after fifteen years. During this period Reuven was instrumental in raising millions of dollars for scholarships, especially for students from the Ethiopian community. The Ethiopians for Engineers program he established was the first of its kind and thanks

to Reuven's efforts, JCT has over 100 Ethiopian graduates, many of whom are now continuing their studies towards attaining a master's degree. Most of them are pursuing professions either as career officers in the IDF or in high-tech and accounting. In appreciation of Reuven's tremendous contribution, JCT will be naming this program in his honor.

Reuven was also responsible for raising funds for the construction

of many of the buildings on the Machon Lev campus housing lecture halls, classrooms, laboratories, dormitories, dining hall and a gymnasium. Not only did Reuven raise funds for the Beit Midrash, he also worked closely with the artist who designed the beautiful Aron Kodesh and stained glass windows depicting the tribes of Israel.

Reuven worked closely with president emeritus **Prof. Joseph S. Bodenheimer** and current president, **Prof. Noah Dana-Picard** to help JCT grow and develop into the institution it has become. During trips abroad to Europe, the United States, Canada and Australia, he succeeded in bringing many new friends and supporters to the college who have helped to advance JCT's mission to educate students who can combine their profession with a Jewish way of life.

On behalf of all of the students and faculty, we wish to express our deep appreciation for all Reuven's efforts on JCT's behalf and wish him many years of good health together with his wife, Channa, his children and grandchildren.

Helping those in need

An article appeared recently in Yediot Yerushalaim, which examined the socio-economic status of students in various institutions of higher education in Israel. This article revealed that the Jerusalem College of Technology (JCT) has the highest number of underprivileged students of all the universities in Israel. Unlike its counterparts, such as the Hebrew University and Bezalel, which cater to those with higher socio-economic standing, JCT has a staggering 17.7% of students from the three lowest rated socio-economic areas.

The division into socio-economic areas, instigated by the Department of Education, is based on several factors, one of the main factors being the gross income of men and women in every area. The levels and data presented in the article are based

only on students beginning their first year of higher education for the year 2011-2012 who graduated 12th grade from a high-school recognized by the Department of Education. Olim (new immigrants to Israel) who finished high-school overseas, Haredi (Ultra-Orthodox) and students who did not finish their high-school studies in a recognized Israeli high-school were not included. In view of this, and as a large number of JCT's (Jerusalem College of Technology) students are Haredi and Olim, the percentage of underprivileged students is even greater than the numbers revealed in the article.

JCT realizes the necessity of reaching out to those from all underprivileged sectors and assisting them in bettering their socio-economic standing and prides itself on this accomplishment.

International school

The International School at JCT offers English speaking students an array of courses in English. In the spring 2013 semester fourteen courses in Math, Physics, Computer Science and Business will be available. Currently, students can enroll for a full business degree in English and can also take introductory courses in Computer Science/Engineering. The Beit Medrash offers two shiurim in English, a basic level shiur as well as an advanced level shiur. For more information please visit www.international.jct.ac.il or email: international@jct.ac.il

Rabbi Hershel Schachter,
Rosh Yeshiva at Yeshiva
University gives a shiur
to students of the
International School



Generative Leadership: How to Innovate with Fewer Resources

by Benjamin B. Lichtenstein



Even as the economic decline is restricting sales and growth, the need to stay competitive in the global marketplace is increasing. For IT and high-tech companies, the key is to generate higher and higher levels of innovation while using fewer and fewer resources. Achieving this is simply not possible by traditional management style analysis, or by “shared” or “distributed” leadership. How can such high levels of innovation be achieved in the face of shrinking budgets and limited room for new contracts?

According to traditional views, leadership is something that someone ‘has’ – a resource they can use, inter alia, to increase productivity. Within this framework,

innovation originates from an individual or from a group, with executive leaders influencing those individuals to perform their best. However, recent research into complexity science suggests that the focus on “heroic” leaders actually reduces innovation and drains innovation potential from our endeavors. What is a different approach?

An alternative strategy is called Generative Leadership. In this new analysis, leadership influence is not ‘in’ a person, but emerges from the interaction between people. That is, whenever two people interact they both influence each other – thus they each generate leadership for the other. From this perspective, leadership emerges in the space

between people, as they interact. This interpretation of leadership as a generative process has important implications.

First, an awareness of the potential two-way influence (leadership) in any interaction means that the origin of innovation can be any given comment, from any conversation, . Rather than innovation being 'led' by managers, innovation becomes more like an ecology – an ecology of innovation – that encompasses every interaction. For example, a simple remark by an associate could inspire an alternative version of an idea you've been working on; when you mention the new idea to another colleague she is also influenced, and her response may further catalyze your ideas. All of these are leadership events that are continuously emerging through the ecology. In this sense, innovation originates in the web of relationships which connect colleagues to each other and to their environment.

Generative leadership highlights the way that innovation may not be led by any one individual but instead emerges through interactions at every level of the organization. Generative leadership focuses on the mutual influence that occurs within every exchange. Rather than concentrating on how a supervisor wields influence over an employee, generative leadership sees them both as expressing leadership. This kind of mutual interchange creates new opportunities that increase the organization's potential for novelty, flexibility, and growth.

In the long term this approach can have non-linear effects, whereby small inputs can achieve much larger outcomes. Once an ecology of innovation is developed within an organization, senior managers can encourage

their employees and colleagues to create experiments in novelty – allowing any comments and ideas to become the seeds for new possibilities. By developing systems and processes of support and resonance, these experiments can materialize into tangible innovations. As before innovation emerges from the ecology, and not from individuals.

Finally, complexity science has expounded on these mutual interactions which give rise to innovation. Research shows that it is the differences between agents—their diversity of expertise, perspectives, organizational experience, social background, and heritage—which generates the potential for innovation, because difference allows for unanticipated outcomes. Of course, this is magnified many times through the interactions in a company within its ecology of innovation. In this way, generative leadership can provide far more innovation and novelty. By implementing the tools of generative leadership, high-tech companies can increase innovation without increasing budgets – a powerful strategy during these challenging times.



Benjamin B. Lichtenstein is a professor of Entrepreneurship, and a Director of the Entrepreneurship Center at the University of Massachusetts, Boston. He specializes in Entrepreneurship and Small Business; Clean-Tech – Sustainability – Social Entrepreneurship; Organizational Change and Transformation; and Leadership. He has published several books including **Complexity and the**

Nexus of Leadership: Leveraging Nonlinear Science to Create Ecologies of Innovation.



JCT Global

New York

Hosted by Jerusalem College of Technology Member of the Board and former president **Aurora Cassirer, Esq.**, more than 40 community leaders gathered for an important meeting to discuss the latest developments at JCT. The meeting took place in Manhattan and included participants from many communities including Chicago and Los Angeles.

The conversation varied from a discussion of JCT's role in the remarkable technology achievements of the Israel Defense Forces, to JCT's unique role in answering the needs of hundreds of Haredi (ultra-Orthodox) Israelis who want an education in science and business. Introduced by **Louis Libin**, President of the American Friends of JCT, Malcolm Hoenlein, JCT Board Member and Executive Vice Chairman of the Conference of Presidents of Major American Jewish Organizations, gave a fascinating and extensive briefing on the rocket attacks that were taking place in Israel. **Prof. Noah Dana-Picard**, JCT President, described some of the more than 4,000 students who study at JCT, sharing how JCT independently provides higher education opportunities for hundreds of Ethiopian students, gives religious women the opportunity to secure degrees in science and business, and in many other ways answers the most critical needs of Israeli society. He invited all of those in attendance to visit the campuses during their next trip to Israel, where they will see for themselves the diversity of the student population, and the cutting edge programs that are preparing the next generation of leaders in Israeli scientific achievement and entrepreneurship.

Jerusalem Mayor **Nir Barkat** was scheduled to participate, but had to return to Israel because of the Pillar of Defense Operation. However, he appeared in a video where he stated how important JCT is for Israel and particularly for the City of Jerusalem, and how its students and graduates are very important members of his city and the State of Israel. **Stuart Hershkowitz**, Senior Advisor to President Dana-Picard, described the plans for JCT to develop and build a campus for the almost 2,000 women who study at JCT including the most up to date research and educational facilities and easy access to a planned Jerusalem Municipality Technology Park.

The proceedings concluded with a meeting of the Board

of The American Friends of JCT, where several new members of the Board were elected, including **Professor Linda Allen, Abbe L. Dienstag, Malcolm Hoenlein, Howard Millendorf, Gary Miller, Henry Orlinsky and Louis Tuchman**. They join present members of the Board, **Roy Barth, Aurora Cassirer, Abbe L. Dienstag, Ira A. Greenstein, Dana Haddad, Jack Lahav, Louis Libin, Ed Low, Hannah Low, Zvi Lowey, Andrew Neff, Candace Plotsker-Herman, Dr. Dov Rubin, Dr. H. Stephen Schloss and Seymour G. Siegel**.

In January, **Sanford T. Colb, Esq.**, Chairman of JCT's Board of Trustees, hosted the American Friend's Board at a dinner in New York. Sandy delivered a comprehensive update about JCT, describing some of the overall plans of the school as it continues to become a stronger foundation for its students. He suggested several specific ways that US supporters of JCT can make a difference, including providing scholarships and stipends, support for a new E-Learning program, and helping to build the International School which can increasingly benefit American high school and post high school students. Sandy concluded by expressing his hope that the American Friends Board will visit him when they are in Israel during a planned JCT leadership retreat in June.



From L-R Henry I. Rothman, Sandy Eisenstadt, Stuart Hershkowitz, The Hon. Robert Abrams

Toronto

More than 250 people attended the Canadian Friends Gala Dinner at Toronto's Ritz-Carlton Hotel, with speeches by York Centre **MP Mark Adler** and Israel Consul General **D.J. Schneeweiss**. CFJCT chairman, former JCT student and Toronto businessman, **Larry Krauss** served as master of ceremonies. **Shimon Vinger**, CFJCT's recently appointed Executive Director organized the event.

Many leaders of the Canadian Jewish community were in attendance to hear about JCT's newest contributions to Israel's economy and security as well as its contributions to significant changes in the social arena.

The audience was enthralled by the moving words of the honoree, Minister of Foreign Affairs **John Baird**, who spoke of Canada's outstanding support for Israel. The event was held in November during operation Pillar of Defense, when the world was expressing opposing views of whether Israel "has the right to protect itself". In his speech, Baird declared "it is not just that Israel has a right to protect itself, what other fundamental responsibilities does a state have other than to protect its citizens?"

"Israel is a remarkable place...because of its great society, the challenges it has endured and responded to, the great ingenuity and innovation that has made Israel such a phenomenal place which did not happen by accident." Baird praised JCT for being "One of the great institutions

which has contributed so much to that success." Stating that-, "if you look at so many economic, scientific and innovative successes, many of them can be attributed to graduates of the college."

Mr. Baird concluded by thanking JCT for the tremendous honor of receiving an honorary degree and thanking the audience "for the tremendous gift that each and every one of you have given to the future prosperity and vibrancy of the Jewish state by being so supportive of this great institution here tonight."



L-R: Prof. Noah Dana-Picard, Shimon Vinger, Hon. John Baird, Larry Krauss

Jerusalem

JCT will be holding a gala event in honor of its graduates who have contributed so much to the defense of Israel. The event will be held on Wednesday, June 19, 2013 (Tammuz 11) on the Machon Lev campus. Honorees are **Conrad Morris**, **Jack Lahav** and **Kurt Rothschild** and the keynote speaker will be **Brig. Gen. (Res.) Michael Herzog**, Senior Fellow at the Jewish People Policy Institute and former Chief of Staff to the Minister of Defense. Entertainment will be provided by the IDF's Chief Cantor, **Lt. Col. Shai Abramson**.

For more information and reservations, please contact the Department for Development – 02-6751269 or development@jct.ac.il.

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Save the Date

We Salute You -

JCT Graduates and Faculty serving in the IDF's top research and technology units.

Join us for an evening of celebration and acknowledgment of JCT's contribution to the defense of Israel

**on Wednesday, 11 Tammuz 5773,
June 19, 2013,**

on the Machon Lev Campus, Givat Mordechai, Jerusalem

Guests of Honor Ruth and Conrad Morris
Lifetime Achievement Award Kurt Rothschild
Perot Hallan Award Jack Lahav

Keynote Speaker Brig. Gen. (Res.) Michael Herzog
Entertainment Lt. Col. Shai Abramson, IDF Chief Cantor

Dinner Committee

Stuart Herszkowitz, **Chairman**
Sanford Colb
Eliezer Jesselson
Stuart Dove
Ari Shalit

Gedalia Gurfein
Yossi Apter
Zalli Jaffe
J.J. Gross
David Schreiber

Robert Black
Jon Medved
Shlomo Kalish
Meir Steiner
David Leichner

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