

TECHNION FOCUS



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Technion—Israel Institute of Technology, Division of Public Affairs & Resource Development, October 2003

ASTOUND THE WORLD IN 80 YEARS



Technion's first graduating class of architects: (l-r) Zvi Fraenkel, Shlomo Ginsburg, Moshe Tiegerman, Prof. Alexander Baerwald, Zipporah Neufeld, Zeev Gasko, Yehuda Leshtziner, and Shlomo Spector.
Chennoti Tales novella p. 11 celebrating 80 years of Technion

CODE CRACKERS



Harel Shapiro

The team who cracked the GSM encryption code (l-r) Nathan Keller, Prof. Eli Biham, Elad Barkan.

Technion Computer Science researchers gained international attention when they cracked the popular GSM (Global System for Mobile Communications) cellular phone network encryption code.

Prof. Eli Biham, Ph.D. student Elad Barkan, and Nathan Keller, who holds a master's degree from the Faculty of Mathematics, presented their findings to 450 participants at the recent Crypto 2003 international conference on cryptology held at the University of California, Santa Barbara.

The GSM telephone network has 850 million users in 197 countries and was considered the world's most secure cellular network. Biham explains, "Elad discovered a serious flaw in
continued on Page 2...

SUPER HERO ON CAMPUS

On a four-day scientific fact-finding mission to Israel, actor/activist Christopher Reeve visited the Technion. Calling Israel the "world center" for research on paralysis, Reeve was updated on stem cell research and robotic surgery by Technion experts.

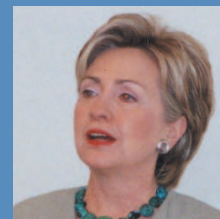
"Technion is a model of progressive research."—Christopher Reeve

The actor, best known for his film portrayal of Superman, was paralyzed in an equestrian competition in 1995. Since that time, he has dedicated himself to finding cures for paralysis caused by spinal cord injury and other central nervous system disorders. He is a strong supporter
continued on Page 3...

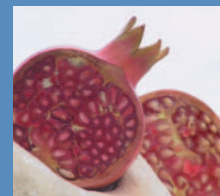


Shlomo Shoham

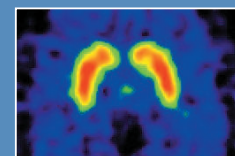
Christopher Reeve (l) learns the latest in robo-surgery from Prof. Moshe Shoham of the Faculty of Mechanical Engineering



Senator Speaks p.3



Juicy Health Tips p.4



Brain Drain p.5



Checking for Shock p.7



Heavenly Bodies p.12

FROM THE PRESIDENT



Prof. Yitzhak Apeloig, President

Eighty years ago, when the Technion first opened its doors to a small class of engineers and architects, there was no State of Israel. The challenges of the future could not even have been imagined by those early pioneers seeking to create a Jewish technical college on Mt. Carmel. Their spirit and vision is still present today.

It is an attitude that anticipates challenges and fuels the optimism to meet them head-on. It is the spirit of innovation that allowed the Technion to lay the foundations for a modern state with a thriving industry and to ensure its security. It is the flexibility that allowed the Technion to play a major historic role in absorbing waves of immigrants. It is the vision that ensures that even as the Technion itself strug-

gled to survive, it ceaselessly reached out to support others in the international community.

The founders of 1924 left us with a noble legacy, one which we still carry with pride. Today we are not only concerned with the nuts and bolts of engineering, but with the frontiers of technology in communications, aviation and robotics, breaking new ground in nanotechnology, pioneering stem cell applications, and introducing life-saving medical cures for all humanity. Yet the legacy remains: the spirit of community, of dedication and investment in pure brainpower as a means to truly empower not only ourselves, but Israel, the Middle East, and the future of the global community.

Today, we must meet the challenge of a new academic year with all the budgetary constraints imposed on us. Technion counts on all its supporters worldwide to help in our continuing quest for achievement. Join us in celebrating 80 years of courage, inspiration and determination.

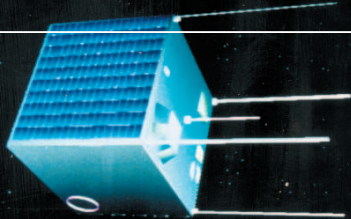
STILL IN ORBIT

Five years on, the Technion microsatellite functions like new, beyond all expectations.

Technion is one of few universities world-wide to launch its own student-designed microsatellite. In July 2003, Gurwin TechSat II celebrated its fifth year in space, surpassing original predictions of its lifespan. Prof. Moshe Guelman, Director of the Asher Space Research Institute (ASRI), said that Technion's satellite is "small but smart." The cube-shaped satellite has 45 centimeter-long sides and weighs 48 kilograms. "During the last five years the satellite orbited the globe more than 28,000 times," says Guelman. "It carried out all six planned experiments successfully, with results that in some cases, represented worldwide 'firsts'."

The satellite's control system, camera and radiation experiment still function like new. The solar panel system still supplies some 90 percent relative to the satellite's initial energy. The satellite also provides services for amateur radio operators on a partial basis.

"At this rate, the Technion satellite will remain in space for hundreds of years, as a reminder of Technion activity for generations to come."



The Technion satellite orbits at an altitude of 820 kilometers and has lowered its altitude by only three kilometers in the last five years, testifying to the thin atmosphere at this altitude. "At this rate, the Technion satellite will remain in space for hundreds of years, as a reminder of Technion activity for generations to come," says Guelman.

The Technion satellite began as a student project of the Faculty of Aerospace Engineering, supervised by Prof. Haim Eshed and initiated by Prof. Giora Shaviv, then head of ASRI.

CODE CRACKERS ...continued from Page 1

the network's security system: First, it inflates the information passing through in order to correct interference and noise, and only then encrypts it."

Since this discovery, the Technion team developed a way to compromise the GSM encryption system at the initial ringing stage, even before the call begins, and to eavesdrop. With a special device, one can steal calls and adopt a caller's identity in the middle of a conversation. The Technion researchers have even busted an upgrade patch designed to overcome the vulnerability of the system.

"Our research shows it is possible to crack the codes without knowing anything about call content."

Biham explains that the GSM encryption ciphers were kept secret until 1999. "Since then many attempts have been made to crack them, but these efforts required knowing the call's content during its initial minutes in order to decrypt its continuation, and to enable decryption of additional calls afterward. Since there was no way of knowing call content, these attempts never reached a practical stage. Our research shows it is possible to crack the codes without knowing anything about call content."

A copy of the research was sent to the GSM authorities. The researchers are patenting their discovery, but add that they will only release it for use by law enforcement agencies.

Both Biham and the GSM Association say the problem will not affect third-generation (3G) mobile phones since engineers have now replaced the encryption and security mechanisms.

Elad Barkan and Nathan Keller are both grads of the Chais Family Foundation Program for Exceptionally Gifted Students



TECHNION FIGHTS TERROR



COUNTER CONTEST

Having battled terrorists for five decades, Israel knows this is a dirty, bloody, and "unconventional" struggle. Technion, Israel's leading science and technology institution, continues to contribute invaluable to the nation's defense, in part by encouraging counter terrorism research.

To make Israel – and the world – a safer place, Technion is sponsoring a Counter Terrorism Competition, underwritten by funds donated by dedicated friends of Technion in the United States. The research conducted on campus will improve the capabilities of Israel and other countries to defend themselves against the plague of international terror.

Research teams and individuals in seven faculties will be awarded the first research grants and prizes for completed projects at a ceremony to be held at the beginning of the academic year. Chemical Engineering Prof. Avi Marmur, Head of the Institute for Future Defense Technologies Research named for the Medvedi, Shwartzman and Gensler families, says, "The Technion aims to mobilize its finest minds for the improvement of Israel's defensive capabilities against terror."

First prize for excellence in a completed project, goes to Prof. Daniel Weihs (Aerospace Engineering) and Profs. Alexander Yarin and Eyal Zussman (Mechanical Engineering).

NATIONAL SECURITY

The Samuel Neaman Institute for Advanced Studies in Science and Technology, an independent public policy research institute located at Technion, announced the establishment of the Research Forum for National Security. The Forum promotes academic research and facilitates feedback and exchange of ideas between the Israeli defense establishment and academic researchers.

Behind this initiative are three main reasons. One, important areas related to national security which overlap with the civilian sector, such as defense economics, are inadequately addressed. Two, much defense-related research is done without consultation with the potential users – resulting in research that does not consider the requirements of the defense establishment. Three, there is no framework for interaction and communication between the researchers themselves.

The new Forum for National Security will set up a research infrastructure and will bring together the defense establishment and academia to carry out focused research that will serve policy-makers.