Rising to the Challenge

Dr. Ofer Levi builds mathematical models to solve real world problems

Dr. Ofer Levi loves a challenge; whether it is designing mathematical methodologies from scratch or arm wrestling, he is game.

Levi has developed wide-ranging collaborations with Ben-Gurion University researchers, often facilitating communication between his research partners, given his grasp of both mathematics and engineering. The common theme of Levi's research projects is a focus on mathematical modeling, computational methods, and data analysis – with a little time spent figuring out how to win a sailing competition.

"My specialty is developing new analysis and computational methods and integrating them into various applications in the fields of exact sciences and engineering. It demands a lot of specific background learning and patient work to create tailored analysis and accurate computational methods that are compatible with real-life scenarios and systems," he says.

Levi has developed improved methods to create 3-D tomographic medical images from MRI, CT, and SPECT scans.

He developed a new system for analyzing materials using NMR scans with Avram and Stella Goldstein-Goren Department of Biotechnology Engineering Prof. Zev Weisman, Prof. (Emer.) Charles Linder, and Prof. Michael Saunders of Stanford University.

"The results attained by our system for NMR scans of materials are several times better than those achieved through commercial systems," he confidently asserts. The four are in the process of patenting their system.

Levi's educational path got off to a rocky start. He was thrown out of two schools during eighth and ninth grades and had a difficult first couple of years of high school, enrolling in both a tough boarding school as well as joining an external youth group on a kibbutz.

It was only after enrolling in the ORT school on Hebrew University's Givat Ram campus that Levi discovered his love of mathematics.

"My teacher Sofia Shpolensky put a challenge question on the board and told us that anyone who solved it would get a bonus. I immediately saw the answer but was afraid to make a mistake in front of the class, and so I waited to see if anyone else would answer it. When nobody did, I approached the board to write my solution. From then on, she lavished praise and encouragement on me. She raised my grade from 65 to 90 because of that challenge. She taught me to love and appreciate mathematics," he recalls.

He received further indication of his ability to thrive under adversity in the IAF pilots' course. Though he wasn't very good at flying, he excelled in the academic elements of the program.
"The competitive atmosphere really spurred me on," he reflects.

Contrary to expectations, he completed two BAs in Industrial Engineering & Management as well

as in Mathematics and a Master's degree in Industrial Engineering & Management, under the tutelage of Prof. Israel David, graduating from BGU with the highest honors. He was already serving as a teaching assistant in multiple engineering classes as an undergraduate student and then as a lecturer as a Master's student.

Finally, putting all doubts as to his path to rest, he achieved a PhD at Stanford in scientific computing and computational mathematics under legendary faculty member Prof. David Donoho, focusing on high-dimensional image processing.

It was at Stanford that, in addition to completing his PhD, two momentous events occurred: he met his wife, Donabel; they now have two boys, Tom and Adam, aged 8.5 and 10.

Second, he became an ISEF Foundation-supported scholar. Founded in 1977, ISEF's mission is to narrow Israel's socio-economic gap through higher education for gifted students from disadvantaged backgrounds. Its unique methodology combines scholarship grants with required community service, as well as training in leadership and social awareness.

"[ISEF President and founder] Nina Weiner got in touch with me personally very soon after I arrived at Stanford and amazed me from the very first moment with her warmth and big heart. She found the time to meet with me, and became a mother to us all. We had meetings at ISEF in New York once a year. I did my best to participate in all of their activities," he recalls.

Levi credits ISEF with providing him with a sense of family, first while he was studying at Stanford and now in Israel, where he has been active with the Foundation for years.

"I mentored a student at BGU and met with many other doctoral and master's students. I recently joined the ISEF Doctoral Students Acceptance Committee," he continues.

"Nina has a huge impact on students in the program, encouraging the overseas fellows to return to Israel and contribute to the State," thus reducing the "brain drain" phenomenon. "I have also been very impressed with ISEF's ability to close societal gaps through education and the opportunities the Foundation offers to those who would not usually receive them," he adds.

Levi was an academic faculty member in BGU's Department of Industrial Engineering & Management for 12 years before recently moving to the Open University. He still maintains close research ties and projects with a variety of BGU researchers in a range of fields.

As a faculty member, he was a prolific advisor, always looking for ways to help students succeed. "I advised four PhD students and 18 master's students writing theses from a variety of departments, such as mathematics, computer science, biomedical engineering, electro-optical engineering, communication systems engineering and, of course, industrial engineering and management," Levi says proudly.

The interdisciplinary approach runs through much of Levi's research. From a new imaging technology conceptualized together with Prof. Adrian Stern of the unit of electro-optical engineering, to gauging the best way to sail during a competition with the legendary race walking world champion and world record holder, Prof. (Emer.) Shaul Ladani, Levi has been at the forefront of developing new systems and methods to help people and to better understand our world. He also has research collaborations in the field of game theory with Dept. of Economics Prof. Aner Sela and Dr. Chen Cohen of Ashkelon College, as well as with Dr. Yekaterina Tektinsky of the nuclear medicine department at Soroka University Medical Center, seeking to improve SPECT images using new and improved mathematical methods, a project funded by the Open University.

Levi's sense of fun and challenge extends beyond the walls of his laboratory. He recently took up amateur arm wrestling, successfully competing among about 100 other aficionados from all segments of Israeli society.

Levi grew up in a household that respected sports – his father was the Israeli squash champion and he has taken up the sport as well. The Open University student team, to which Levi belongs, finished first in a competition in Eilat last year. Levi was able to join as he is also studying music, even while serving as an academic faculty member in another department.

He is now passing that love of sports and challenge on to his sons, going rock climbing with them at the Performance Rock gym in Beer-Sheva three times a week.