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## Small wonder

Technion developing 3 tiny satellites to fly in formation

# Technion developing 3 tiny satellites to fly in formation Devices could locating missing, in distress persons

• By JUDY SIEGEL

Researchers at the Technion-Israel Institute of Technology – for years experts in the miniaturization of satellites – plan to build and dispatch into space a fixed formation of three nano-satellites weighing up to six kilograms each, the first time scientists will attempt this feat.

The project, headed by Prof. Pini Gurfil of the aeronautics and space engineering faculty, is due to be unveiled officially next Monday at the Science and Technology Ministry's International Ilan Ramon Memorial Space Conference at the [Fisher Institute](#) for Air and Space Strategic Studies in Herzliya. Representatives of space agencies and space researchers from around the world are due

to attend.

“This is the first time in the world that scientists will attempt sending three satellites together in a controlled formation,” Gurfil said. “Until now, this has not been possible because of their size and weight and the problems of dispatching multiple satellites in a uniform formation and their remaining in space for a long time.”

The communications satellite construction will be launched in 2015. The Technion in Haifa has had much success in building satellites that are smaller than a refrigerator and thus more efficient and cheaper than devices built in the US and Europe.

The nano-satellites will try to receive signals at various fre-

quencies from Earth and calculate the location of the transmission facility. Receiving signals in space from Earth with the help of a number of nano-satellites flying in a fixed arrangement is a new concept that has never been performed anywhere. If the experiment succeeds, said Gurfil, such satellites could be applied to locating missing persons or individuals in distress.

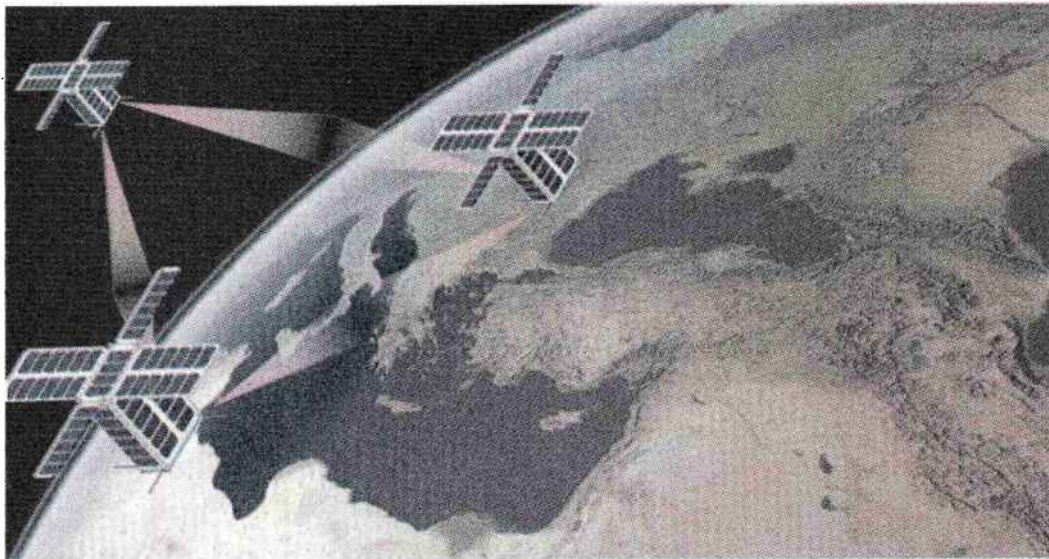
The project is aimed at proving that it is possible to hold tiny satellites in formation for a year as they pass 600 kilometers above the Earth. Each of the satellites will be built with a movement system that will help keep it together for a long period in space.

They will be built according to the standard CubeSat model

whose parts will be put together by students of the Technion faculty. Each satellite will be constructed out of six cubes, each of them 10 centimeters cubed. Thus the whole structure will be 10 x 20 x 30 cm. in size. Measuring equipment, antennas, computer and control systems and navigating equipment will be attached. The programs and algorithms that manage the flight were developed in a Technion lab for space research. The nano-satellites will be sent off as an additional shipment on a rocket to be sent via Europe, Russia or India, the Haifa institute said.

Gurfil received a 1.5 million euro grant from the European Union a few months ago to carry out the project. He and his team of interdisciplinary

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THE SATELLITES, shown as models, will weigh up to six kg. and pass 600 km. above the Earth. (Courtesy of the Technion)

researchers have already built a working model to overcome the problems resulting from

the need to prevent the nano-satellites from getting too close or too far from each other. The

parts must be able to communicate and function even when something goes wrong and to fix their relative position with a minimum of fuel so they can remain longer in space.

"If we succeed in proving that such a flying formation is possible, it will boost the development of very small satellites and technologies connected to miniaturization of electronic components, efficient processing and movement in space," said Gurfil. "It would advance a variety of other civilian applications as well."

Another target is to provide practical training for space engineers, and students for bachelor's and advanced degrees will participate in examining areas connected to the project. Training and practical experience are vital for developing Israel's future in the field, Gurfil said.

In July 1998, Technion aeronautical and space engineers and students dispatched the Gurwin-TechSAT-2 satellite, one of the smallest of its type in the world. It succeeded in staying in space and carrying out all its missions for 21 years. Built as a cube, with each side 54 cm. long, it weighed only 84 kg., significantly reducing its power consumption.