Artificial "maple seeds" from rockets

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The device, developed at TU Wien, which will be ejected 80km above ground and find its way back to earth. Credit: Vienna University of Technology

The Space Team at TU Wien is launching an ambitious project together with the University of Würzburg. Measurement devices are going to be

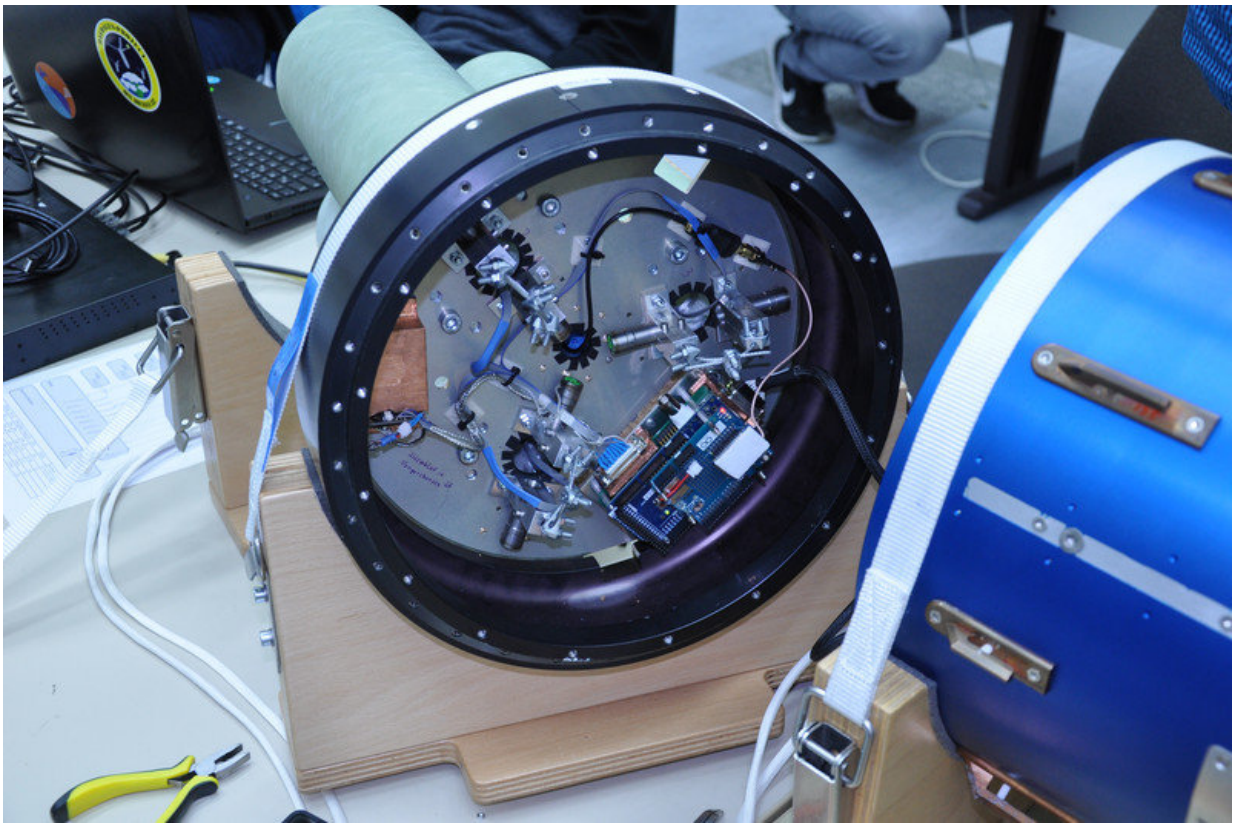
ejected from a rocket and will fall to Earth without a parachute.

It's a bold idea, and no one knows for sure if it will work. Tubular measurement devices will be transported to an altitude of 75 kilometres by a rocket and will then return to Earth undamaged and entirely unassisted. If this technology proves successful, it could be a great new tool for meteorological research.

In recent years, the TU Wien Space team, a group of students at TU Wien (Vienna) has drawn attention to itself with successful rocket launches and satellite projects. Now, the students' association at TU Wien is joining forces with a student team from the University of Würzburg to make the idea of space probes autonomously returning to Earth a reality. The project is called 'Project Daedalus', and is now intended to be implemented in March as part of the international REXUS programme for promoting student space initiatives.

80 kilometres high

'REXUS/BEXUS' is a collaboration between the German Aerospace Centre, the Swedish National Space Board and the ESA. As part of 'REXUS', two rockets are launched each year in Sweden that carry instruments and experiments developed by students to an altitude of approximately 80 kilometres. The TU Wien Space Team is now also joining the imminent rocket launch in March for the first time.



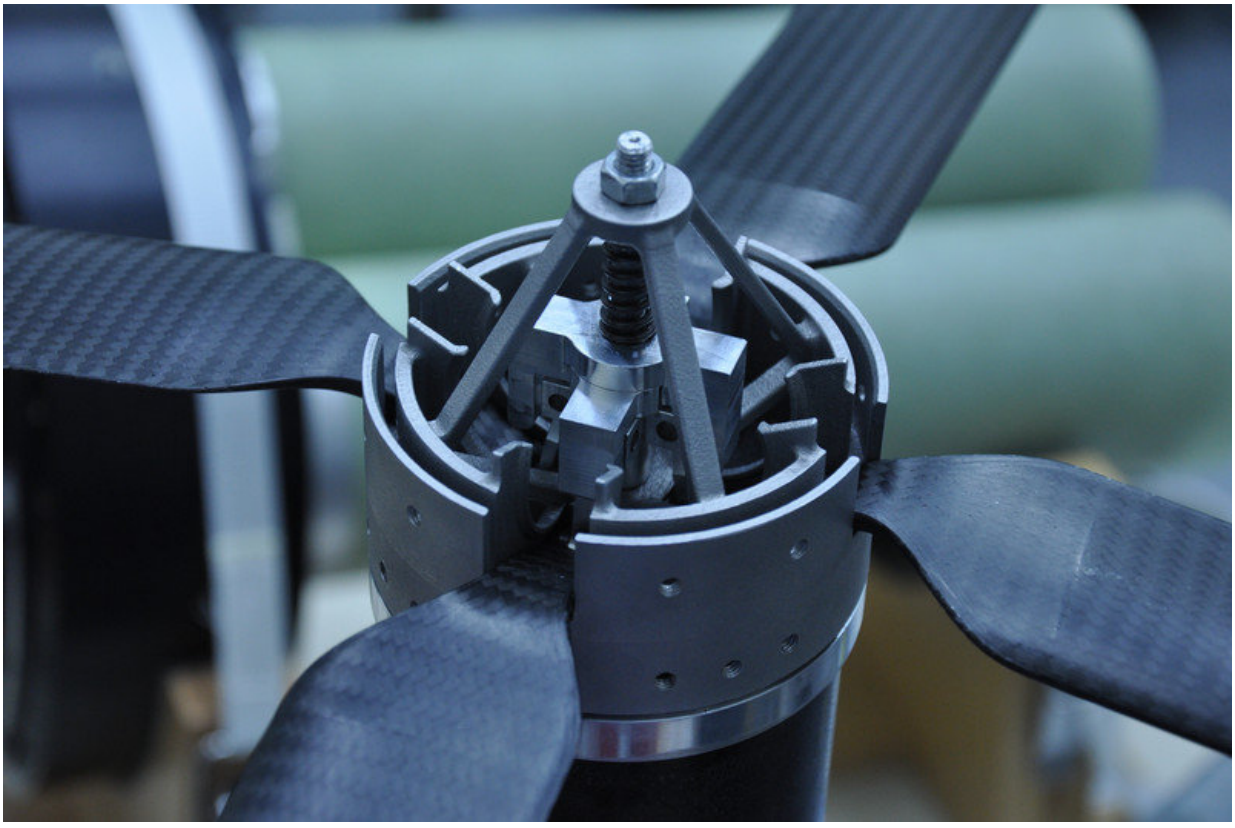
The inside of the device. Credit: Vienna University of Technology

"The aim was to develop a device with which meteorological data can be collected conveniently and easily," says Sebastian Seisl from the TU Wien Space Team. The altitude of approximately 80 kilometres reached by the REXUS rockets is particularly interesting. For weather balloons, which can climb to a maximum of 30 to 40 kilometres, this is too high, and satellites can only poorly capture data in this area of the atmosphere.

The basic idea for the innovative measurement device is reminiscent of maple seeds, which fall to the ground very slowly and gently due to their long wings. The tubular probes from Project Daedalus are also provided with wings. A specially developed ejection mechanism is intended to

launch three of these probes from the rocket at an altitude of 80 km, at which point their wings fold out and ensure that the devices return to Earth as slowly and as unscathed as possible. GPS modules are then intended to report the landing location, so that the devices can be retrieved as easily as possible.

Some important data are measured during their descent, for example acceleration, temperature and air pressure. "Our main focus this time, however, is on demonstrating that the method actually works. The additional measurement sensors with which the devices are provided actually do not play such a big part, in technical terms," says Christoph Fröhlich, President of the Space Team.



The construction was inspired by maple seeds. Credit: Vienna University of Technology

In addition to support from private sponsors and the Institute of Automation and Control (ACIN), the Austrian participants in this project are also generously sponsored by the Austrian Research Promotion Agency (FFG). "As an institute at TU Wien, we are particularly pleased to support the students in the Space Team with their plans and their work on these promising projects," says Prof. Georg Schitter from ACIN.

The Space Team at TU Wien was responsible for the ejection mechanism and the development of the on-board computer. In the process, the team was able to draw on its own experience. For example, it developed the on-board electronics for the nano-satellite Pegasus, which was brought into Earth's orbit in 2017. In addition, the Space Team has already developed several experimental rockets, which successfully made advances at international competitions at altitudes of up to 6 km.

Members of the TU Wien Space Team working on the device. Credit: Vienna University of Technology

In the meantime, the TU Wien Space Team has gathered over 70 members from very different fields of study at TU Wien. "For us, it is of primary importance that you can get enthusiastic about aerospace," says Christoph Fröhlich. "We have lots to do: From programming to quality checks, from electronics to aerodynamics – in rocket technology you face many different challenges that can only be overcome with an interdisciplinary approach."

At the start of March, a delegation from the team will leave for Kiruna (Sweden). The earliest launch window for the REXUS rocket is on 12

March – shortly after that, we will know whether the ambitious Daedalus project has been a success at the first attempt.

Provided by Vienna University of Technology