

## Weekly reading #1

### **The Indians failed for the first time – adapted from**

<https://www.nytimes.com/2019/09/06/science/india-moon-landing-chandrayaan-2.html> – 171 words

Space is demanding. It is difficult to forgive mistakes. A million things must go right for a successful mission, and only one wrong to fail. Proof of this is (among others) the last three attempts to land on other celestial bodies. Esin Schiaparelli crashed along Mars. Israeli Beresit by the Moon. India's Vikram, which was heading toward the moon's ground yesterday evening, has disappeared.

Just 2.1 kilometers from the ground, that is, in the final minutes of more than a month, the Indian space agency ISRO lost contact with it. What happened? ISRO will first analyze all data and only then make a formal statement. However, it was evident from Friday's video transmission that, immediately at the beginning of the fine braking, that is, the slow last descent, Vikram began to turn uncontrollably and even accelerate vertically. It is possible to conclude that he therefore hit the ground at high speed. The possibility that there is something wrong with the communication system and Vikram's successful landing, but not likely, remains open.

### **»Car« accident in space, caused by computers, successfully prevented – adapted from <https://www.theverge.com/2019/9/3/20847243/spacex-starlink-satellite-european-space-agency-aeolus-conjunction-space-debris> – 389 words**

For the first time in history, the European Space Agency has been forced to move its satellite to avoid collisions with a larger constellation of satellites.

Their Aeolus, according to calculations, was likely enough (less than 1 in 1,000) to crash with SpaceX's Starlink 44 that a rail change was necessary. Aeolus rose 350 meters, according to ESA.

The event itself is nothing very special, and satellites, as well as the International Space Station, sometimes change their orbit slightly because of the possibility of a collision.

It is important because it is a very crucial procedure of the future. There are well over sixty Starlink satellites in the sky, with the number set to reach 12,000 within a few years. Several other companies are planning similar things, which means that Earth's lower orbit will soon become filled with a lot of so called space junk. The space will still be huge, but the more objects that swirl around at a speed of 30,000 miles per hour, the greater the chance that paths will intersect. And as an average satellite surrounds Earth in just under two hours, there will be more and more opportunities for collision.

Things can quickly escalate, the collision of just two satellites can create thousands of smaller pieces, that can cause problems for the next generation of victims, and quickly we have a chain reaction that cripples most human infrastructure and makes any trip to space inappropriately more dangerous for generations.

According to the European Space Agency, the event signaled a need for "traffic rules" for space. Nowadays, if there is a risk of collision, everything is done with a required connection to Earth, where the calculations are done. It is scary that man-made objects in space still rely on human interaction. And a lot of coordination between the human controllers is still done via the plain old E-Mail. When there are tens of thousands of satellites in the sky, established rules and communication channels are essential.

ESA's Aeolus satellite was launched on August 22, 2018 on a Vega rocket. The agency describes it as "the first mission to profile Earth's winds globally." Slovenian knowledge is also involved in the project.

Most satellites are in Earth's lower orbit, ranging from just under 200 kilometers to 2,000 kilometers above sea level. Since the launch of Sputnik in 1957, nearly 10,000 have accumulated, of which nearly two thousand are active. Beside the already mentioned artificial satellites, there are about 30,000 other objects in space. Agencies are trying hard how to solve the problem of these space junk in the long run.

**Cause of the European Vega rocket disaster finally known – adapted from**  
<https://www.bbc.com/news/world-latin-america-48946597> – 324 words

On July 10 this year, they were very surprised at Arianespace. Their Vega rocket, which had never failed before, only briefly disintegrated just two minutes after take-off, with the expensive cargo, the United Arab Emirates's Falcon Eye-1 satellite, also destroyed.

In the fight against price pressure from US and increasingly Chinese suppliers, the European rocket industry has regularly emphasized the high reliability of its products, so the event on the VV15 flight was a serious blow. All the more so because the new competition is quickly accumulating precisely in the field of launching smaller satellites, that is, on Vega's cabbage.

A few days ago, an independent investigation team finally submitted an incident report. The explosion was caused by the second-stage engine of the Zefiro-23 rocket, according to a press release. "The Commission identified the thermostructural failure of the front dome of the Z23 engine as the most likely cause of the anomaly." They are convinced that this is the true cause of the accident, and have rejected any possibility of "malicious acts", ie sabotage.

According to Spacenews, cargo insurance totaled \$ 415 million, which will be one of the largest payouts of insurance in the space industry at all. One of the largest space flight insurers just dropped out of business this year, citing high costs.

Vega is capable of carrying up to 1,500 pounds of cargo into polar orbit. Arianespace fires three to four specimens per year from the Kourou Launch in French Guiana. It is 30 meters high, 3 meters wide and weighs 137 tons, with a single launch costing a good € 30 million. Vega is made by the Italian company Avio (its director responded to the report here), and the next flight is expected to be in the first quarter of 2020. Since 2012, it has listed 14 without error, the 15th went wrong.

The plan is a new version, Vega C, which will upgrade the capacity to 2.2 tonnes.

**International Space Station: Soyuz departs, Japanese arrives – adapted from PHP Fatal error: explode requires string, array given in**  
<C:/Users/kondenzator/Desktop/projects/ai-news/fetch.php> on line 62 – 452 words

On Friday night, the Soyuz MS-14 spacecraft disengaged from the International Space Station (Star module). Just the one who had a significant problem with the station only two weeks ago, and who brought her the Skybot F-850 humanoid robot. She also took it back.

The station is now in preparation for the next arrival, which is being planned by the Japanese. On September 10, the Kounotori 2 rocket launches a HTV8 freighter full of new technologies and scientific experiments. They are due to ship on September 14th.

Hourglass should be mentioned among the newcomers. They brought to the station a bunch of powders that are reminiscent of materials from other celestial bodies, ie the moon, Mars, asteroids ... They will test how these materials behave at different gravity levels. They intend to use the findings when planning missions to these bodies, that is, to plan landers, space suits, and also dwellings. Dust in foreign celestial bodies is not an innocent matter, it contains toxic substances on the moon and on Mars that no one would want to ingest or inhale, and can also be detrimental to mechanics.

The SOLISS trial will test optical interconnection to Earth (currently running through geostationary satellites, which is slow), and FLARE to test the combustibility of some solid fuels in micro-gravity, which is expected to benefit fire safety improvements. This is literally a hot topic, as a spacecraft fire is a disastrous scenario, an astronaut's nightmare.

Of course, the crew did a number of experiments this week already at the station; astronauts Nick Hague and Andrew Morgan with Fluid Shifts. Ultrasound measures the movement of fluids inside the body. On Earth, it pulls us down, not in space. So astronauts say the universe brings a slight but constant headache as pressure in the upper body increases. This is a nuisance, but the real problem is elsewhere. Astronauts are getting worse vision in space, some of them very much, presumably because of the constantly high pressure in their eyes. Among the solutions tested are trousers that create pressure in the lower body.

One older experiment has borne fruit: MICS. They are interested in how cement behaves in space and at different levels of gravity. Not least because someday people will visit Mars, the moon and other celestial bodies. They will be forced to erect habitation there, temporary or long-term, to protect them from the devastating radiation of the universe, meteorites and deadly conditions. What kind of cement to use, what techniques (possibly 3D printing), what combinations to put into the final concrete are all questions that humankind must address now if it wants to go elsewhere in 10 years. Some answers are in the scientific publication *Frontiers in Materials*.