

# Surrey Space Centre to lead test mission to clear up space junk in 2017

July 5 2016

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Surrey Space Centre is leading a test mission, RemoveDEBRIS, to test the world's first low-cost space litter-picking technology to remove the 7,000 tonnes of space junk orbiting the Earth. University of Surrey scientists will be showcasing the technology at the Royal Society Summer Science Exhibition opening today.

Funded by the European Commission and led by Surrey Space Centre, the mission, which is due to launch in early 2017, has a range of European partners including: Airbus DS France; Airbus DS Germany; Airbus DS UK and SSTL (Surrey Satellite Technology Limited).

It will test technology that has been designed to remove the 7,000 tonnes of [space](#) junk ranging from flecks of paint and used rockets, to dead satellites and debris from past collisions of space junk. With debris orbiting the Earth at thousands of miles per hour, even small fragments of rubbish can damage communication satellites which are vital for the internet, mobile phones and satellite navigation. Junk that's just 10cm across could completely obliterate a space station.

The RemoveDEBRIS team warns that if we don't start work to get rid of the junk in space now, it could cause major problems. Within a decade it could be too dangerous to leave the Earth's atmosphere, putting space exploration on hold for a generation.

Dr Jason Forshaw, Surrey Space Centre project manager on the RemoveDebris team "Various orbits around the Earth that are commonly

used for satellites and space missions are full of junk, which is a significant danger to our current and future spacecraft. Certain orbits – which are commonly used for imaging the [earth](#), disaster monitoring and weather observation – are quickly filling up with junk, which could jeopardise the important satellites orbiting there. A future big impact between junk in that orbit could result in a real life 'Gravity-like' chain reaction of collisions.

"The international community needs to start working together now to remove space junk. The space around Earth is part of Earth's environment and keeping it clean is a common responsibility. Our mission, RemoveDebris, is one of the first concerted efforts to pioneer future technologies to remove space junk."

The RemoveDebris team has designed a set of engineering systems to help clean up space. One of the systems being put to the test in their 2017 mission uses a net (like a fishing net) to grab junk. Once captured, the rubbish could then be dragged behind a space craft, like a tow truck, as it returns to Earth. The heat of re-entry would cause pieces of junk to burn up as they enter the atmosphere. Very large pieces would fall safely into the centre of the Pacific Ocean, far away from civilisations. In the RemoveDebris mission, their main spacecraft will release a tiny metal 10cm cube as "artificial junk" to test the net on. This proof of concept will open doors to real litter-picking missions.

Another of the systems tests a "dragsail" which can be in future attached to larger pieces of rubbish. The sail works like those on boats, but instead of being pushed along by wind the sail is pushed by photons of light from the sun. The sail will drive the junk out of its orbit, causing it to start spiralling back into the Earth's atmosphere. The sails are made from a special material which will be on display at the Royal Society Summer Science Exhibition.

## Space junk: The facts

- There are approximately 7,000 tonnes of junk in space, ranging from flecks of paint and used rockets, to dead satellites and debris from past collisions.
- The European Space Agency owns the largest piece of junk. It is called Envisat and is 8.5 tonnes. It is over 10m long.
- When pieces of junk collide they start a chain reaction. In 2009 two satellites, Iridium 33 and Kosmos 225, collided at a speed of 26,000 mph which lead to over 1,000 pieces of debris being created.
- There are over 170m pieces of debris smaller than 1cm, but they can still devastate a satellite. Last month Tim Peake shared a photo of a chip in the window of the International space station caused by a tiny piece of space debris just a fraction of a millimetre across.
- The International Space Station (ISS) has special shields (Whipple Shielding) that protect it from space junk- though it is still covered in hundreds of dents from small impacts.
- The ISS regularly moves out of the way to avoid larger pieces of [space junk](#).
- Only in the last several years have regulations come in to reduce space debris. It is currently law in France that all future missions within the Earth's orbit must return to Earth within 25 years. In other countries this 25 year rule is only advisory, but not law.
- All items bigger than 10cm are tracked. We don't have a map of where all the smaller pieces are.
- Currently there are few solutions for getting rid of small pieces of junk. One idea is to use a laser to nudge them off course and out of orbit.

Citation: Surrey Space Centre to lead test mission to clear up space junk in 2017 (2016, July 5)  
retrieved 25 April 2024 from  
<https://phys.org/news/2016-07-surrey-space-centre-mission-junk.html>

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