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On a mission to clean up space

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Author: *Maryanne Blacker*

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Professor Craig Smith has been passionate about astronomy and science since he was a child. Now as CEO of EOS Space Systems, he's helping build giant lasers to prevent space debris from colliding and creating chaos in our communication and navigation systems on Earth.

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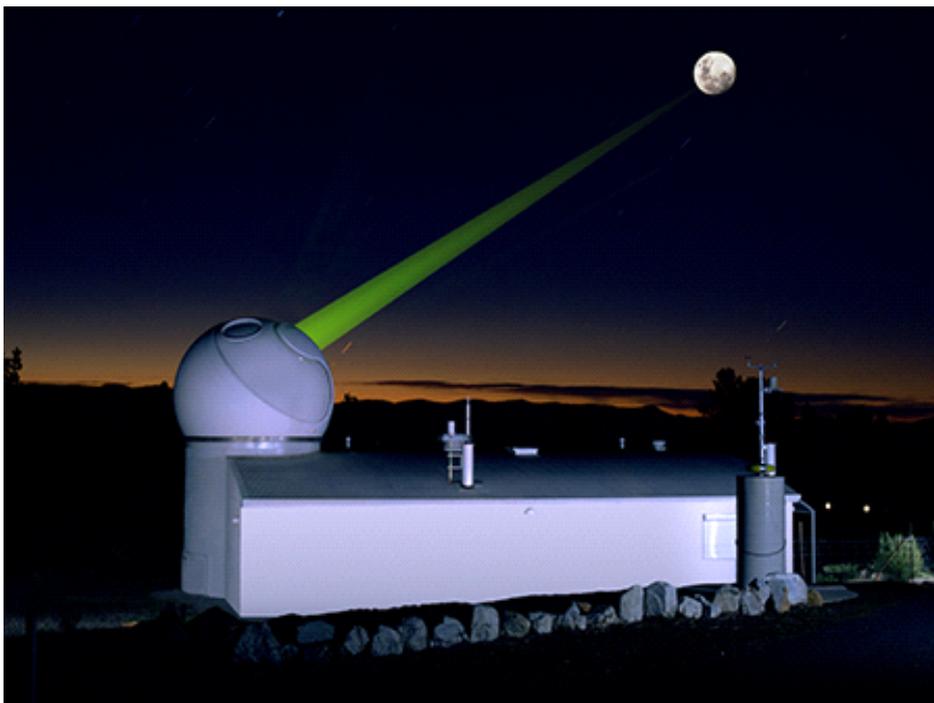
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In 2009, an active Iridium satellite and a dead Russian satellite crashed into each other and spawned 5,000 new bits of space junk, all of which are still floating around up there.

There's now so much space debris that even if we never launched another thing, it could proliferate because frequent collisions are creating new flotsam, Professor Craig Smith, Chief Executive Officer and Technical Director for EOS Space Systems says.

Increased space debris boosts the possibility of damage to space vehicles, shuttles and satellites as orbits get more crowded. In 2014, the International Space Station had to move three times to avoid lumps of space debris.

“These things are travelling at 30,000kms per hour so even a collision with a very small 1cm piece of space junk is enough to destroy a satellite,” Smith says.

And satellites play a role in almost everything we do these days.

“Communication, navigation, earth observation, timing, all the automatic tellers run off timing systems created by satellites so if the satellite navigation sites went down, for example, all the banks would be crippled,” he says.

Smith and his team at EOS Space Systems have developed a laser tracking system, the only one of its kind in the world, which allows them to monitor space debris much more accurately than previously. If they see chunks are on a collision course, they can intervene.

One push is all it takes

“We're building very big lasers which are strong enough to nudge space debris into a different orbit,” he says.

“The laser puts out a very concentrated stream of light,” the physicist explains. “Light has energy and it has momentum and when that light hits an object, all that energy is absorbed into the target and effectively it has a push.

“It’s a small, but measurable and predictable force and because we can track things accurately, we only need a small push to make things miss each other. They sort of pass like two ships in the night and no-one’s the worse for wear.”

Radar systems, previously used to track debris, are less accurate than EOS’s lasers, failing to register objects below a certain size, of about 10cm.

“With the invisible light that we use, we can see much smaller things, we can go down to 2cm,” Smith says.

EOS has been building laser systems for tracking satellites for about 30 years. The company was spun out of an Australian government geodetic ranging program by Group CEO Ben Greene and three other colleagues, and now counts governments in Japan, the US and Europe, international space agencies, satellite owners, and defence agencies as clients.

Satellite owners rely on EOS’s pinpoint tracking to tell them how high the threat of a collision is. Then they can make an informed decision about whether or not to move their satellite out of the way.

“Often satellites just go off the air, and you’re never quite sure if it’s been hit by space debris or it’s just died spontaneously. It’s probably 50-50,” Smith says.

Growing amount of space junk

Smith estimates there are 20,000 bits of space debris, everything from fragments of astronauts’ clothing to remnants from launch vehicles, currently being tracked.

“The first satellite Sputnik was launched in 1959 and ever since then we’ve been leaving stuff up there,” Smith says. “Prior to then, space was pristine, there was no space junk.

“There’s enough up there now that it’s a self-perpetuating problem,” he says. “We need to stop collisions and then start bringing down some of the junk.

“The oceans will probably recover if we stop polluting them, but space will not recover on its own.”

Over the years EOS has evolved from space tracking to building telescopes and observatory systems used around the world, and manufacturing remote control weapon stations for armoured vehicles (a person safely controls the weapon from inside the vehicle using a joystick).

The latter, Smith says, is now a very successful component of the business, with armed forces in Australia, Europe, Singapore and the Middle East using the weapon stations.

“We’re a state-of-the-art company,” Smith says. “We look for niches that people haven’t yet identified and develop a product so that by the time the customer realises they have a problem, we’ve got the solution.”

Taking out the trash

Space remains a passion for Smith – “since I was a kid I’ve been interested in astronomy and science” – so he’s particularly pleased that Australia now has its own space agency.

“Australia has always taken a leading role in trying to establish normal, reasonable behaviour on use of space,” he says. “We are world leaders in the downstream use of space information, such as meteorology and geoscience. Now we have a focal point for collaboration, leadership, guidance, monitoring and regulation.”

Smith firmly believes we can fix the problem of space debris, despite there being more frequent crashes between tracked objects and an estimate that debris will triple by 2030.

“We just have to have the will and show the leadership to make it happen,” he says. “The issue is not to take ourselves back to the Stone Age and stop doing things but to find new technologies to clean it up.

“We have one solution but there surely are others.”

Smith is confident that awareness of the dangers of space debris is growing, and more companies are stepping into the fray.

“If it’s going to make space clean again, then the more people working on it the better.”

What about the idea of using space harpoons, robot arms and giant nets to snag space junk and drag it back to Earth? Smith is all for it, although his preferred solution is much simpler: “Just make it an offence to dump in space.”

Find more about [EOS Space Systems](#).