

Tackling Space Debris With Nanobots And Lasers

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AsianScientist (May 24, 2012) - Three students of the Institute of Science and Technology at Klawad in Haryana, India have proposed a revolutionary method to tackle the problem of space debris.

In a paper entitled *Space Debris and its Mitigation* published in the *Moon Miners' Manifesto India* quarterly, Sourabh Kaushal and Nishant Arora propose the use of decayable material when manufacturing space machines, and nanobots that collect these machines upon decay.

The work has also earned the team - which includes a third student Niraj Pachpnde - acclaim from space experts like V. Adimurthy, Dean (R&D) of ISRO's Indian Institute of Space Science and Technology, and Priyankar Bandhopadhyay, a space debris expert at ISRO.

According to the eight-page paper, fragmentation debris accounts for 42 percent of space debris; break up of satellites, unused fuel, dead batteries and rocket bodies 17 percent; mission-related debris 19 percent; and non-functional spacecraft 22 percent.

“These objects consist of everything from spent rocket stages and defunct satellites to explosion and collision fragments... As the orbits of these objects may overlies the trajectory of spacecraft, debris is a potential collision risk,” they explain.

The method proposed in this paper involves a mesh made out of carbon nanotubes that acts as a touch screen. When debris brushes onto the screen, nanobots placed at specific coordinates collect the particles for storage.

Another proposal by the team involves the use of a laser which could either vaporize or redirect space debris back to earth. The laser could be installed on the International Space Station, they suggest.

The authors also recommend the creation of huge orbit junkyards surrounding the space station for additional shielding. The paper says that the possibility of using space debris for energy production can also be explored.

Approximately 15,000 pieces of space debris in earth's orbit are larger than the detection limit of three inches, the paper says, meaning that there are probably millions or even billions of smaller pieces of space debris that remain undetected.

“Despite the size of these objects, they all have the potential to be mortal because of the speed that they are traveling, especially since most of the debris are traveling hundreds or thousands of kilometers per hour,” they write.

Quoting a study, the paper states that the debris amount was placed at 5,000 objects in 1981. By late 1990, it was thought that the majority of 28,000 launched objects had already decayed and about 8,500 remained in orbit. By 2005 this figure had been adjusted upward to 13,000 objects and in 2006 it went up to 19,000.

Nearly 12 percent of catalogued space debris consists of objects discarded during normal satellite deployment and operation, the paper says. Explosions in higher orbits are one of the main causes of space debris, while space walks also generate some debris.

"For example, Sunita Williams of STS-116 lost a camera during extra vehicular activity. Lost equipment include garbage bags, gloves, and tool kits," the authors write.

The article can be found at: [Kaushal S et al. \(2012\) Space debris and its mitigation.](#)

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