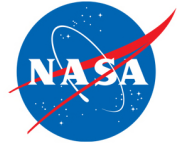


National Aeronautics and  
Space Administration



## TECHNOLOGY SOLUTION

### Robotics, Automation and Control

# Method and Associated Apparatus for Capturing, Servicing, and De-Orbiting Earth Satellites Using Robotics

## Making Satellite Servicing a Reality

Engineers at the Goddard Space Flight Center have overcome limitations plaguing the satellite sector since its inception through the development of a robotic systems allowing for the autonomous capture and servicing of in-orbit satellites. By enabling spacecraft to identify, pursue and attach to a target satellite this innovation will make possible satellite inspection, repairing, refueling, and upgrading. The major benefits provided by this technology will be of great interest to the commercial satellite sector.

### BENEFITS

- Increased satellite lifetime
- Lowered costs due to decreased satellite turnover rates
- Decreased satellite insurance rates



## THE TECHNOLOGY

This method begins with the optical seeking and ranging of a target satellite using LiDAR. Upon approach, the tumble rate of the target satellite is measured and matched by the approaching spacecraft. As rendezvous occurs the spacecraft deploys a robotic grapppling arm or berthing pins to provide a secure attachment to the satellite. A series of robotic arms perform servicing autonomously, either executing a pre-programmed sequence of instructions or a sequence generated by Artificial Intelligence (AI) logic onboard the robot. Should it become necessary or desirable, a remote operator maintains the ability to abort an instruction or utilize a built-in override to teleoperate the robot.

## APPLICATIONS

The technology has several potential applications:

- Satellite Servicing
- Robotics
- Communications
- Earth Remote Sensing
- Defense

## PUBLICATIONS

Patent No: 7,240,879; 7,438,264

## More Information

National Aeronautics and Space Administration

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