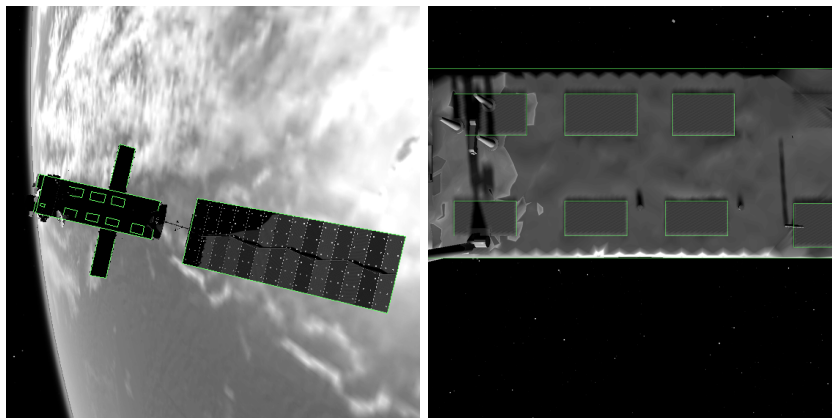




Image-based Determination of the Relative Motion for Spacecraft Rendezvous Maneuvers at Close Range

For space flight rendezvous a precise calculation of the pose of the target is essential. In the thesis, in respect of the aim of the removal of space debris, a procedure is developed calculating the relative position and orientation of the uncooperative but known target from camera image data (visual or infrared). This procedure works in real-time by means of an annealed particle filter. A rough information about the potential position is needed for the initialization of robust tracking.

Chosen sharp edges of the target object are projected into the camera image. Comparing the edges in the images, the weight of the particles are calculated. The particle with the highest weight after several filter applications yields the estimated pose. From the resulting poses, the relative motion can be calculated. In the thesis, it is shown that the approach is robust with respect to single, temporarily not visible or partially visible edges of the objects. This can be caused by shadows, for example. At the same time, the procedure achieves a high precision for a small distance to the target with only a few number of edges of the object visible.



Tutor: Dr.-Ing. F. Schnitzer
Supervisor: Prof. Dr.techn. K. Janschek
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Author: Richard Liebscher