EPSRC CDT in Distributed Algorithms

PhD Project: Scheduling Surveillance of Space Objects

University of Liverpool

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Project Description

This project has been developed by the University of Liverpool in partnership with STFC Hartree and DSTL.

Satellite operations provide services to the UK that underpin most aspects of modern-day life, from navigation to communication to banking, and therefore the continuation of these services is of critical importance to both the UK government and to the public. Since the start of the space age, Earth's orbit has been becoming increasingly congested with debris from previous launches, break-up events, collisions and other mission related activities. To mitigate the risk of collisions between active satellites and debris there is an increasing emphasis on the enhancement of sensor networks to survey space objects in order to understand the composition of orbital debris, and to inform operators of the potential need to perform collision avoidance manoeuvres to ensure on-orbit safety. The research within this PhD supports long term UK prosperity and has applications in commercial, civilian and military spheres.

The aim of this project is to develop cutting edge sensor surveillance strategies to observe space objects which can outperform existing techniques by developing high quality, efficient, non-myopic sensor management algorithms to control space-surveillance sensors. These algorithms are required to maximise the value gained from limited sensor resources to enhance the understanding of the composition of space objects in orbit, specifically using ground-based optical telescopes. These surveillance strategies should have the ability to detect and respond in the instances that a satellite manoeuvre was performed and/or a collision event has occurred, to ensure that the correct data is promptly collected to enable mitigation actions.

Due to the high levels of computational complexity, a key focus of the project is likely to be on understanding the potential to exploit multi-core computing hardware, such as GPUs.

Go to the EPSRC CDT In Distributed Algorithms website.