Preventing Collisions in Orbit: PREEMPT

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Determining whether a satellite needs to change course in order to prevent a possible collision means taking various factors into account. PREEMPT visualizes potential collision events, creating a superb basis for decision-making.

THE CHALLENGE

Today, there is a significant risk of an accidental collision between man-made satellites and other objects in orbit, which would endanger the provision of the respective services. This presents a real challenge for satellite operators and the service providers involved.

Although the risk of collision can be minimized, the satellite generally needs to change course in order to do so – a maneuver which requires fuel and shortens the service life of the satellite. Furthermore, this can also affect the quality of the service provided by the satellite for a limited period of time. The decision as to whether a collision risk should be accepted or minimized through an orbital maneuver therefore depends on many factors. Decision makers need a tool that supports them in this by visualizing the available data in an intuitive way.

Figure 1: A PREEMPT search window with list of search results.

OUR SOLUTION

PREEMPT is a web application that visualizes conjunctions, which describe a possible collision between a satellite and another object orbiting the Earth.

FACT SHEET

SUMMARY

- PREEMPT visualizes CDM data in 3-D using an intuitive and dynamic web interface.
- Numerous camera settings are available.
- Satellite operators can gain a good overview of a possible collision situation and come to an informed decision.
- PREEMPT does not need to be installed on the end user's system – the application is simply accessed via a browser.
- The asynchronous web application reacts reliably to user entries.
- Thanks to its attractive design, PREEMPT is also suitable for public presentations.

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The program can visualize the collision event in three dimensions for satellite operators, contributing crucially to their understanding of the situation. This allows operators to make an informed decision as to whether or not they should take preventive action.

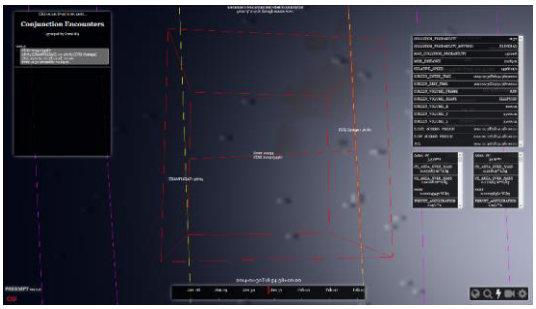

Figure 2: A detailed view of a possible collision event. The shortest distance between the collision objects and further detailed information is visible here.

As a web application, PREEMPT is browser-based and can be used immediately, with no need for further plug-ins. Various camera settings are available: the view of the individual collision objects from a first-person or pursuit perspective, a view centered on the potential collision event, and an overview setting centered on the Earth. Multiple conjunction data messages (CDMs) belonging to the same collision event can be displayed at the same time for comparison. This makes it possible, for example, to visualize the effects of a preventive maneuver.

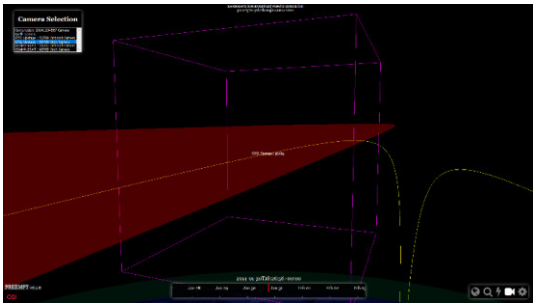

Figure 3: A detailed view of a potential collision object. The dark-red area represents the statistical uncertainty as to the exact position of a piece of scrap in space both longitudinally and transversely. The red sphere symbolizes the potential collision event. The position of the collision objects is shown by the purple cube.

WHY CGI?

CGI has more than 40 years of experience in consulting and system integration for Earth observation, navigation, satellite monitoring and control, the ground segment, flight dynamics, and data processing.

Our focus is on creating customer-oriented solutions, in which innovation and new technologies are applied, for example automation of operations for satellite constellations, data processing with artificial intelligence, and modern cloud solutions for Software-as-a-Service.

ABOUT CGI

CGI is a global service provider for IT and business processes. We were founded in 1976 and have a total of 77,500 employees at 400 locations in 40 countries.

We are on-site for our customers – with strategic IT and business consulting, systems integration, managed IT, business process services, and intellectual property at a top level.

We support our customers in making better use of ongoing investments, while at the same time leveraging new digital technologies and business strategies that enable customers to achieve the best solutions across the entire value chain.

Regarding time and budget, we are regularly awarded due to our strict delivery discipline. To this end, we have consistently achieved more than nine out of ten potential points in customer satisfaction surveys over the past ten years.

For more information, please write to info.de@cgi.com or visit us at de.cgi.com/space.

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