Luciad
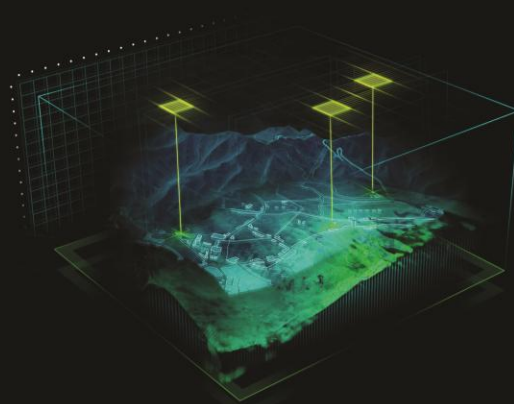
GPU-accelerated Geospatial Situational Awareness

Background

Situational Awareness (SA) involves being aware of what is happening in a given vicinity to understand how information, events and one's own actions will impact immediate and long-term goals and objectives.

Geospatial Situational Awareness (GSA) leverages geospatial information (e.g., UAV feeds, satellite imagery, radar feeds, sensor plots, weather data, and platoon information) to provide defense agencies and the aviation industry with critical decision-making information and analysis.

Luciad provides software solutions for developing state-of-the-art Situational Awareness systems. The company's customers include leading system integrators: Boeing, Lockheed Martin, the Thales Group, and others.

Challenge

Incomplete or inadequate SA/GSA data is one of the primary factors in incidents attributed to human error. As such, timely access to accurate, high-quality data is critical for domains in which poor decisions may lead to serious consequences such as piloting an airplane, conducting military missions, and treating critically ill patients.

For example, the success of military operations relies on immediate access to high quality, real-time target positioning information. Yet, this data needs to be refreshed regularly (preferably at its own refresh rate) to enable quick analysis and action, which, in the case of 60hz for radar feeds, is 60 times per second.

Delivery delays of this critical data can prove costly. For example, a complex helicopter mission often has to be planned in as little as 20 minutes. In this time, the mission planner needs to load all the geospatial data and perform precision operations, such as terrain analyses, and calculations on densities of air routes and the line of sight from the helicopter.

Given that this data often comes from multiple sources – each with a different geo-reference – and changes constantly, multiple imprecise transformations can introduce inconsistencies in the information presented to soldiers,

making decision making extremely difficult. In certain conditions, errors introduced by competitive solutions can exceed 500 meters. Outdated or incorrect data could lead to faulty decisions, potentially resulting in mission failure or, in the worst case, casualties.

Solution

Luciad's LuciadLightspeed software leverages the processing power of NVIDIA® Tesla® GPU accelerators to dramatically speed the delivery and increase the accuracy of geospatial information.

With GPU-accelerated LuciadLightspeed, visualization and analysis is 75 times faster, and all transformations and calculations are accurate within 3 cm (1.2 inch) on world-scale. In addition, GPUs enable the LuciadLightspeed visualization and analysis to perform at 100 calculations per second vs. 1.2 calculations per second on a CPU-based system.

Impact

GPU acceleration enables LuciadLightspeed to combine multiple data sources -- highly dynamic and static -- into one coherent view with unparalleled accuracy. It also enables military personnel to visualize and analyze changes in data (new hostile positions, updated information on targets) in real-time, and instantly adjust mission parameters based on those changes.

With LuciadLightspeed, users gain better insight into the available data, more accurate information on which to base critical, real-time decisions, and the ability to respond to incidents considerably faster than before.

As a result, military missions are safer as the commanders and soldiers can make better and faster decisions and confirm targets based on more accurate data visualization.