OAK RIDGE NATIONAL LABORATORY
MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY
FACT SHEET

Geographic Information Science and Technology

Global Navigation Satellite System Simulation

Using alternate constellations to back up GPS

Project Description

From location-aware applications running on a mobile phone to sophisticated military tracking systems, more and more aspects of daily life depend on having access to a robust global navigation satellite system. Yet in time of conflict, the easiest way to deny an adversary the advantage of holding the "high ground" is to jam their geo-navigation equipment. Thus it is necessary to have backup satellite services that can be pressed into service even though they were never intended to be a substitute for the Global Positioning System (GPS).

Technical Approach

There are many aspects to consider in determining whether a satellite system can be used for geo-navigation. To study all of the possibilities, ORNL developed the Satellite Simulation Toolkit (SatSim) using the Geospatial Integrated Problem Solving Environment (GIPSE) framework. Task wizards allow the researcher to investigate items such as satellite geometries and digital signal processing techniques like the Extended or Scented Kalman Filter using either simulated or real received data streams.

The ORNL Geospatial Viewer is one of the main components of GIPSE and provides an animated way to view how satellite geometry impacts the convergence rate of the navigation solution. Other built-in analysis and plotting tools quantify the resulting position errors as a function of time.

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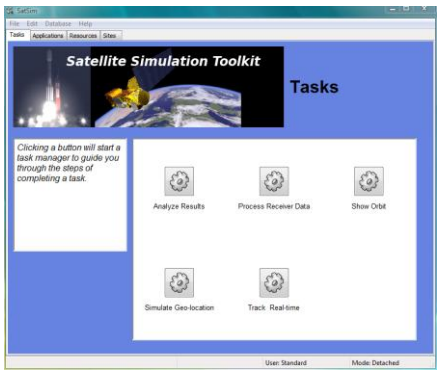
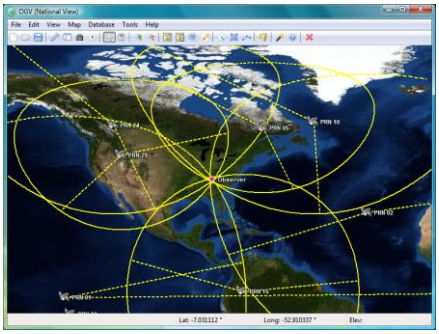
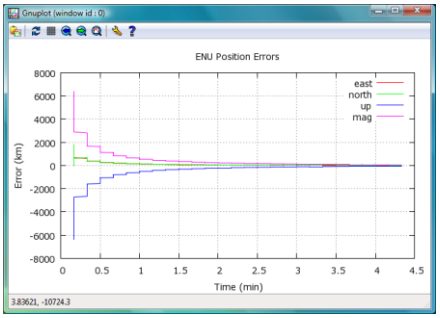


SatSim Task Panel.



Geospatial-temporal Display.



Built-in Analysis Tools.

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