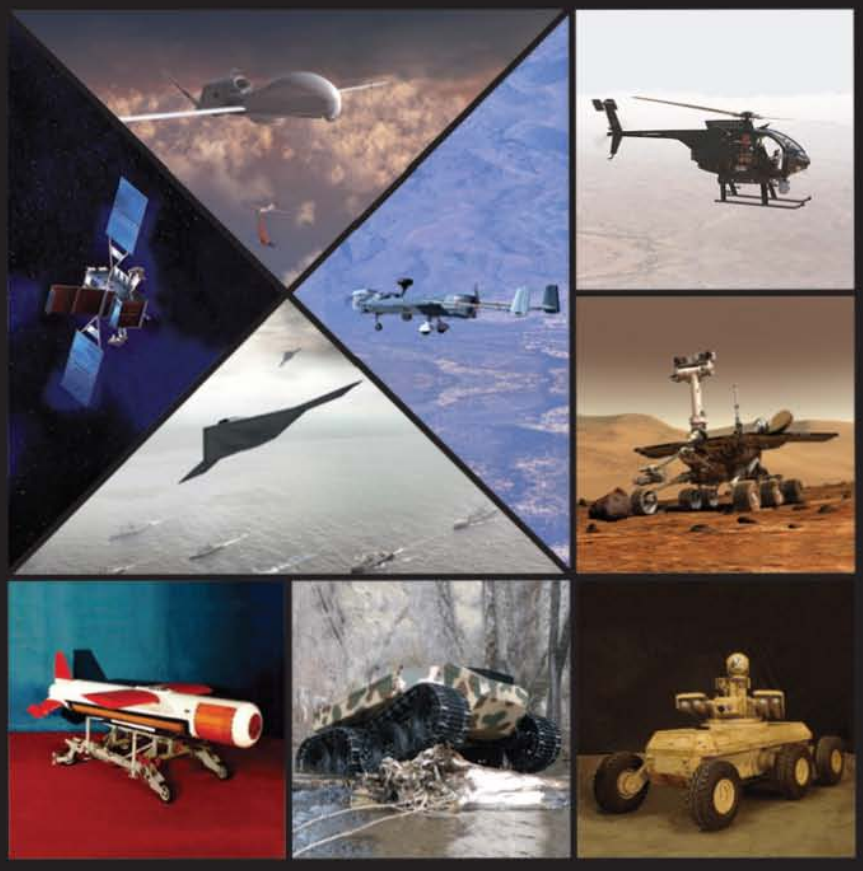
NORTHROP GRUMMAN

Unmanned Vehicle Navigation



Northrop Grumman Navigation Systems guide Unmanned Vehicles—in the air, on the ground, underwater, and in space

Unmanned Vehicles (UV) provide a wide range of new capabilities—they operate in areas where manned vehicles can't, allow for prolonged missions which are not limited by human endurance, and reduce risk to human lives. Northrop Grumman's Navigation Systems Division (NSD) provides a family of products and services that will guide UVs wherever they may go, and meet the full range of inertial and navigation needs for UV applications. From gyroscopes to precision inertial/Global Positioning System (GPS) solutions, our products have been integrated into unmanned platforms for air, ground, underwater, and space missions.

NSD developed Fiber-Optic Gyroscopes (FOG), the latest navigation grade gyros, to ensure that we are poised to meet customer requirements now and in the future. The FOG navigation product family includes:

- LN-200 inertial measurement unit (IMU) for airborne and space applications
- LN-251 inertial navigation system (INS)/GPS for airborne and underwater applications
- LN-260 INS/GPS, a form, fit and function replacement for the LN-93 Ring Laser Gyro system for airborne applications
- LN-270 INS/GPS for land and pointing applications
- LR-240 IMU for airborne and land stabilization and pointing applications

In the Air

NSD offers non-dithered inertial navigation systems which feature the lowest velocity error and the most accurate geolocation solutions. The FOG Embedded GPS/INS (EGI) has the best size, weight and power in the medium accuracy INS performance class with the highest Mean Time Between Failures at over 20,000 hours. The FOG sensor block has the lowest white noise performance, which enables the system to be used for superior Synthetic Aperture Radar (SAR) imaging, camera stabilization, antenna pointing, geolocation, and weapon targeting. NSD's LN-251 is currently installed on several Unmanned Aerial Vehicles (UAV), including the U.S. Navy's Broad Area Maritime Surveillance (BAMS) Unmanned Aircraft System, the Unmanned Little Bird helicopter, Hunter, and Phantom Ray, along with many other UAVs.

Relative Navigation

NSD is one of the premier leaders in the Relative Navigation market. Relative Navigation allows the user unprecedented accuracy for autonomous aerial refueling (AAR), Joint Precision Approach and Landing System (JPALS), and swarm flying of UAVs. NSD is leading this emerging requirement by developing the necessary algorithms and working with the U.S. military and industry partners to ensure that EGI-centric solutions meet or exceed all requirements.

On the Ground

NSD's LN-270 has been adapted for Unmanned Ground Vehicles (UGV), using either GPS or odometer input to produce geolocation navigation and pointing solutions that allow the user to perform a variety of missions. The LN-270 provides stabilization during the most demanding terrain excursions, providing the user the ability to precisely geolocate threats or ensure a perimeter is maintained. The LN-270 has been selected for the Army Brigade Combat Team Modernization program as the navigation solution of the future, along with other unmanned applications.

Underwater

NSD's LN-251 INS and LN-200 IMU, both non-dithered solutions, allow for ease of installation and create no acoustic noise for underwater applications. Unmanned Underwater Vehicle (UUV) applications include both unmanned remote sensors and unmanned/manned small submersibles. The INS can be tightly integrated with sonar Doppler for unrivaled performance.

In Space

NSD supports a variety of applications in space, from Space Based Infrared System (SBIRS) satellite stabilization to the Mars Rover. NSD's LN-200 was utilized on the Mars Rover parachute to enable landing and is also in use on the Rover to support camera stabilization on Mars, allowing scientists to collect invaluable data.

Northrop Grumman Navigation Systems Division's family of navigation equipment provides high accuracy solutions, in any environment, to the challenges of UV operation. Our customized solutions are designed to meet our customers' evolving needs at the forefront of UV technology.

LN-200

LN-251

LR-240

LN-260

LN-270

NORTHROP GRUMMAN

For more information, please contact:
Northrop Grumman Corporation
Navigation Systems
21240 Burbank Boulevard
Woodland Hills, California 91367 USA
1-866-NGNAVSYS (646-2879)
www.northropgrumman.com Search:NSD

25194/August 2010