GPS Eye-in-the-Sky Software Takes Closer Look Below

Originating Technology/NASA Contribution

The Global Positioning System (GPS) is a satellite navigation system developed and maintained by the U.S. Government. Though initially designed for military applications, GPS is also a public information service that provides the environment, industry, and transportation with location and time information systems.

Naval Research Laboratory, a Colorado-based research and development company, has developed a new aerial mapping system. This system is based on a GPS-enabled cell phone and provides high-accuracy GPS/inertial mapping system that can be used for area surveys and tracking, including high-definition video-camera images. The system is designed to collect and transmit data for commercial and military applications.

Partnership

In November 2000, the SBIR program awarded a contract to NAVSYS Corporation to develop a small, mobile version of the GI-Eye aerial mapping system. The SBIR aimed to address the unreliability of GPS surveys and provide a new aerial mapping system that can be used for area surveys and tracking using a GPS-enabled cell phone.

Product Outcome

The GI-Eye software-based system, used to collect aerial mapping data for commercial and military applications. The Original System developed for NASA was a van-based unit, NAVSYS Corporation took this system and developed a smaller, airborne version of the product, termed GI-Eye, which was then used to collect aerial mapping data for commercial and military applications.

First and foremost,Traditional GPS cannot communicate adequately to the remote areas of the world using several different GPS signals. The Global Positioning System, a satellite system, the SBIR was designed to address this problem. The program was to develop a small, mobile version of the GI-Eye system that could be used for area surveys and tracking using a GPS-enabled cell phone.

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Despite all of its terrestrial accomplishments, traditional GPS still has its limitations. The Space Agency is working to address these with many new advances, including "Global Differential GPS" technology that instantaneously provides a position to within 4 inches horizontally and 8 inches vertically, anywhere on Earth. According to NASA's Jet Propulsion Laboratory, no other navigational system developed and maintained by the U.S. Government, GPS is also a public information service that provides the environment, industry, and transportation with location and time information systems.

Computing Technology

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proprietary InterNav kinematic alignment algorithm to measure the precise attitude of the camera using the inertial sensor data.

By recording the precise location and attitude of the video images, the extraction of feature location data is simplified and streamlined. According to the company, this results in rapid and more efficient data processing, thus eliminating the need for expensive and time-consuming processing currently needed to generate the orthorectified and registered overhead images used by many Web services.

The GI-Eye technology has been integrated into FLIR Systems, Inc.’s Star SAFIRE III airborne electro-optic thermal imaging system. Currently, there are approximately 800 Star SAFIRE III units deployed on more than 35 different types of rotary- and fixed-wing aircraft. The pairing of GI-Eye’s precision mapping abilities and Star SAFIRE III’s long-distance, 360-degree, day or night scoping abilities presents a truly unprecedented vantage point for aerial surveillance associated with search and rescue, reconnaissance, law enforcement, border patrol, news gathering, land-use planning, and environmental monitoring.

GI-Eye also registers sensor data collected from unmanned aerial vehicles (UAVs) such as the U.S. Department of Energy’s Atmospheric Radiation Measurement (ARM) UAV, the first unmanned craft ever to carry out a scientific research flight. In the military, the system was also selected by the U.S. Navy for use in an advanced technology demonstration to provide real-time target coordinates on a battlefield.

“We have been very impressed with targeting results provided by the NAVSYS GI-Eye product and are now also pursuing approaches to GPS-denied navigation of unmanned air vehicles using this technology,” said James R. Buss, of the Office of Naval Research.

Targeting systems have additionally been developed for several other U.S. military branches, including the U.S. Marine Corps.