Signal Exploitation and Geolocation

As today's communications spectrum becomes increasingly complex, Southwest Research Institute continues its development of innovative solutions for U.S. and friendly foreign governments that expand the performance of traditional communication signal intercept, direction finding, surveillance, tracking and geolocation technologies.

To help reduce friendly fire incidents on the battlefield, engineers continue co-developing the Flashlight™ Soldier Combat Identification System. Comparable in concept to an ordinary flashlight, an interrogator focuses radio beams, "illuminating" the area in its path. Soldiers and other assets fitted with a transponder are identified, alerting the soldier with the interrogator to the presence of friendly forces (sgd.swri.org). The U.S. Office of the Secretary of Defense recently gave FSCIS high marks in an evaluation.

We created, documented and released a new technical data interchange that allows government agencies to task, report and disseminate information processed by the worldwide geolocation network. The upgrade is the first major redesign of the network in almost 30 years, significantly expanding data formats, structures and data storage, as well as supporting future expansion requirements.

Our engineers are developing an integrated mast antenna and ruggedized below-deck equipment using SwRI's Frontier architecture for shipboard applications (tpd.swri.org). We also are expanding Frontier's capabilities to provide a cost-effective solution for high priority SIGINT applications within the U.S. and allied navies.

Our Skywisp® atmospheric glider lifts a wide range of mission payloads to stratospheric altitudes. We recently fitted the Skywisp glider with capillary tubing to measure greenhouse gas concentrations from sea level to 100,000 feet. The tubing self-evacuates as it ascends and collects ionospheric gases as it descends. The samples are compressed in layers that roughly correspond to the collection heights, providing an efficient, cost-effective method for analyzing carbon dioxide, methane or other gases compared to the use of high-altitude aircraft and free-floating balloons.

In response to client needs, we are developing methods to incorporate diverse geolocation operational data into the computing "cloud" and designing efficient methods to store and retrieve the information (sed.swri.org).

We also are building on our N-channel technology expertise in high-frequency bandwidths, applying this expertise to the U.S. government's next-generation VHF/UHF communications intelligence sensors.

For another program, we are developing advanced capabilities for a flexible radio frequency communication platform using software-defined radio technology for operationally

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Our engineers are reducing the size, weight and power consumption of the Flashlight™ Soldier Combat Identification System to make the system "soldier-scale." The system also could be scaled up for use on ground vehicles and aircraft, replacing the array of combat identification systems currently in use.

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An SwRI researcher holds the Skywisp® glider prior to in situ *gas collection. Capillaries are visible on the underside of the wings. The glider can be launched with a weather balloon to altitudes as high as 100,000 feet and its descent controlled to a specified GPS coordinate.*

responsive space plug-and-play compatibility (se.swri.org).

SwRI uses internal research funds to help develop these technologies and pave the way for client-sponsored programs. We continue to use internal funding to reduce the size, weight and power of electronic systems and components. These reductions have contributed to the success of our combat identification and unmanned aerial vehicles.

analysis, analytics & reporting • antennas & propagation • array processing • cloud computing • combat identification • communications signal processing • communications solutions • cross domain solutions • cyber exploitation • combat identification • electromagnetic modeling • electronic attack • electronic warfare • genetic programming • intelligence networking • GPS engineering • high-performance data visualization • information exploitation • information operations • geolocation • SEI CMMI®-DEV Level 3 • life-cycle support • micro-SIGINT • signals intelligence • steganalysis • surveillance systems • tagging, tracking & locating solutions

Staff members perform signal exploitation and geolocation projects according to the ISO 9001 Quality Management System. Since 2008, our "Business Environment for Effective Management" has provided a business system that satisfies both ISO 9001 and the Software Engineering Institute's Capability Maturity Model® Integration, which was appraised at Level 3 in October. This combination helps assure strict quality standards are met for products and services, as well as for process improvement and program efficiency and effectiveness. ❖

Visit sigint.swri.org for more information or contact Vice President Dr. William G. Guion at (210) 522-2902 or william.guion@swri.org.

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Courtesy DOD Australia

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SwRI designed an integrated mast antenna (inset) for installation on Australian AWD-class ships. SwRI SIGINT capabilities support allied navies throughout the world.

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SwRI maintains a 200-acre field test site to assess the performance of various antenna designs. We are updating the measurement equipment at the site, including adding new arrays and fiber optic links with distant laboratories to improve the efficiency and cost effectiveness of client programs.