

Signal Exploitation and Geolocation

Southwest Research Institute continues to provide information exploitation systems to support homeland security, particularly with signal intelligence obtained through electronic surveillance. For more than 55 years, we have assisted U.S. and friendly foreign governments, developing communications signal intercept, direction finding, surveillance, and tagging and tracking systems.

We are expanding the frequency coverage of existing naval shipboard communications intelligence (COMINT) collection

systems. Appropriate antennas and processing systems, designed to withstand the rigors of an ocean environment, intercept radio communications signals, store the signal information and calculate directions of arrival to allow the determination of the transmitters' locations.

We are building, testing and delivering AU-506 direction finding antennas for use on submarine platforms. The antennas provide frequency coverage in the HF/VHF/UHF ranges, while withstanding the hydrodynamic flow loading, vibration and shock of undersea operations.

Staff members are working with the Florida National Guard on the Civil Support for Enhanced Responsiveness (CSER) program to develop communications capabilities for units deployed following a disaster, such as a hurricane. If communications infrastructure has been destroyed, the system allows Guard units to communicate with an operations center via satellite. The system uses a personal digital assistant with SwRI-developed software to send and receive messages. When communications are restored, the system resumes using cellular telephone communications.

Our cost-effective and simple-to-operate SkyWisp® autonomous stratospheric glider provides timely and responsive communications, intelligence, surveillance and reconnaissance (CISR) for ground forces and emergency responders during special operations. The system provides line-of-sight coverage over large areas, and its scalable airframe can be tailored to a variety of mission payloads, such as communications relay, remote sensing or monitoring. SkyWisp loiters over the mission area at



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We are developing a kit that will increase the radio frequency coverage of SwRI-built antennas by a factor of three. These retrofit kits provide a cost-effective upgrade to increase the service life and utility of equipment currently in service.

Staff members are building cable assemblies that are no longer supported by the original equipment manufacturer to help sustain the navigation and infrared system used aboard the Air Force F-15 and F-16 aircraft. The system allows these aircraft to use unguided and precision-guided weapons at night, at low altitudes and during inclement weather.



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*geolocation systems • intelligent SIGINT networks • wideband intercept • automatic signal recognition
electromagnetic modeling & propagation analysis • system production • information exploitation
tracking systems • spectrum surveillance • special-purpose tagging & tracking devices • steganalysis
life-cycle support • repair & refurbishment • field engineering support • signal intelligence systems
signal analysis • genetic programming*

stratospheric altitudes and glides to a pre-programmed location following its mission.

For decades, SwRI has used internal funding to advance technologies that benefit our clients. Many of our efforts are targeted at automated processing and reducing the size, weight, and power of instrumentation and systems. We are currently funding the development of systems for data link protocols, high-frequency environments, N-channel processing, demodulation and information exploitation, and “knowledge discovery in data.”

Internal research funding supported the development of stealthy shipboard antennas including the AS-141, AS-142 and AS-420B. They are designed for low radar cross section, yet are rugged enough to perform in the severe physical and electromagnetic environments aboard surface combatants.

All signal exploitation and geolocation work is performed using an ISO 9001:2000 Quality Management System. In 2008, we started a program called “Business Environment for Effective Management” to bridge the gap between ISO-9001 requirements and Level 3 of the Software Engineering Institute’s Capability Maturity Model® Integration and combine the two into a single business system that complies with both ISO and CMMI®. This assures strict quality standards are met, including 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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An inexpensive helium-filled balloon launches our SkyWisp® autonomous stratospheric glider to altitudes in excess of 100,000 feet. This expendable low-cost system can carry a communications radio relay, a remote-imaging system and other payloads that require line-of-sight coverage over large areas. To date, SkyWisp has completed more than 200 successful test flights.

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Our configurable production bay allows for fabrication and testing of a wide variety of engineering models, prototypes and hardware (pod.swri.org). Work benches, assembly and test equipment, storage cabinets and shelving, partitions, network and communication lines, and electrical power can be reconfigured quickly, as shown in these images, to meet a variety of client needs.