

Automation & Data Systems



D014862-0019

Wireless connectivity, reconfigurable systems, automation and other enabling technologies hold promise for significant advancements in numerous industries. Southwest Research Institute engineers and analysts are applying these technologies to develop innovative hardware and software systems for traffic management, manufacturing, medical, network and industrial security applications.

One of the most important issues of the day is the defense of our

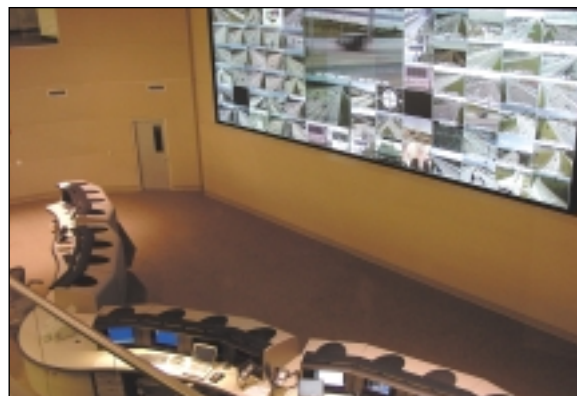
Our device for safe and efficient removal and installation of F-16 fighter aircraft wings precisely aligns the wing with the aircraft fuselage for retrofit operations. The tool has resulted in a significant decrease in labor and increases in quality and reliability.

nation's **networking infrastructure**. We are developing a novel, cost-effective approach for Internet packet traceback to locate the source of Internet "denial of service" attacks (cybersecurity.swri.org). Our staff is also examining the broader legal, social, privacy and economic

barriers to the deployment of network defense systems.

Broad multidisciplinary expertise in networks, communications and embedded systems hardware and software (communications.swri.org) are supporting the development of a novel network-centric, real-time data acquisition, recording and telemetry **flight test system**, which improves scalability and flexibility compared to traditional approaches.

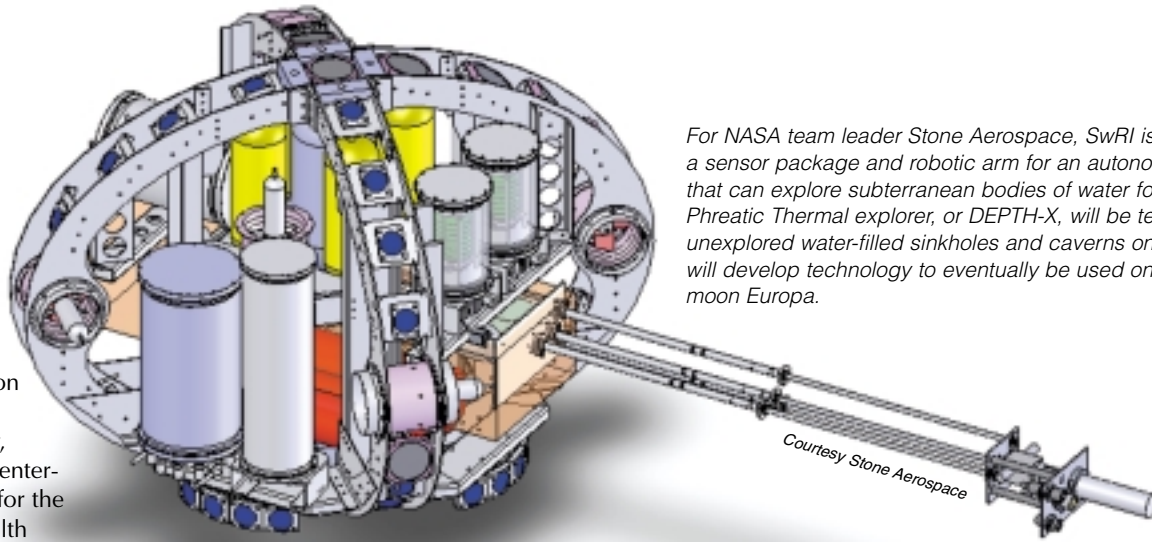
Our engineers are developing a modeling tool to rigorously analyze radio design decisions, particularly for **software-defined radio**, which modulates and demodulates radio signals using software. This tool allows users to play "what if" games to evaluate size, weight and power tradeoffs, as well as assess the relative cost of adopting standard or



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The state of Florida recently deployed the SwRI-developed SunGuide software at the Fort Lauderdale Traffic Management Center. The software, planned for use across the state, will be deployed in three more locations by the end of the year.

process re-engineering • cyber security & information assurance • real-time & embedded systems • image & signal processing • control center software • medical device development • MEMS & microfluidics • process automation & robotics • adaptive & reconfigurable systems • lean manufacturing • automated inspection •



For NASA team leader Stone Aerospace, SwRI is developing a sensor package and robotic arm for an autonomous vehicle that can explore subterranean bodies of water for life. Deep Phreatic Thermal explorer, or DEPTH-X, will be tested in unexplored water-filled sinkholes and caverns on Earth, and will develop technology to eventually be used on the jovian moon Europa.

Courtesy Stone Aerospace

alternative architectures.

We are on the verge of testing a new, user-friendly enterprise system for the Veterans Health Administration. We are re-engineering [patient scheduling and pharmacy applications](#) for integration with the VHA's existing medical information system ([medicalsystems.swri.org](#)). Staff members are currently adding supplies inventory, order dispensation, order entry, reporting and security functions to the pharmacy application. The patient scheduling application will be field-tested early next year. Additionally, SwRI is upgrading the automation software for the VHA's consolidated mail outpatient pharmacies.

SwRI's medical technology expertise includes cardiovascular, orthopedic, cancer detection, ultrasound, medical packaging and medical manufacturing processes ([bioengineering.swri.org](#)). Specifically, we are designing novel [spinal implant](#) devices and tools to provide better

options for back pain surgery, investigating immunofluorescent biomarker combinations for use in early [cervical cancer detection](#) and developing non-invasive techniques to diagnose peripheral and coronary [vascular disease](#).

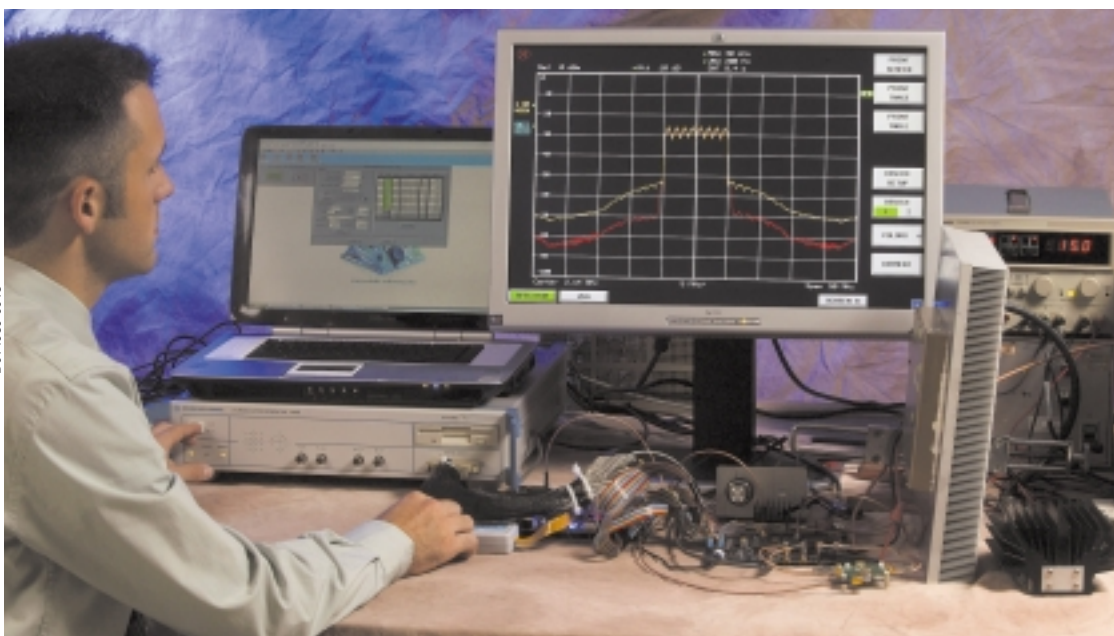
A general improvement in the economy is sparking manufacturers to invest in automation, process improvement and employee training. Using expertise in these areas, SwRI recently developed a large, [automated system](#) for producing glass fiber ([manufacturing.swri.org](#)). The system will provide significant gains in manufacturing productivity, safety, quality and waste reduction.

SwRI's intelligent transportation systems program continues to expand and mature as the ITS industry moves toward

statewide deployments of [advanced traffic management systems](#) ([its.swri.org](#)). SwRI is developing statewide solutions in Florida and Texas. We celebrated a milestone with San Antonio's TransGuide, the first automated traffic management system in Texas and one of the first in the nation, as it celebrated its tenth anniversary. In addition, we have developed a system for the Orlando Orange County Expressway Authority to calculate travel times on its expressways using automated vehicle identification tags and to provide that information to the traveling public on dynamic message signs and the Internet.

This year, we deployed a [closed-circuit television subsystem](#) in Houston in conjunction with a redesign of Houston's TranStar Advanced Traffic Management Video Network. The new system consolidates disparate analog video and data networks into a single, manageable system. ❖

Visit [autodata.swri.org](#) for more information or contact Vice President Les B. Hoffman at (210) 522-5172 or [lhoffman@swri.org](#).



SwRI engineers are pioneers in the implementation of digital predistortion algorithms to substantially increase the efficiency of communications power amplifiers.