Southwest Research Institute® (SwRI®) engineers have experience spanning several decades in modeling, simulation and analysis of complex systems. Staff expertise includes communications systems modeling, radar modeling and analysis, electronic warfare, software-defined radio, integrated electronic systems, distributed interactive simulation architectures, and hardware-in-the-loop simulation.

The multidisciplinary staff in the Communications and Embedded Systems Department provides a wide range of services with an emphasis on system design and development and rapid response to challenges. Additional capabilities include technical consulting, basic and applied research, design and development, and testing and evaluation of products and technologies.

Communications Systems Modeling
SwRI engineers have developed model-based design and analysis tools for software-defined radio and other communications systems to help evaluate size, weight, power and cost tradeoffs. In a project for a major aerospace company, SwRI developed a set of models that describe communications and processing requirements, available hardware, and relevant properties of the alternative software architectures.

Trade space analysis tools allow the design space to be both quickly searched and incrementally refined in regions of higher payoff.

Integrated Electronic Systems
SwRI engineers have evaluated, developed, deployed and verified computer-based threat analysis systems for more than a decade. These include independent sensors, integrated air defense systems (IADS), and other electronic warfare systems. Staff members have extensive experience in the design, development, testing and maintenance of systems used by military organizations to evaluate data, plan courses of action, and reduce development time and cost for complex systems.

Distributed Interactive Simulation Architectures
SwRI engineers have expertise in the design and development of distributed, interactive and constructive simulation architectures and systems. Under internal R&D and USAF funding, SwRI developed the Joint Ground Game (JGG) information warfare engine, which implements multiple DoD interface standards and is now one of the core modeling systems in the Air Force Air & Space Constructive Environment – Information Operations Suite (ACE-IOS).

Hardware-in-the-Loop (HIL) Simulation
In addition to large-scale simulation systems, SwRI engineers use HIL techniques to enable high-fidelity benchtop testing of systems for field or flight. SwRI developed complex electrical, software and electro-mechanical systems for the Tomahawk Anti-Ship Missile (TASM) HIL simulation system.

Antenna Performance Modeling
SwRI has conducted research in the design of novel antenna topologies and simulation of single- and multi-antenna systems. Engineers have conducted entire platform simulations to determine the optimal placement of a set of antennas with regard to co-site interference and calibration challenges. Monte Carlo and worst-case simulations can extrapolate the effects of changes in element performance to entire phased-array systems.

SwRI engineers also have extensive experience in developing smart antennas, which can adaptively point the main antenna beam in the direction of a desired transceiver and can resonate at different frequencies. Research areas include broadband, electrically small, and low-observable antennas; phased-array radar systems and other special attributes.
We welcome your inquiries. 
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