

In This Issue - Technically

On the Vulnerability of Biometric Security Systems

This paper presents an overview of the weakness of biometric security systems and possible solutions to improve it. Different levels of attack are described, and the strengths and weaknesses of the main biometric system is emphasized. Solutions are provided with special emphasis on cryptography and watermarking techniques.

IR Circuit Board and IC Failure Detection

This paper describes research and development efforts in the use of infrared (IR) laser beams for detecting failures in integrated circuits resident on printed circuit boards. This work involves taking advantage of the transparency of the silicon substrate of ICs to radiation in the near infrared (NIR) spectrum to devise a non-invasive method for imaging the component circuitry of the IC. The implication is that a means to see into the physical structure of an integrated circuit can be created by using lasers tuned to these wavelengths. While the silicon substrate is transparent to the laser, the circuit paths and devices embedded within the substrate are readily visible since their metallic composition is opaque to laser energy at this wavelength. A laser test fixture consisting of a 1064 nm continuous wave laser, CCD camera, and image acquisition board is used to generate images from flip-chip integrated circuits. Multiresolution image processing techniques are then applied to the resulting images to identify potential defects.

Military Aircraft Fiber Optics Networks: Status & Direction

Fiber optics is proving to be an essential transmission medium at data rates of 1 Gigabit per second and above because of advantages relative to copper, including increased distance-bandwidth, reduced weight, and reduced cable volume. Whereas implementation in commercial applications is often straightforward, aerospace applications present a number of challenges due to an environment harsher than exists in the commercial world.

In order to meet the future needs of military aircraft, designers will have to choose carefully between a number of component and architectural choices now available. This paper examines current trends in aerospace fiber optics and maps future needs for aerospace.

3D Visualization to Support Airport Security Operations

In the summer of 2000, the National Safe Skies Alliance awarded a project to the Applied Visualization Center at the University of Tennessee to develop a 3D computer tool to assist the US Federal Aviation Administration security group,

now the Transportation Security Administration, in evaluating new equipment and procedures to improve airport checkpoint security. At the time of this writing, numerous detection equipment models, three specific airports, and a placement and passenger flow simulation tool for airport security planners have been developed. Similar tools have been constructed for simulating cargo/baggage inspection and other airport security operations. An extension of the original effort to consolidate the tools is currently underway.

COTS Software Design Minimizes ATS Lifecycle Cost

This paper identifies the design features of Commercial-Off-The-Shelf (COTS) software that impact the lifecycle cost of Automatic Test System (ATS) solutions and provides a set of design guidelines. It demonstrates that the architecture of COTS software must be modular, based on correct functional allocation, should possess distribution capabilities, and contain open interfaces that remain backwards compatible. In the case of COTS development tools, the programmatic interface should be simple, extensible, and enforced in the development environment.

NETEX UWB Test Results

The goal of the Defense Advanced Research Projects Agency's (DARPA) Networking in Extreme Environments (NETEX) program is to create a wireless networking technology for the military user that enables robust connectivity in harsh environments and support its integration into new and emerging sensor and communication systems. Phase 1, resulted in a thorough understanding of the effects of UltraWide Band (UWB) system operation on existing military spectrum users based on modeling, simulation, and measurements. In order to accomplish this task the DARPA Advanced Technology Office (ATO) procured a set of UWB emitters and broadband antennas to use as interference sources and contracted with the Naval Air Warfare Center Aircraft Division (NAWC AD) Electromagnetic Environmental Effects (E3) Division to provide candidate victim systems from the existing (legacy) US naval aircraft and shipboard inventory for testing. Testing was conducted on seventeen legacy systems during the period of October 2002 through March 2003. The purpose of this paper is to provide a brief overview of the results of these tests.

This paper will provide a brief discussion of the UWB emissions as described by the US Federal Communications Commission (FCC) and describe the generic UWB emitter used for these tests. It will then provide a discussion of the results as they apply to the purpose of the NETEX program.