

TECHNOLOGY

Ivars Peterson reports from Lexington, Ky., at the 1982 Carnahan Conference on Security Technology

Fence signatures for security

When an intruder disturbs a chain-link fence that protects an area requiring a high level of security, his actions trigger vibrations in the fence. Researchers at SRI International in Menlo Park, Calif., are investigating the possibility of analyzing the "signatures" of various types of disturbances in order to identify potential threats while reducing the false-alarm rate.

Termpoon Kovattana, senior research engineer, says the sensor required for the system is an extension of devices already in use for handwriting identification and signature verification. It is designed to detect not only frequency and amplitude but also the direction of the force as it varies with time. This triaxial force sensor detects forces through a probe attached to a circular aluminum diaphragm and separates the motion into time-varying vectors parallel to the three major axes of the fence.

Tests have shown that the signals received from a sensor located on a fence panel can be used to distinguish various disturbances including an intruder climbing over the fence or using a ladder and the effects of wind and rain or an animal pushing against the fence. Kovattana says the next step involves work on a computer algorithm for microprocessors to identify automatically the types of disturbances, and then design of "a suitable processor to handle as many as 30 sensors and report 'real' intrusion attempts within three minutes."

Substance, shadow and computer storage

Valuable information often must be protected against both disclosure and destruction. These requirements seem incompatible because preventing disclosure requires keeping and guarding as few copies as possible while avoiding destruction requires making and dispersing many copies. In the last three years, advances in information theory have helped to resolve the dilemma. Several mathematicians have developed various "threshold information preservation systems" that protect information to whatever level of security a user desires.

In such a system, says George R. Blakley, a mathematician at Texas A&M University, the information contained on a roll of magnetic tape can be used to produce, for example, nine other rolls of magnetic tape in such a way that no three of these rolls give any inkling of the original information, but any four of these nine rolls make it easy to construct the entire contents of the original roll of tape. Thus, valuable digital data (called the substance) can be stirred in with randomly generated electronic "garbage" to produce several seemingly senseless messages (called shadows), which are all the same size as the original message. The user selects the level of security by specifying the total number of shadows and the minimum number required to reconstruct the entire message.

In these systems, all information is stored as a list of numbers. Blakley says, "It no longer makes sense to keep really valuable information in the form of documents people can read, or videotape they can watch, if there is a way to turn that information into digital form which can be manipulated in a computer." A typical system requires a description of the desired level of protection, the number to be protected and a random input.

There are many types of threshold information preservation systems, says Blakley. Each has its distinctive advantages and costs. Some can even be implemented on a personal computer, although generating truly random numbers to use in the systems may be a problem, Blakley says. The technique can be applied to mailing lists, cryptographic keys, personnel records, trade secrets, computer programs and a variety of documents. "Safe storage of a substance dispersed among shadows is, simply, much cheaper and more secure than safe storage of a physical object symbolic of that substance," says Blakley.

BIOMEDICINE

From the Society for Investigative Dermatology meeting in Washington, D.C.

Zapping wounds with current

Electricity, which speeds up the rate at which bones knit together after a fracture, may also stimulate wound healing, say Oscar M. Alvarez and colleagues at the University of Pittsburgh School of Medicine.

Inspired by the findings in bone, the researchers applied direct current to surface scrapes on the skin of young domestic pigs via what Alvarez calls "an electric Band-Aid"—a silver impregnated cloth hooked up to an electric source. They found it took an average of 2.9 days for half the wounds treated with electricity to heal over, compared with 4.1 days for wounds treated with an unenergized electrode and 4.6 days for wounds left open to the air.

Because some of the silver gets into the skin, the researchers can't say for certain whether the effect was due to silver ions, due to a combination of electricity and ions, or whether it was due to the current alone.

Athlete's foot in the genes?

While many people get athlete's foot at some time in their lives, it can usually be cleared up with medication. But for some people the itching and scaling between the toes just won't go away.

A. Razzaque Ahmed and colleagues at the University of California at Los Angeles School of Medicine believe the problems of some chronic sufferers may be due to a combination of genetic and immunologic factors that limit the body's ability to fight the fungus that causes athlete's foot. They studied 45 patients who had athlete's foot for an average of 17 years and found a preponderance of certain HLA types—genetic markers related to tissue rejection—indicating a genetic component to persistent infection. Their study also reaffirmed that athlete's foot sufferers have higher levels of certain antibodies in their blood.

"This genetic predisposition and the antibodies may make the environment such that the fungus is not attacked by the defense mechanism," says Ahmed. In addition, he says, it may explain why therapy is ineffective for certain people.

Psoriasis, acne treatment update

Psoriasis—thickened, red skin covered with silvery scales—is not a lethal disease, but it can be physically and emotionally damaging to the 2 of every 100 Americans it affects. In 1974 researchers announced that a treatment called PUVA—a combination of a retinoic acid called psoralen and ultraviolet light—worked in most of the cases resistant to medication. But follow-up studies showed side-effects, including an increased risk of curable skin cancer and possible long-term effects on the immune system, prompting the National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases to sponsor a 16-university study of more than 1,300 people receiving PUVA treatment.

John Parrish of Harvard Medical School, one of the original developers of PUVA, was asked at a press conference when the Food and Drug Administration was likely to make a decision on the therapy. "Momentarily," he said, and he was right—a few minutes later he received a nod from the back of the room, and announced that the FDA had approved it. While some doctors have already been using PUVA, the approval means more doctors are likely to do so and that the drug company that makes psoralen can begin promoting the therapy.

13-*cis*-retinoic acid, a drug similar to psoralen, may be nearing approval for use in acne. The drug, which one researcher said has been "unbelievably successful" in clinical trials on severe cases of acne, is expected to receive the FDA's nod this fall.