

Fact Sheet

ENVIRONMENTAL EFFECTS ON INTRUSION DETECTION SYSTEMS (IDSs)

PROBLEM

Exterior sensor systems used for intrusion detection are affected by their operating environment. They experience diurnal and seasonal variation in site conditions, as well as less predictable changes caused by storms. Winter conditions have sensor-specific impacts on IDS reliability. For example, when moist ground freezes, buried electromagnetic sensors have a higher probability of detection, but ground motion sensor systems become ineffective. Transitional periods can be particularly troublesome because of the frequency of change in a sensor's operating environment. Unless security personnel are aware of the dependence of sensor system reliability on site conditions, episodes of environmentally caused reduction in detection capability may go unnoticed—until an intruder passes undetected. If the variation in site conditions satisfies the alarm criteria of the sensor system, then the problem is numerous nuisance alarms, which cause security personnel to lose confidence in the sensor system and perhaps fail to respond appropriately.

SOLUTION

Sensor system performance is optimized when environmental effects are accounted for during security planning and IDS installation, and when operators are made aware of detection limitations resulting from weather and terrain effects. Probabilities of detection and nuisance alarm rates must be expressed to security personnel as a function of the IDS's operating environment.

STATUS

The Weather Vulnerability Assessment Tool (WVAT) is a stand-alone software application that corrects for the influence of weather on IDS performance data and predicts detection capability under other weather conditions. Currently under development, WVAT will alert operators to specific situations (weather events, daytime/nighttime scenarios) in which the likelihood of detecting an intruder falls below a chosen allowable probability of detection. WVAT also will indicate the likelihood of nuisance alarms as a function of weather and time of day.

CRREL expertise can be applied to system development, trade-off studies, and performance testing, as well as to selection, installation, and operation of commercially available IDSs. CRREL field tests of intrusion detection systems also have been training exercises for Army Special Forces soldiers, who participated as high-threat intruders.



Special Forces soldiers attempting to breach security fence protected by vibration IDSs.

POINT OF CONTACT

Dr. Lindamae Peck
603-646-4261
Fax: 603-646-4397
E-mail: lpeck@crrel.usace.army.mil

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Cold Regions Research &
Engineering Laboratory