Cross hairs mark a detail normal scans would miss.

ULTRAFINE ULTRASOUND

Every year nearly one million unnecessary biopsies are performed in the United States, while tens of thousands of tumors go undetected. This is because diagnostic imaging techniques like x-ray mammography and ultrasound can't resolve features smaller than about five millimeters. Now biomedical engineers Vasilis Marmarelis and Tae-Seong Kim at the University of Southern California have developed an ultrasound system with 10 times better resolution. It uses an array of dozens of transmitters, each .4 millimeters on a side, to send ultrasonic pulses through tissue to a matching array of sensors on the opposite side. A computer generates images of the tissue based on the time delay and shape of the received sound waves. Resolution is high because the hardware elements are so small, and because transmitted signals carry more information than the reflected signals used in conventional ultrasound. The system will enter human trials this fall, says Marmarelis, and the researchers hope to partner with medical-imaging firms.

TEXT, LIES, AND VIDEOTAPE

A picture may be worth a thousand words—but even a few words can help sort a thousand pictures. At Siemens Corporate Technology in Munich, Germany, engineers Andreas Hutter and Joerg Heuer have developed software that analyzes video sequences and automatically generates text descriptions of all the moving objects within them. Instead of classifying an object in a parking garage as a person—a difficult task—the software could indicate that a "triangle" (legs) with a "brown top" (hair) traced a certain trajectory. Armed with a text database, security personnel could then search for a car thief with brown hair walking along a certain path just by typing in a few keywords. The Siemens approach, which is compatible with digital-video data standards and could be commercially available in three to five years, is faster and more reliable than training a computer to search videos specifically for a walking person, says Hutter. And the computer doesn't need to be reprogrammed if security also wants to look for something else, say a particular car: a search for a "red rectangle" with "circles" will do.

A one-armed coaster gives a personalized ride.

ROBO RIDE

Imagine experiencing the upside-down thrills and G forces of a 100-meter-high roller coaster, but without tracks and within a space only seven meters high. That's the idea behind Robocoaster, a programmable robot arm that can carry two passengers through loop-the-loops and barrel rolls at accelerations of almost twice the force of gravity. The ride, developed by Robocoaster of Warwick, England, and Kuka Roboter in Augsburg, Germany, is a modified cousin of the giant robot arms that handle everything from heavy lifting to spot-welding on automotive-factory floors. "Riders can choose from five levels: gentle, fun, fast, turbo, and extreme," says Robocoaster president Gino De-Gol. That versatility makes the ride exciting for teens but still accessible to small children and senior citizens. Robocoasters are being tested at three amusement centers in the United States, Brazil, and Denmark, and could show up next year at major theme parks, says De-Gol.

DRIVER PROFILER

Horrible driving seems to be reaching epidemic proportions. So DriveDiagnostics of Jerusalem, Israel, is aiming to give vehicle owners and insurers direct feedback on drivers' performances. Next year, the company plans to begin marketing a device, eight centimeters in diameter, that sits on the dashboard and monitors every move the vehicle makes using accelerometers to measure the forces on the car. Different combinations of forces correspond to different events, and algorithms deduce whether the driver is braking suddenly or taking a corner sharply. The software examines a journey's worth of events and correlates them with one of 30-odd driver profiles, such as "tired," "drunk," or "inexperienced." Although the device will flash a red warning light when a bad move is made, the target market isn't drivers but those who want to enforce better driving, such as parents of new drivers, car fleet managers, and insurance companies, who could review drivers' performances after the fact.

Warning Aggressive driving

Lousy drivers can't hide from this device.