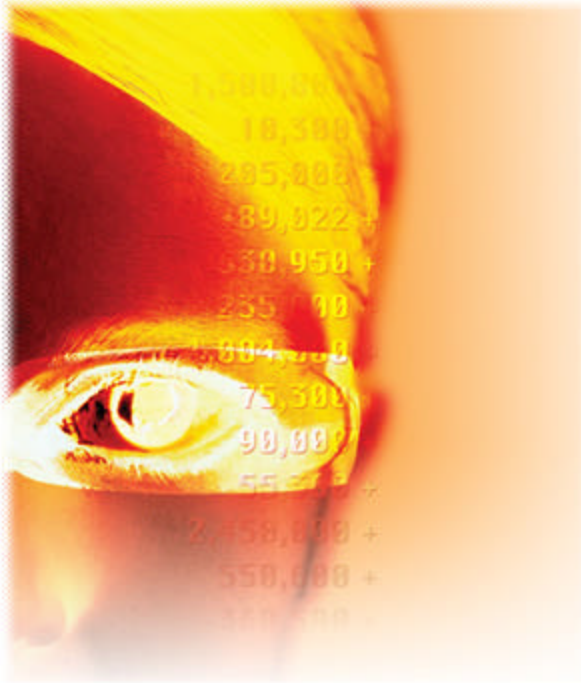


Calculating the Odds



A licensee of ORNL technology receives a venture capital investment.

Battelle Ventures has already placed a bet on ORNL technology. The \$150 million venture capital fund launched in 2003 by Battelle Memorial Institute of Columbus, Ohio, has invested in ORNL licensee Multispectral Imaging, Inc., of Parsippany, N.J. MII's mission is to build high-sensitivity, low-cost infrared camera detectors that enable soldiers and firefighters to "see" objects at night or in smoky areas.

The detector will incorporate ORNL's infrared-sensing microcantilever array technology invented by Thomas Thundat, Eric Wachter and Bruce Warmack. MII's engineering team designed and fabricated a capacitive sensing readout chip integrated with the MII-designed microcantilever sensor array. ORNL's Panos Datskos helped optimize and test prototype microcantilever sensor arrays.

A somewhat surprising aspect of the investment is that MII, a 2003 startup, received venture capital funding even though the managers had just changed technology

horses mid-stream.

"The company had the courage to abandon the original infrared sensing technology with the blessing of its investors and switch to ORNL technology," says Russ Miller, commercialization manager in ORNL's Technology Transfer and Economic Development office. "Battelle Ventures and the company's original investors had confidence in MII's new direction."

In an array of 160×120 silicon microcantilevers, each 50-micron-long microcantilever, which represents a pixel, bends in proportion to the intensity of the infrared radiation striking it. Every object gives off infrared light; the hotter the object, the greater the number of infrared photons emitted. Competing infrared sensing technologies can be either cooled to cryogenic temperatures or operated at near room temperatures. The "un-cooled" ORNL microcantilever technology operates at room temperature, and because this technology requires no cooling, it uses less energy than most competitors, lowering the cost. MII's capacitively sensed microcantilever array offers high resolution, low noise and impressive dynamic range, allowing users of the future camera to take finely detailed pictures of objects with high sensitivity in both brightly lit and dark, smoky rooms.

MII first licensed ORNL's microcantilever technology and then licensed two related inventions by Datskos and Slobodan Rajic. Later the company entered a work-for-others agreement with ORNL to get

help in characterizing the sensitivity of MII's test devices and measuring how much a cantilever bends with changes in infrared light intensity.

ORNL's microcantilever technology patents previously had been licensed to Sarcon Microsystems, an East Tennessee company that closed in 2004. Sarcon had not solved significant engineering problems with the readout circuitry before the company's operating funds were exhausted.

"UT-Battelle recovered the rights to the microcantilever technology after terminating the Sarcon license," Russ Miller says. "Soon thereafter we re-licensed the patented microcantilever technology to Multispectral Imaging."

Matt Miller, MII's founder and chief executive officer, learned about the ORNL technologies when he met former Sarcon managers, including Scott Hunter. Hunter worked at ORNL in the 1980s, learned about ORNL's microcantilever sensors as a Consultec Scientific employee, cofounded Sarcon Microsystems to commercialize the ORNL technology and became Sarcon's chief technology officer.

Miller was a senior executive for NextWave Communications, Viacom, Perkin-Elmer Corp. and General Instruments. He began his career at RCA Laboratories, now the Sarnoff Corp., a company based in Princeton, N.J., that was a founding shareholder in Sarcon. Miller holds a Ph.D. in engineering from Princeton University. Princeton is the home of Battelle Ventures.

Miller encouraged his engineering team to take a fresh look at the ORNL technology. Hunter shared with MII the technology's potential and Sarcon's engineering problems. Hired as CTO, Hunter guided his MII team on the redesign.

Incredibly, in one year, the MII engineering team made arrays of uniformly released microcantilever sensor structures that have up to five times the responsivity of Sarcon's devices. The microcantilevers bend out of the sensor plane, avoiding sticking problems that Sarcon encountered. MII redesigned and fabricated the electronics to eliminate readout problems that caused low sensitivity.

The ability of this ingenious team to quickly solve difficult technical problems probably added to the investors' confidence in Matt Miller, making Multispectral Imaging seem like a good bet for Battelle Ventures.