

Self-Localization of MicroSensors Using Ultra-Wideband RF

# Smaller, Better Ground Sensors Make Tracking Less Expensive



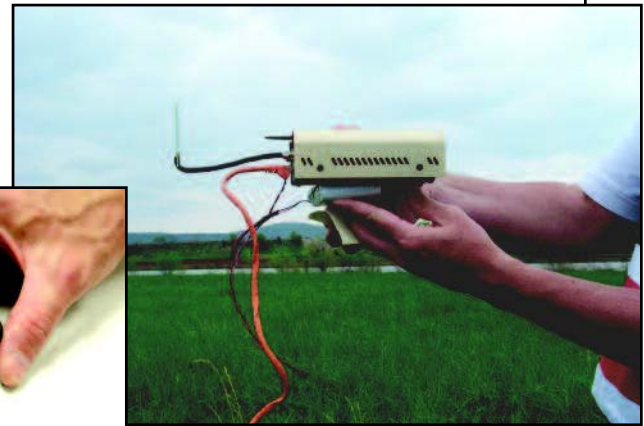
## Technology and Innovation

While there are numerous options available to warfighters when selecting ground sensors for detecting the movement of people, these options are often relatively expensive. Under this DARPA SBIR, Time Domain Corporation developed a low-cost, long-endurance unattended ground sensor (UGS) that has a low incidence of false alarms, has its own communications system, and can self-locate.

The primary end product under this project is an ultra-wideband (UWB) chip device that sells for less than \$600, weighs less than 150 grams, measures 2.5 by 2.5 by 1.25 inches, and lasts 180 days on AA batteries. The sensor is capable of detecting and tracking people who move through a field of such sensors, and, when completed, will be attractive to military users who need to monitor borders, defend base perimeters, or monitor the flow of people. These same capabilities are of great utility in many different commercial markets.

Time Domain Corporation's technology is unique in using UWB radio frequency (RF) technology combining three functions—radar, communications, and positioning—into one device. Using this technology as a radar sensor is advantageous because the transmissions additionally:

- Are difficult for others to detect
- Can form ad hoc data networks
- Can be used to accurately measure the distance between radios



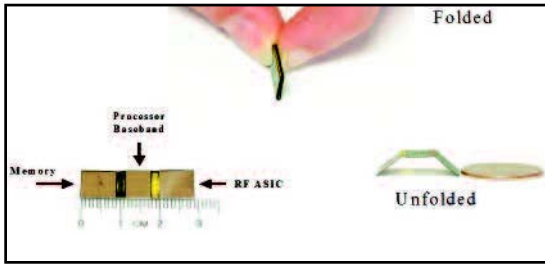
These functions can be performed simultaneously, offering “fused capability.” UWB also makes an outstanding radar and lends itself to low-cost implementations.

## Joint Collaborations

Time Domain Corporation actively collaborates with other SBIR programs, governmental departments, companies, and investors. The company has received strong interest from the military aviation community, border security, and organizations interested in perimeter defense. To support the rollout of Time Domain's technology, several of these entities have offered matching funds to trigger the SBIR Enhancement funding. The company has plans to engage experienced partners and systems integrators to produce and deploy UWB products for homeland security, Department of Defense, law enforcement, healthcare, and other markets.

A DARPA SBIR facilitated the development of an innovative ground sensor (above right), which Time Domain is now refining for further applications (above left)

## Time Domain Corporation



Time Domain plans to develop its ground sensor technology to produce very small sensors, as shown in this prototype

### Lessons Learned

- Seek partners early in the course of the SBIR project, especially where the customer demands are high and technology is advancing quickly.
- The process of transitioning innovations to the military takes considerably longer than you would expect. Be prepared for schedule slips and other unexpected events.
- Companies that participate in the SBIR program should avail themselves of all the online tools to understand the process, follow the rules, and expedite their proposal responses.
- End user sponsorship is critical. With sponsorship, you have a legitimate chance of making real products. Without sponsorship, all you have is a \$750,000 science fair project.
- Companies should understand what the DARPA project manager wants before submitting a proposal and should continue the interaction after winning the SBIR.

### Economic Impact

As a direct result of its work on this DARPA SBIR, Time Domain Corporation was able to capture a \$5.1 million DARPA sub-contract for development of camouflaged long-endurance nano-sensors (CLENS).

Time Domain has successfully performed on numerous government contracts. SBIR programs

for all government agencies have accounted for more than 25% of the company's revenue since 1998. During the same period, DARPA SBIRs have represented about 8% of the company's revenues. DARPA SBIR contracts have played an important role in the company's ability to generate revenue.

DARPA funding has increased Time Domain's credibility, and the SBIR Enhancement program offers a quick and easy way for them to "get their feet wet" by becoming accustomed to working with potential customers. Time Domain has developed significant intellectual capital through this program and other SBIRs, and has built a broad and deep patent portfolio covering the base technology, which is independent of government funding.

### About the Company

Time Domain Corporation of Huntsville, Alabama is a leader in ultra-wideband radio frequency technology. The company holds over 110 patents and has built several development platforms to demonstrate the utility of the technology. Time Domain Corporation creates value by integrating UWB technology into military and commercial applications that benefit from UWB's unique advantages. <sup>1</sup>