OAK RIDGE NATIONAL LABORATORY
MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

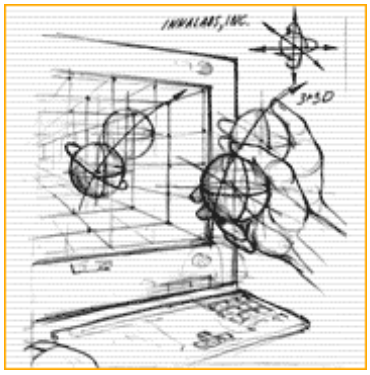
FACT SHEET

August 9, 2002

Next-Generation Tagging and Tracking System

The Department of Energy's (DOE's) Oak Ridge National Laboratory (ORNL) and a strategic partner are working to develop the next generation of tagging and tracking systems for both defense and commercial applications. The intent is to address a significant need that currently exists in the training and logistics areas to know where assets (personnel and material) are at all times, if they are moving, how fast they are moving, and in which direction they are moving. Applications for this technology could include:

- Soldier tracking
- Platform tagging and tracking
- Container tagging and tracking;
- Vibration monitors;
- Tilt monitors;
- Movement tracking during training maneuvers;
- Awareness enhancement in all environments (e.g., MOUT, JRTC, and NTC)
- "Virtual reality" glove or body suit implant—duplicate human movements on screen;



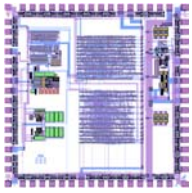
ORNL is a multiprogram science and technology laboratory managed for the U.S. DOE by UT-Battelle, LLC. ORNL is a leader in research that includes neutron science, high performance computing, energy efficiency, complex biological systems, material science, and instrumentation science and technology. ORNL has extensive expertise in RF tagging, tracking, and communications technologies. ORNL' partner is a developer and producer of measurement sensors and control subsystems that combine the latest in gyroscopes and other magnetic technologies.

The objective is to integrate advanced sensor technology with digital signal processing to create a unique tagging and tracking system with custom components that are small in size, highly reliable, and low cost.

Technology Foundation

ORNL and its strategic partner have extensive tagging and tracking expertise:

- Robust communications in difficult RF environments;
- Advanced spread spectrum modulation and radiolocation tracking techniques (10 patents have been issued in these areas);
- Monolithic analog, digital, and RF electronic circuitry (Si, Si-Ge, GaAS, InP);
- Low-power electronics and power management circuitry;
- Smart RF network configurations;
- Microminiature sensors and sensor arrays;
- Custom antenna design and fabrication; and
- 6-D gyroscopic sensor technology capable of tracking movements in free space along linear and rotational axes (1 patent pending).



Custom ASICs

Microtransmitter

Antenna on Substrate

UT-BATTELLE

Planned Work Scope

Phase 1—Breadboard Prototype

- Develop front-end electronics (signal processing, power management, and data acquisition) and fabricate prototype circuit board; (see Fig.1)
- Initiate 6-D gyroscopic sensor reduction process (reduce sensor diameter from 2.54 cm to 5 mm);
- Identify environment, develop RF electronics to facilitate hybrid spread spectrum communications, and fabricate prototype circuit board; (see Fig.1) and
- Fabricate table-top demonstration with computer display.

Phase 2—Component Miniaturization

- Complete 6-D gyroscopic sensor reduction process (final step to reduce diameter size from 2.54 cm to 5 mm);
- Migrate front-end and RF electronics from prototype circuit boards to application specific integrated circuits (ASICs), thereby reducing size and cost; and
- Fabricate operational laboratory-level demonstration.

Phase 3—Integration and Field Trials

- Integrate all components into a production-level device; and
- Conduct field demonstrations.

Phase 4—Commercialization

- Select commercial partner; and
- Transfer technology.

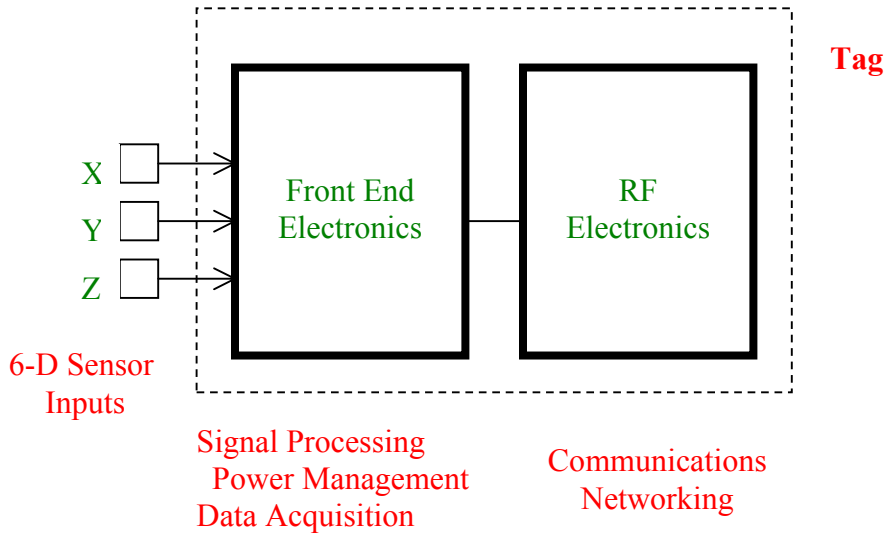


Figure 1. Tag layout.

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