



Wearable Antennas

Integration of Antenna Technologies with Textiles for Future Warrior Systems

Overview:

Natick Soldier Center, a subordinate activity of the U.S. Army Soldier Systems Center-Natick, has a high interest in integrating antenna capabilities with textile materials and soldier equipment. Traditional antennas were not designed for wearable applications: the 30-inch whip antenna extends 2 feet above the head compromising the visual signature and identifying communications personnel, is easily broken, and gets caught in terrain elements. Textile antenna integration technologies will provide the Warrior with fully integrated, body conformal, and visually covert antennas to improve communications, increase situational awareness, improve mobility, and enhance lethality.

Description:

A variety of antennas for near and remote communications need to be integrated into the Warrior's clothing and equipment to reduce weight and bulk from that of existing antennas and to provide visual concealment of the antenna protecting communications personnel to make him undistinguishable from other Warriors. Due to the various frequencies used in military communications, a variety of antenna types and configurations are required to cover the range of communication needs. Multi-frequency signal transmission and reception is required in the 30-88MHz, 1750-1850 and 2400 MHz, and the 1.375 and 1.55 GHz ranges (reception only), corresponding to the Squad radio, Soldier radio, and GPS respectively. Electrical properties must be considered to provide an omni-directional radiation pattern, efficient performance regardless of the body's position, and safe wear by overcoming body absorption and shielding effects on the radiation pattern. Textile integration methods are also required to make the antennas visually covert, flexible and lightweight, comfortable to wear, durable to wear and tear, low cost, and simple to manufacture. Customers include PM-Soldier, SOCOM, and Objective Force Warrior.

Status:

Funding for this effort has come from a variety of sources, including Army S&T, SBIR, and Manufacturing Technology programs depending on the maturity of the individual technology.

Current efforts include: A 30- 88 MHz long distance cross-looped antenna integrated into the Warrior's load bearing equipment replacing the 30" whip, a multi-frequency (30-2000 MHz) antenna vest constructed from conductive fabric, custom designed short distance combined Soldier Radio and GPS receiver antennas, a suite of antennas using novel designs, and fabric-based patch, dipole, and horn antennas. In addition, the use of artificial ground planes, antenna location and positioning on the body, and carbon nano-tube materials are being investigated to enhance antenna performance.

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