

DEVELOPMENTS OF A HIGH RESOLUTION SHORT RANGE SEE THROUGH WALLS UWB RADARS

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Today's Army and the future Army must be prepared to fight in a new war zone with the overmatching operational capability that it has brought to the mobile battlefield. The challenge is to design and field advance system concepts using the latest technologies that will give soldiers an advantage in this new battlefield: the urban terrain. One such area is C4ISR technology. Successful tactical operations in MOUT (Military Operations on Urban Terrain) conditions will require a significant extension of C4ISR capabilities to provide commanders with instantaneous, precise information (measured in feet, not meters) on the 3D location and disposition of friendly, threat, and noncombatant personnel. In urban warfare scenario, door-to-door searches with possible enemy engagement are inevitable. It is desired to provide a new and enhanced situation awareness capability that would allow soldiers to know if and where people are located inside a building before entering, therefore potentially preventing death and injury.

The DoDs in most of the civilized nations have funded significant number of high tech solutions for problems facing their military forces. Many of these solutions have been effective for long-range mass destruction but have not been applicable for close-in combat operations in the streets. Our goal is to convert high-tech capabilities into cost effective tools to help soldiers do their jobs better and safer. Surveillance systems presently used by army make extensive use of television, infrared and other line-of-sight-surveillance hardware. However, these systems cannot tell what is happening on the other side of a wall, behind bushes, or around the corner. Our objective is to develop a new sensor (radar), technology developed by the DoD for missile warhead fusing. This small, lightweight, low power radar is based upon the fact that microwave frequencies can be optimized to penetrate non-metallic materials. This new capability can provide information about what is in a ceiling or floor or on the other side of a wall.

What is needed is a means to generate high quality images through walls to identify potential threat. This mandates the development of a special type of radar with the ability to detect targets through relatively high-density materials such as reinforced concrete, concrete block, sheetrock, brick, wood, plastic, tile, and fiberglass. A very promising and novel approach to address this concern is to use short-range impulse radar technology that utilizes time domain, and ultra-wide band signals. In this paper, we will present our latest results of our program to develop the basic building blocks of the see-through-walls radars.

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