Army Advanced Concept Workshop on Shallow Tunnel Detection

Under the sponsorship of the Army Research Office, CERDEC-NVESD Countermine Directorate, and RDECOM CIED/CM IPT, the University of Mississippi will host a workshop on the 'Real-Time Geophysical Detection of Clandestine Shallow Tunnels' at the National Center for Physical Acoustics on 14-17 February 2006. Shallow tunnels present both military and homeland security threats. Although many technical approaches to tunnel detection have been proposed and researched, a practical, reliable and easily-deployable solution to the problem for military and homeland security applications remains a severe technical challenge. Therefore, the objective of this workshop is to bring together key members of the academic and government research communities, technologists from industry, and military representatives familiar with specific current issues to conceptualize both a short-term technology development program and a long-term basic research program to address the problem. The workshop will consider (i) the detection of tunneling activity, whether by machinery or by hand tools, and (ii) the detection and geometric definition of existing tunnels. The workshop products will be an assessment of the current state-of-capability in the detection and identification of shallow tunnels plus an outline for research and development programs aimed at developing new and enhanced technical capabilities in this challenging area.

The workshop will review the different types of sensor technologies having a potential to be applied to the problem, discuss approaches to sensor signature physics and advanced signal processing, and consider how to better understand the physical character of the top half-meter of soil at both the micro- (cm) and macro- (m) scale essential for detection and definition. Because different sensor types have distinct limitations and environmental sensitivities, the discussion will also address multi-sensor approaches and the development of new signal processing algorithms to relate multi-sensor signatures to terrain conditions. Invitees to the conference will represent a broad spectrum of expertise including operational requirements, both traditional sensor technologies (e.g. seismic-acoustic methods, electromagnetic and resistivity, ground penetrating radar, and magnetic methods) and novel approaches (e.g. microgravity, subsurface interface radar), signal processing, and soil physics.

The agenda for the workshop will begin with an overview of the current military and homeland security operational issues and requirements. This will include a discussion of the types and construction of tunnels to be detected, tunneling methods and logistic and deployment parameters. A discussion of the capabilities and limitations of existing detection technologies will follow. From these two discussions, technology gaps will be identified as targets of the emerging research program. Participants will then divide into groups of experts in similar technologies to discuss the current capabilities of those technologies and their prospective capabilities to fill the previously-identified gaps. Group discussion will also bring together experts in signal processing and soil physics to define the path forward in these two important ancillary areas. The groups will report their findings to the overall meeting and discussions will follow to chart a course of action for a basic research program in tunnel detection.

In addition to generating a new awareness within the research community of the need for shallow tunnel detection solutions, and a more thorough understanding within the community of the operational requirements and the capabilities and limitations of existing methodologies, the final product of this meeting will be a plan of action for a basic research program in tunnel detection that will include: (i) long-term objectives of such a program, (ii) a list of the most promising technologies in which to invest to achieve those objectives, (iii) a course of action to achieve those objectives, (iv) short-term technology opportunities, (v) objectives and metrics to the measure progress of the course of action, (vi) key participants in the program, and (vii) a list of some of the available resources to meet the objectives (e.g. existing tunnels and/or equipment for use in research).

Please bring this announcement to the attention of others in your organization with a potential interest in the subject area. Individuals wishing to participate in the workshop should send their name, address, and contact information to the two workshop 'Points-of-Contact' listed below no later than **15 November 2005**. This should be accompanied by a brief statement of interest describing your technical expertise and its relevance to the tunnel detection problem and/or previous work in this area.

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