DEVELOPING ROBUST EVACUATION INSTRUCTIONS WITHIN AN INTELLIGENT EVACUATION, RESCUE AND RECOVERY SYSTEM

ELISE MILLER-HOOKS
UNIVERSITY OF MARYLAND

ABSTRACT A concept for an expert system will be described that, through the use of sensor technology, can permit real-time assessment of the extent of blast damage to a building, can recommend immediate actions that can be taken to mitigate the situation and prevent further deterioration, and can be used to aid the rescue workers and evacuees in rescue efforts and safe egress. The key capabilities of this system stem from the electronic integration of two critical components: a near real-time intelligent BDA/TVA tool and on-line egress-related optimization techniques. Methodologies will be discussed for determining optimal and robust tactical and operational strategies for rapidly evacuating a large burning building or a building that has come under attack by enemy or natural catastrophe. These procedures explicitly consider the inherent dynamic and uncertain nature of circumstances requiring evacuation. Therefore, they give rise to robust evacuation plans with lower probability of failure than paths determined otherwise, enabling faster and more efficient evacuation of a building in the event of military attack, fire, natural disaster, discovery of a hazardous material or biological agent, or other circumstances warranting quick escape.

BIOGRAPHICAL SKETCH Prof. Miller-Hooks of the Department of Civil and Environmental Engineering at the University of Maryland received her M.S. in Engineering and Ph.D. in Civil Engineering from the University of Texas at Austin in 1994 and 1997, respectively, and her B.S. in Civil Engineering from Lafayette College. In her graduate work at UT-Austin, she wrote her dissertation on "Optimal Routing in Time-Varying, Stochastic Networks: Algorithms and Implementations," which received the Charley Wootan Award for Best Ph.D. Dissertation from the Council of University Transportation Centers (1998). Her research interests are in optimization and mathematical modeling; stochastic and dynamic network algorithms; no-notice evacuation; emergency preparedness and response; routing and scheduling; Intelligent Transportation Systems; inter-modal transport; hazardous materials transport; and collaborative and multi-objective decision-making. Her research program has been sponsored by the National Science Foundation, Federal Highway Administration, U. S. Army through the Protective Technology Center, the Sloan Foundation, United Technologies Corp., the European Union, and others. This funding supported her research in, among other areas: robust on-line location and routing for urban service systems; improving traffic signal timing for evacuation in urban areas; development of an intelligent evacuation, rescue and recovery system prototype for large buildings; emergency preparedness planning and on-line evacuation algorithms; routing and scheduling service technicians; updating routes for in-flight aircraft given unexpected disruptions, and development of a seamless intermodal freight transport system for Europe. Her work has been published in *Transportation Science*, *Networks*, *Computers &*

Operations Research, European Journal of Operational Research, Journal of the Operational Research Society, Transportation –Research Part B and others.