

## Project 1

**Title:** *Designing Ergonomic Interventions for the Fire Service*

**Principal Investigator:** Steve Lavender

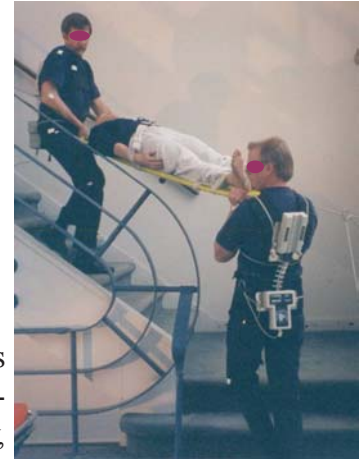
**Funding Source:** University of Illinois

**Funding Period:** 09/30/02 - 09/29/03

**Award Amount:** \$100,786

### Description

The fire service remains one of the most hazardous industries in this country. Its work-related injury rates and total annual costs exceed those for most other occupations. Consistently, musculoskeletal injuries are the major type of firefighter injury, particularly in emergency medical service (EMS) operations, which are much more frequent than fire suppression. Tasks performed during EMS runs contain many of the same risk factors associated with musculoskeletal injury. Unfortunately, few studies have analyzed the biomechanical issues during EMS operations. Previously, we identified and quantified the biomechanical and postural risk factors associated with EMS tasks in the fire service. We are now in a position to design, develop, and evaluate targeted ergonomic interventions for this population of workers.



The purpose of this work is to develop and evaluate up to ten ergonomic interventions that reduce biomechanical loads and are considered worthy of adoption for by EMS workers. A user-centered participatory process will be employed, much like what has been advocated by NIOSH and others. The specific aims of the research are:

- Design specific equipment and work method interventions that address ergonomic concerns during EMS operations;
- Develop and build equipment and refine work methods based on the design process;
- Test equipment and refined work method in a lab setting using simulated EMS tasks; refine and re-test equipment and methods as necessary based on participant feedback and biomechanical results; and
- Implement and evaluate the interventions in the field to obtain usability and acceptability feedback from end users performing EMS operations.

The intervention development and implementation process in this project is comprised of four phases. In Phase 1, focus groups will be conducted with firefighter/paramedics, to discuss ideas for equipment modifications and work method refinement. In Phase 2, the interventions that require the fabrication of equipment will be built and modifications to work methods refined. Phase 3 will test the modified equipment and work methods in a laboratory environment, to quantify the effects on tissue loading. In Phase 4, we will implement and evaluate the interventions in six field tests with firefighter/paramedics by collecting usage data after each emergency run and usability and acceptability data via written survey and group interview at the completion of each field test period.



The ultimate goal of this project is to have identified up to ten successful interventions that are biomechanically validated and superior to their existing counterparts and are judged to be worthy of adoption for use in the field by the end-user firefighter/paramedics.

## Project 2

**Title:** *Ergonomics Assessment Method for Work/Worker Systems*

**Principal Investigator:** Carolyn M. Sommerich

**Funding Source:** NIOSH

**Funding Period:** 09/01/02 - 08/31/04

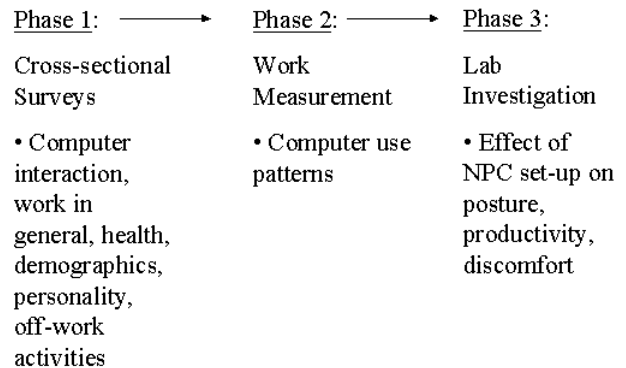
**Award Amount:** \$32,293

### Description

The aim of this project is to make a comprehensive assessment of a work-worker system from an ergonomics perspective. This relies on several common types of tools (questionnaire, work measurement protocols, and biomechanical assessment), with specific new tools being developed. The questionnaire provides qualitative information. Work measurement protocols supply temporal information and biomechanical data. Biomechanical assessments provide a view of the internal activity necessary to carry out work activities. The assessments are used to produce multi-dimensional work-worker profiles. The worker profile characterizes workers' interactions with their work; the work profile characterizes physical and administrative work elements. These profiles are used to identify associations between worker attributes and perceptions, health outcomes, and work profiles. These methods are being applied to mobile computing, an emerging area of office ergonomics.



### Study Design



The long term objective of this research is to develop a predictive model of work-related musculoskeletal impairment that includes physical, psychosocial, work organization and personal factors, and has generalized applicability across job types for use in research from initial exploration to intervention demonstration efforts.

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## Project 3

**Title:** *US-Brazil Higher Education Consortia Program*

**Principal Investigator:** David D. Woods

**Funding Source:** Fund for the Improvement of Post-Secondary Education

**Funding Period:** 10/01/03 - 09/30/07

**Award Amount:** \$200,000

### Description

Initiated an undergraduate engineering student exchange program between the U.S. and Brazil, in *Training Industrial Engineers to Manage High-Risk, Complex Systems: Applying Cognitive Engineering to Human Error and Automation in the Oil Industry*. This is a collaboration between the Ohio State University, the University of Virginia, Universidade Federal do Rio de Janeiro, and Universidade Federal do Rio Grande do Norte, with industrial partner Petrobras/Transpetro Dutos & Terminais. Five ISE undergraduates are preparing to spend six months in Brazil working with local university and oil company as part of capstone project.