Workplace injury reduction
Occupational risk factor identification and Biomechanical Analysis Lab (Xu)

Non-contact interfaces for communication, Brain-Computer Interfaces Lab (Nam)

Processing systems design for human information control, and learning Cognitive Engineering Lab (Nam)

Non-gaming tools for human performance assessment and accelerating healthcare Virtual Reality Applications Lab (Chen)

Biomechanical research for improving occupational safety and workplace injury reduction Biomechanical Analysis Lab (Xu)

Human systems engineering
World-Class Research
VR for Rehabilitation
• Motivating chronic pain patients to do more
• Inflating control-display ratios (1.25:1) to cause perceived motions to under-predict actual movement
• Promotes range of movement
• Accelerates pain recovery with impact for broad population

Human High Performance Multitasking
• Focus on extreme physical demand occupations with concurrent cognitive load
• Assessing decrement in cognitive function under extreme physical load
• Identification of “optimal” sensory channels for commanding (visual, audio, haptic, combo)

BCI for Locked-in
• Using electromyogram systems for precise diagnosis of conscious vs. vegetative states
• Harnessing central brain activation patterns (non-nerve and nonmuscular) to facilitate communication and control via computer technology
• Identifying new methods for efficient brain stimulation

Biomechanical Models to Prevent Low-back Pain
• Overexertion injuries are #1 cause of disability and compensation (~$15B/yr.)
• Lifting is major risk factor
• Need portable, quick and accurate method for modeling spinal forces
• Developing new sparse sensor approach for kinematic monitoring
• Validating force prediction models in industry tasks

Research Labs and Directions
Virtual Reality Applications Lab (Chen)
Non-gaming tools for human performance assessment and accelerating healthcare

Cognitive Engineering Lab (Nam)
Systems design for human information processing

Brain-Computer Interfaces Lab (Nam)
Non-contact interfaces for communication, control, and learning

Biomechanical Analysis Lab (Xu)
Occupational risk factor identification and workplace injury reduction

Major Instrumentation
Full-motion Driving Simulator
Will facilitate substantial FHWA, NASS-TRB & NCDOT research projects along with student theses/dissertations

Motion-tracking System
Biomechanical research for improving occupational safety

ISE Faculty
Kane Chen Assistant Professor
Chang S. Nam Professor
Xu Xu Assistant Professor
David Kaber Adjunct Professor
Nancy Currie Adjunct Professor
Manida Swangnetr Assistant Professor
Jing Feng Adjunct Assistant Professor

Ergonomics Center Staff
Tim McGuireh Executive Director
Jeff Hoyle Director of Ergonomic Services
Gary Downey Senior Ergonomist
Mohini Dutt Senior Ergonomist
Mirha Perazza Senior Ergonomist
Heather White Senior Ergonomist

Support and Partners
NC State, ECE, ITRE, ECE, NC State, Old Dominion, University of Oregon, Oregon State University, University of Texas, Texas A&M, Liberty Mutual, Johns Hopkins University, Duke University, AFOSR, Lockheed Martin

Ergonomics Center of North Carolina (ECNC)

• One-of-a-kind center across ISE departments:
  • Conducts applied ergonomic research
  • Provides ergonomics consulting services
  • Provides training

Collaborative research with ECNC:

“Exercise Regimen Guide for Worker Preparation for Gas Cylinder Handling” ($30K; 2015)

“Design, Prototyping and Validation of an Exercise Regimen Guide for Worker Preparation for Gas Cylinder Handling” ($60K; 2009)

“Ergonomics Program Development & Implementation” ($60K; 2008)

“Ergonomics Program Development & Implementation” ($30K; 2017)