Biomechanics for a Dismounted Warrior

S&T Campaign: Human Sciences
Human Behavior
Real World Behavior

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Research Objective

- **Understand the underlying mechanisms by which physical stress influences Soldier performance**
- **Extend high resolution measures that are typically collected in laboratory environments to more operationally relevant environments**

Soldiers walking on a treadmill in the biomechanics laboratory and through the cross country course at the Soldier Performance and Equipment Advanced Research (SPEAR) Facility

Challenges

- **Collecting high resolution data in an operationally relevant environment**
- **Standard 'physical performance' metrics are insufficient for quantifying Soldier performance**
- **The effects of individual variability are considerable and not well understood**

A Soldier walks through icy terrain during a recent study while researchers monitor his wearable robot

ARL Facilities and Capabilities Available to Support Collaborative Research

- **Soldier Performance and Equipment Advanced Research (SPEAR) Facility**
- **3000 sq ft biomechanics laboratory**
- **12 camera Motion Analysis motion capture system**
- **Integrated Force Plate Treadmill (AMTI)**
  - **Patent No. 6,878,100 B2, April 12, 2005 (Frykman, Harman, LaFiandra) Force Sensing Treadmill**
- **Instrumented M-4 Carbine allows for human in the loop recoil data collection during live fire**
- **<u>New</u>: Biomechanics of Small Arms Shooting Facility**

Soldier shooting instrumented M4 Carbine (left), and buttstock sensor (right)

Complementary Expertise / Facilities / Capabilities Sought in Collaboration

- **The capability to quantify trade offs among area of coverage of ballistic armor, mobility and Soldier survivability**
- **Unobtrusive (to the Soldier) measurement of cognitive performance in operational environments**
- **The ability to impose combat realistic stress to Soldiers in operational environments**
- **An understanding of small team dynamics on small team physical performance**