Going Off Road—Moving in Sand, Snow, Mud

**In-silico**

**In-vivo**

**Terrain Specific Human Movement Principles**

**Wearable devices for real-world, difficult terrain**

**State of the art Wearable device design**

Workflow

- EXOSKELETON
- MUSCLE-TENDON UNIT

Environment/Load

- Force Produced by exo
- Force Produced by HTU

Body Positions and Velocities

- Body
- Sand

Results

- Metabolic Power (W/kg)

- Pseudo Hard
- Loose Sand
- Loose Sand (Exoskeleton)

+23%  
-18%  
1.3%