07 Tactical Athlete Prep Mannequin: Realistic, Modular Training

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Need

4 million Tactical athletes (EMTs, Firefighters, Military, Police) respond to 240 million 911 calls annually.

Tactical athletes require peak physical fitness to work in high-risk environments.

15-20% or ~46,000 trainees fail certification requirements due to lack of fitness.

Functional fitness is used to train, but there are few accessible, modular, & progressive training solutions.

Objective

Develop a cost-effective, humanoid, realistic, modular training mannequin for tactical carries.

Solution

Design Inputs

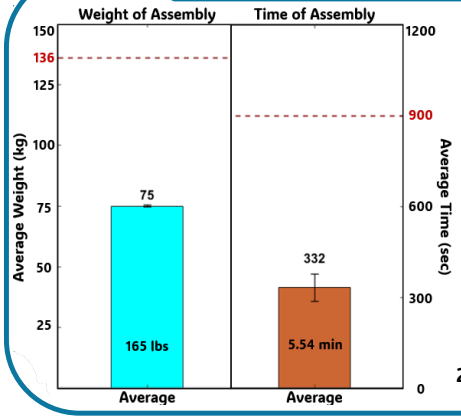
Constraints

- Modularity
- Durability
- Shape: Humanoid
- Cost ≤$2000
- Safety
- Weight ≤ 300lbs

Requirements

- Time < 15 min
- Joint Motion
- Interconnected Scaffold

Verification Test



Joint Motion

- 140° F/E ✓
- > 130° AD/AB ✓

Interconnected Scaffold

- 294N – Tension ✓
- 243.2N-m – Torsion ✓

Impact & Future

We created a $500 modular, anatomically accurate training mannequin that's low-cost, fast to assemble, and proven to simulate human weight.

This solution improves access to tactical training, with the potential to reduce certification failures by 15–20% and injury-related costs by over $1.8B annually.

Next steps include joint upgrades, better weight balance, and field testing with tactical users.