#197

Real-World Whole Foot Ground Clearance

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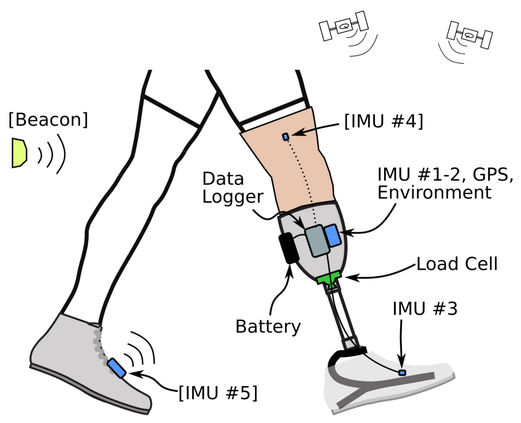
Goal

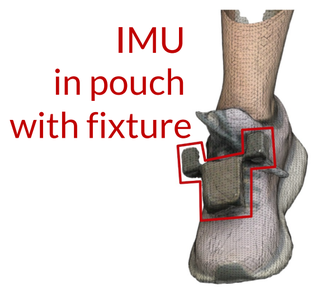
Develop methods to improve richness of data collected via wearable sensors

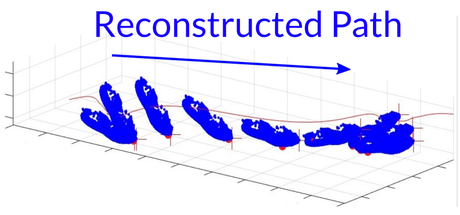
Current studies:
- Orthotics comparison (~10 days/device)
- Prostheses comparison(~7 days/foot)
- Activity-specific prostheses analysis (30 days)



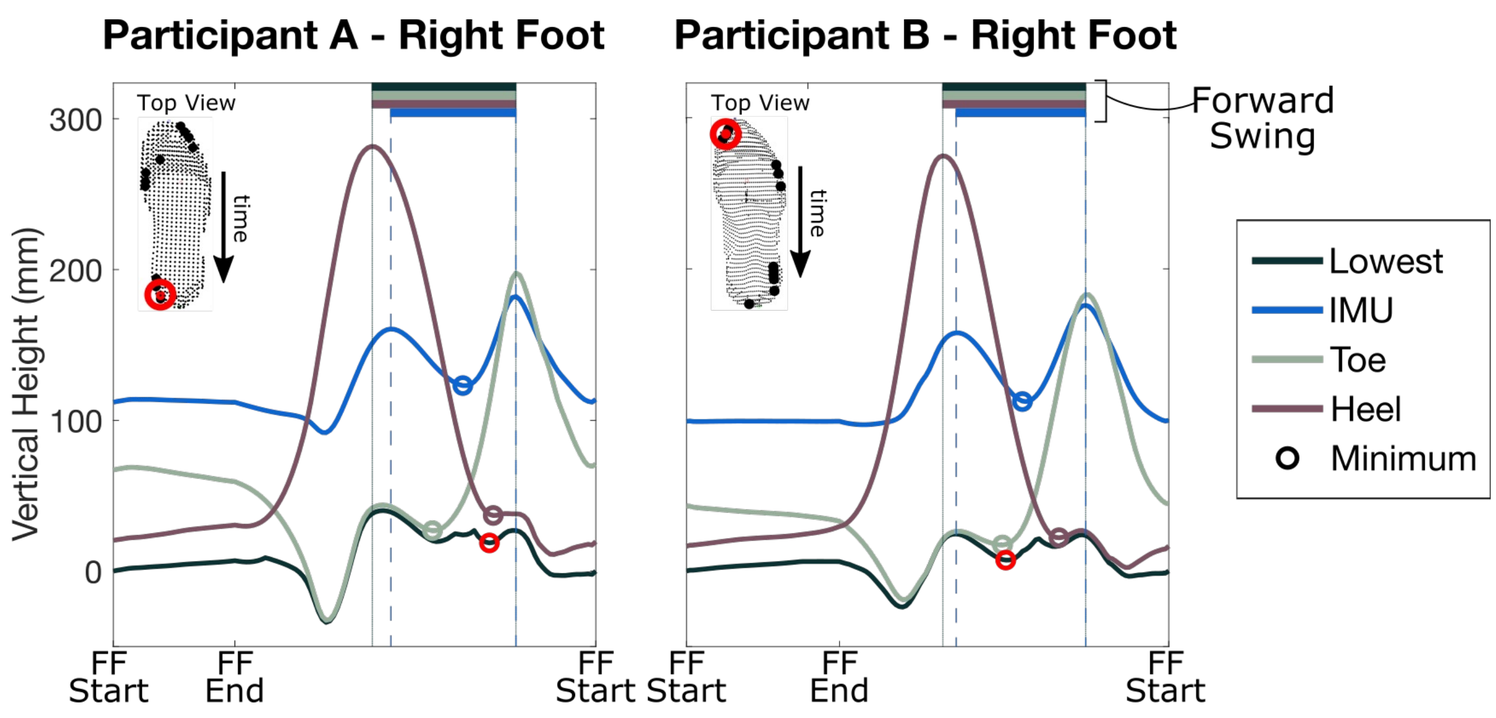
Improving foot clearance measurement by augmenting the IMU trajectory with 3D scans

Method
1. 3D scan foot/prosthesis with IMU in position
2. Fixture to locate foot geometry relative to IMU
   - pose of the IMU
   - toe
   - heel
   - cloud of points along bottom of shoe
3. Reconstruct whole foot in world frame





Preliminary Exploration: Comparison of 2 unimpaired participants' ground clearance



ID precise locations that may lead to trips, scuffs, or falls!

Important in impaired gait

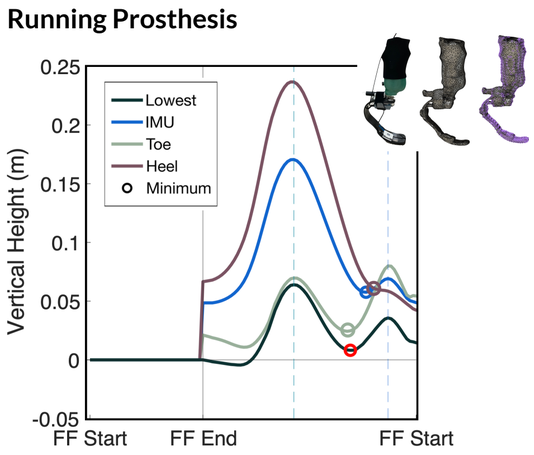
Measure to compare prosthetic & orthotic effectiveness

Participant	Lowest	Toe	Heel	Virtual IMU
A	18.2±4.9	32.4*±6.7	36.3*±6.2	14.26±4.2
B	4.1±4.5	13.4*±3.0	20.8*±3.0	10.2*±3.3
Average	11.1±8.6	22.9*±11.2	28.6*±9.27	12.2±4.2

*denotes significantly greater average clearance than Lowest, $p<0.0167$

Coming soon…

Running Prosthesis



Low-Profile | ESR | ESR with Damper Ankle | ESR with Micro-Processor Damper

Effects on stride length, variability, socket load, ground clearance…

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