

## Introduction

- Traditionally biomechanical experiments are costly, time-taking, requires specific expertise and done (mostly) within labs
- Uses marker-based Mo-cap systems, embedded force plates, Electro-myography (EMG) sensors and mask-based Oxygen consumption devices
- Most biomechanical studies have low sample size (Median -> ~ **12-21**)
- Movement dynamics rarely measured in clinical settings/outside lab
- Data collection, processing & generating dynamic musculoskeletal simulations takes several days
- Inertial Measurement Units (IMUs) and marker less, video-based Mo-cap systems are current alternatives

## The Legacy

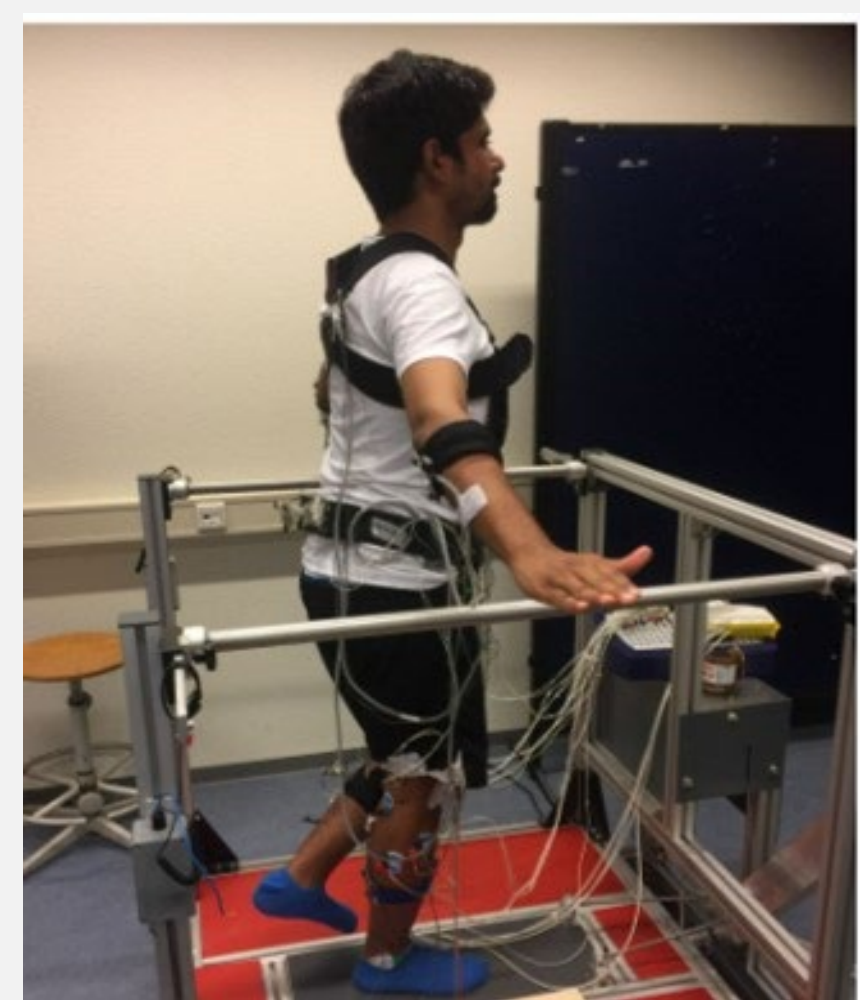


Fig.1: Checking balance and Mo-cap in an experiment



Fig.3: Usage of a Douglas bag to collect expired air

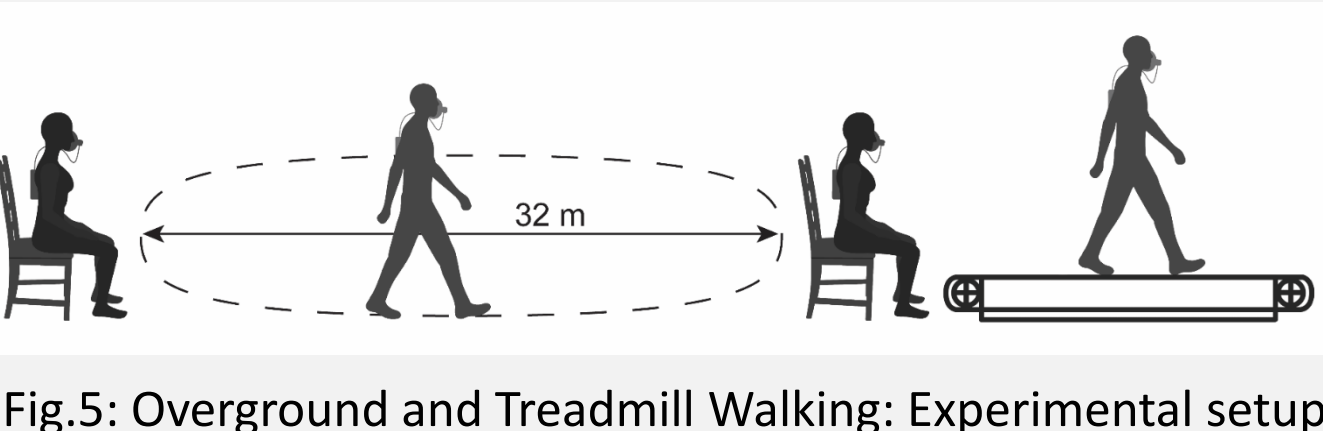


Fig.5: Overground and Treadmill Walking: Experimental setup

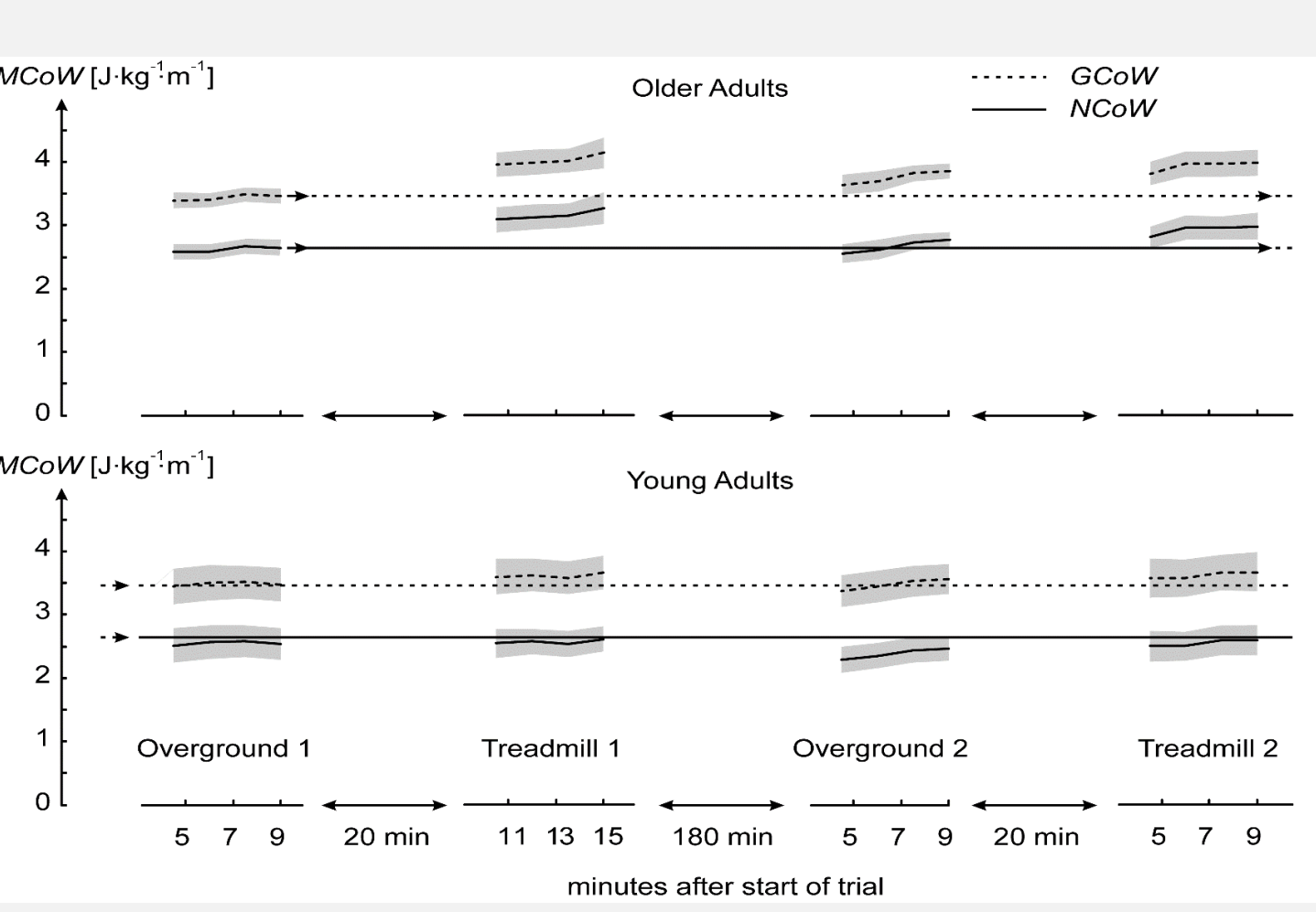


Fig.7: Metabolic Cost of Walking: Overground and Treadmill Walking

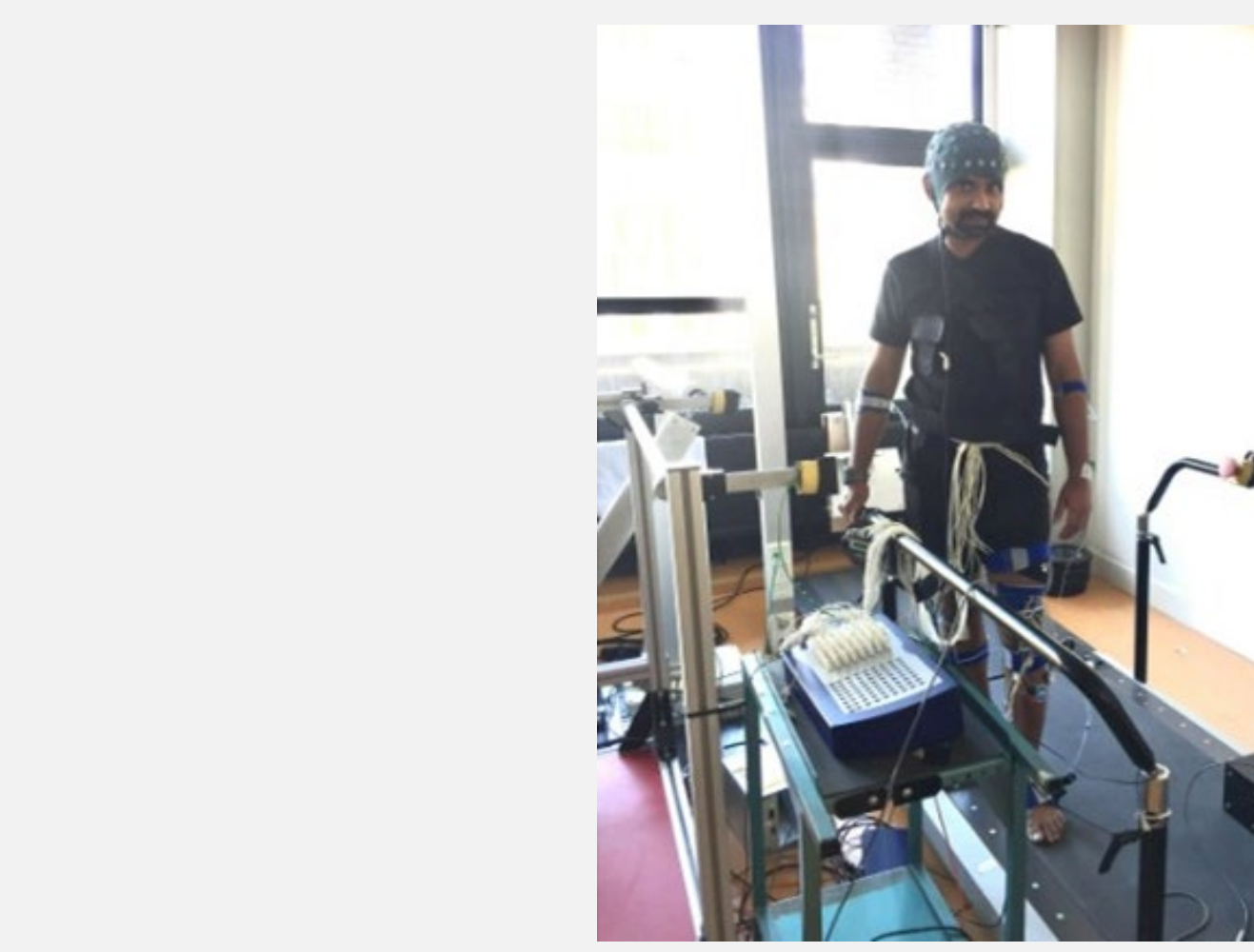


Fig.2: Mo-cap on a treadmill

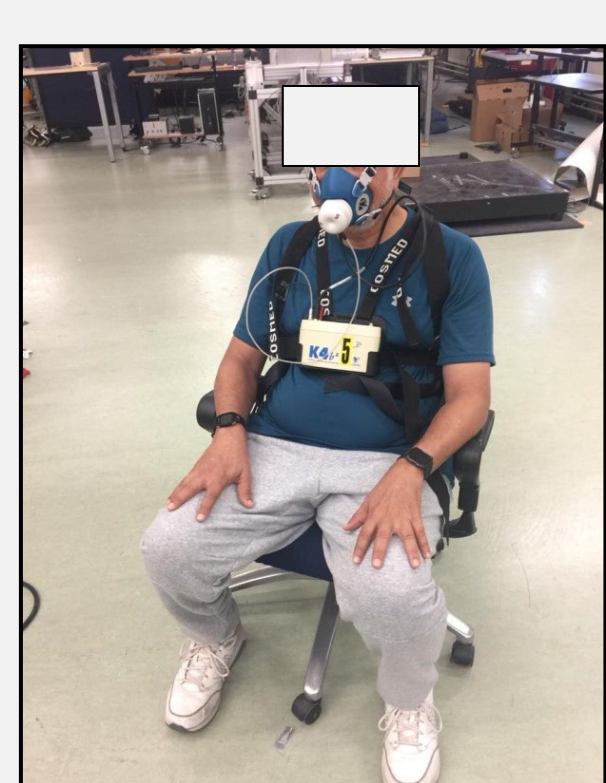


Fig.4: Usage of a face-mask setup to measure Oxygen consumption

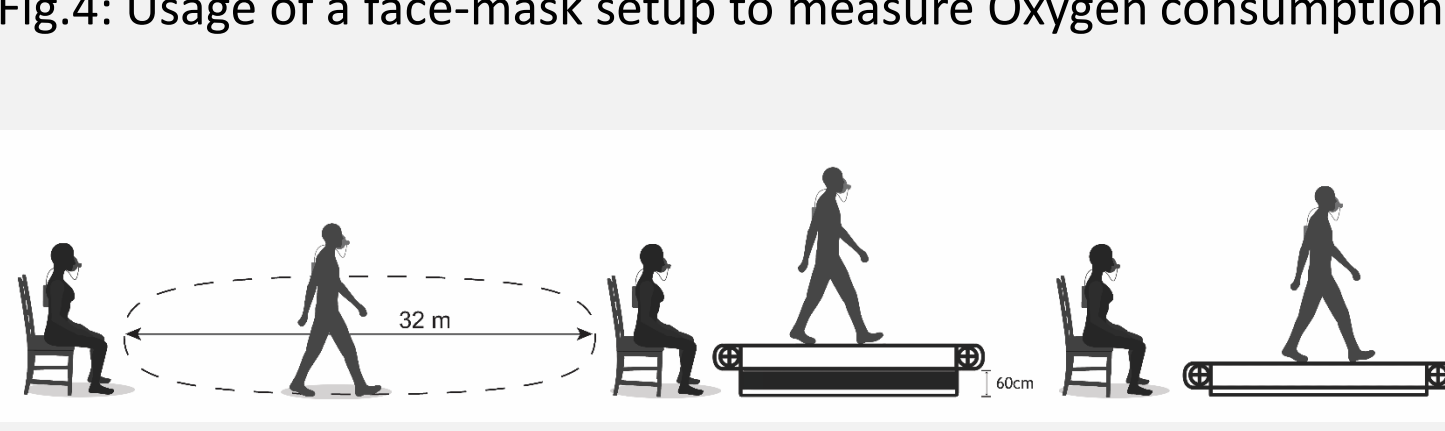


Fig.6: Overground, High and Floor-level Treadmill Walking: Experimental setup

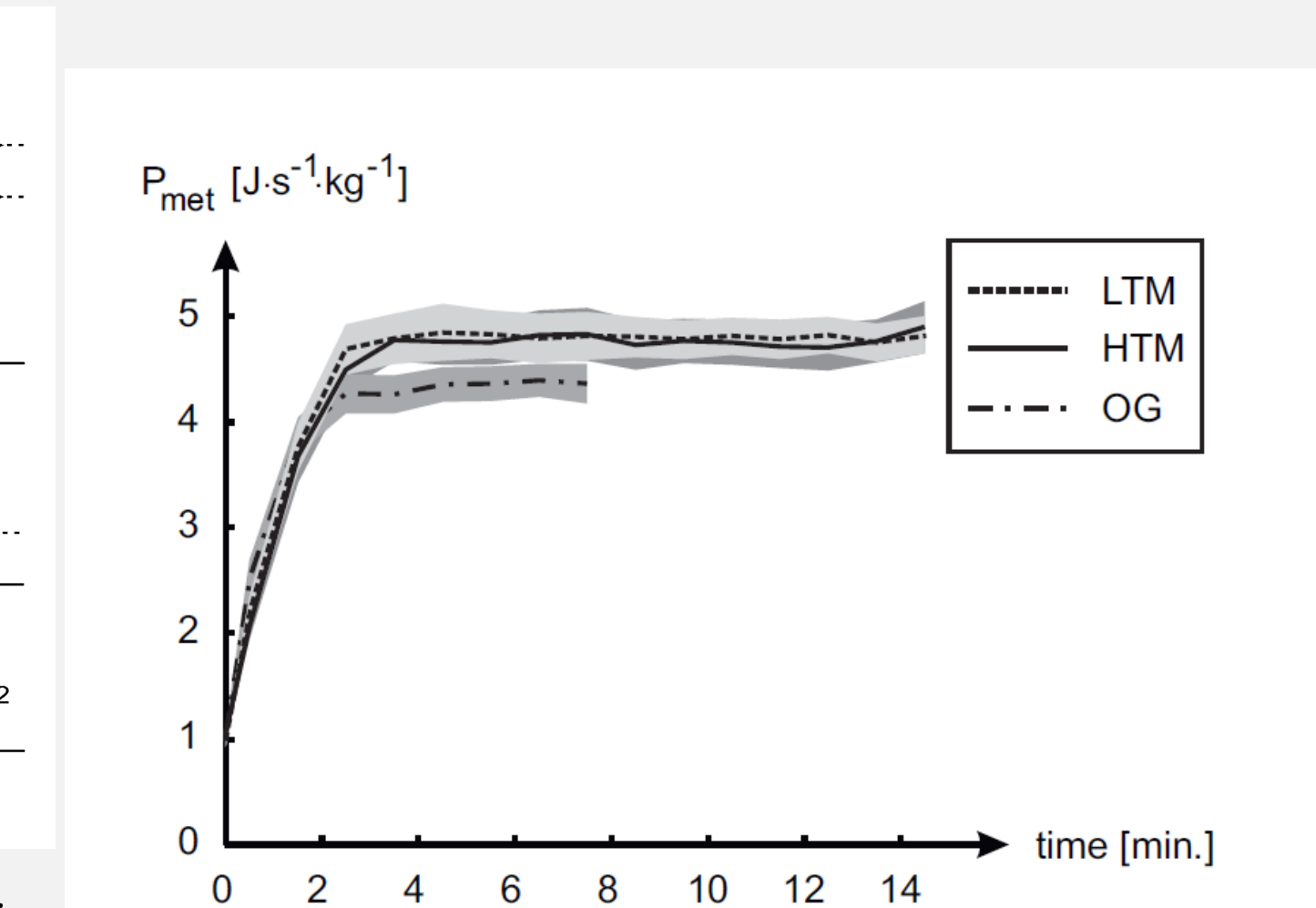


Fig.8: Metabolic Power: Overground, High and Floor-level Treadmill Walking

## The Future



Fig.9: (Wearable) OpenMetabolics: Schematic and hardware prototype

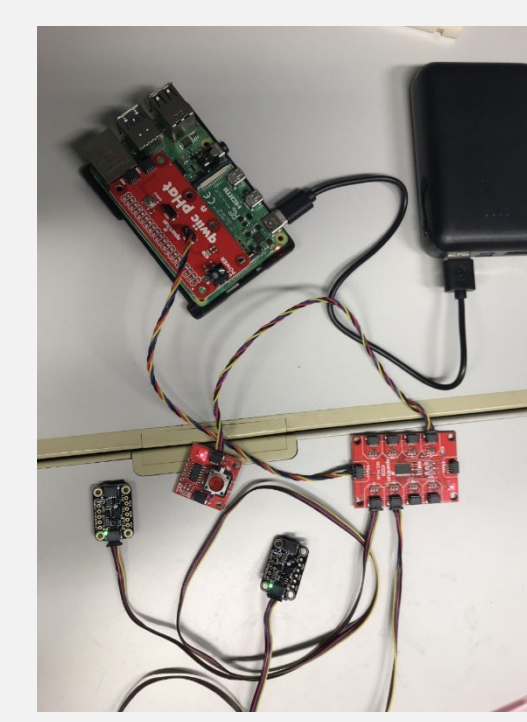


Fig.10: OpenCap: Markerless Mo-cap

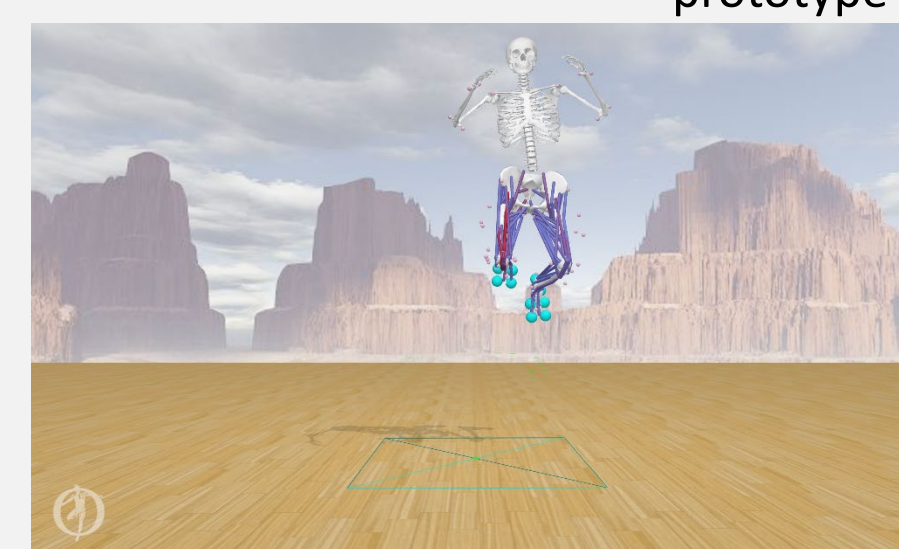


Fig.11: Counter Movement Jump (CMJ)



Fig.12: Squats



Fig.13: Sit-2-Stand (STS)



Fig.14: Videos of musculoskeletal simulations

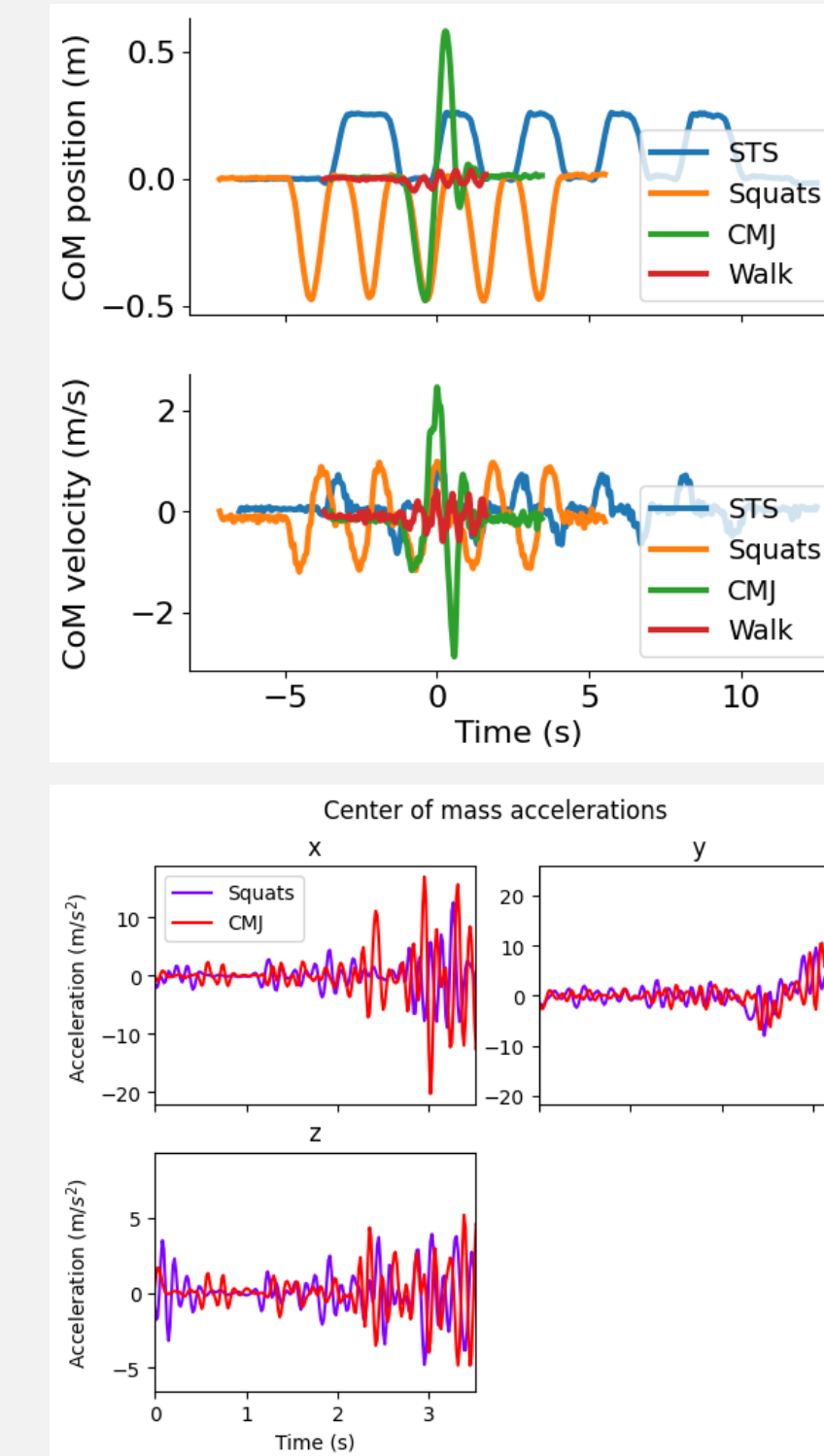
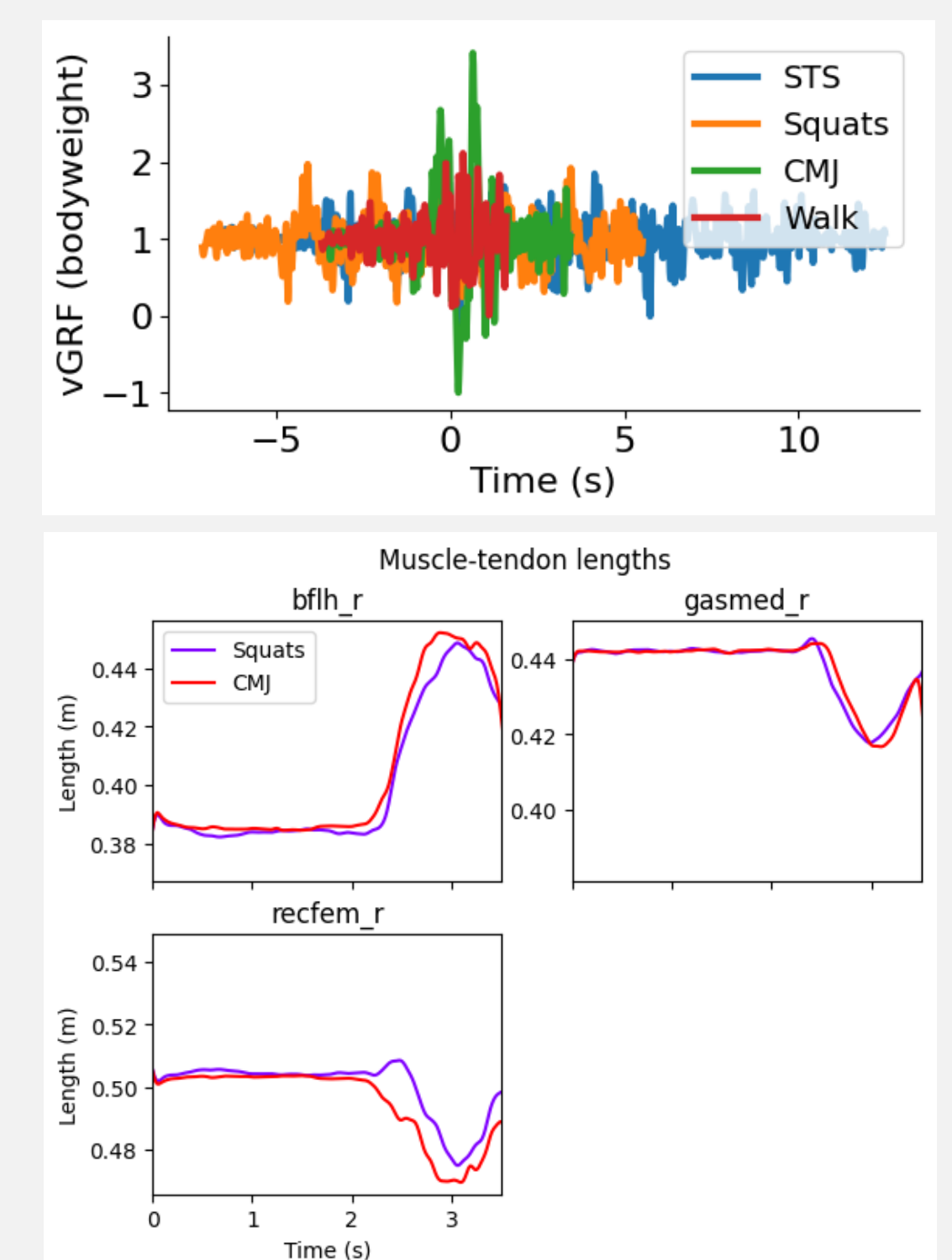


Fig.15: (Selected) results of musculoskeletal simulations



## References and Contact Details

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