

# Body Motion

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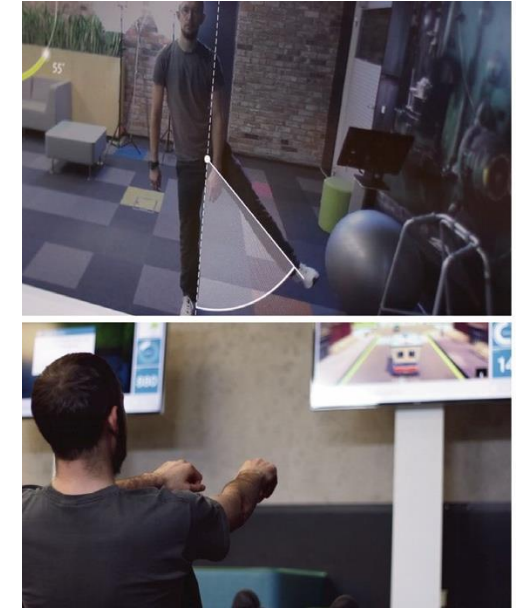


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# Why Study Human Body Motion?

<b>Domain</b>	<b>Purpose</b>
Physical Injury Rehabilitation	Ensure that the correct muscles are being targeted during therapy
Sports Performance	Identify areas for improvement, technique optimization, and injury risk reduction
Aging	Track deterioration of range-of-motion, balance, and overall coordination
Neurological Disorders	Detect external indicators of abnormalities in the nervous system

# Cameras



## Pros

- + Body- and hand-pose tracking are well-studied in computer vision

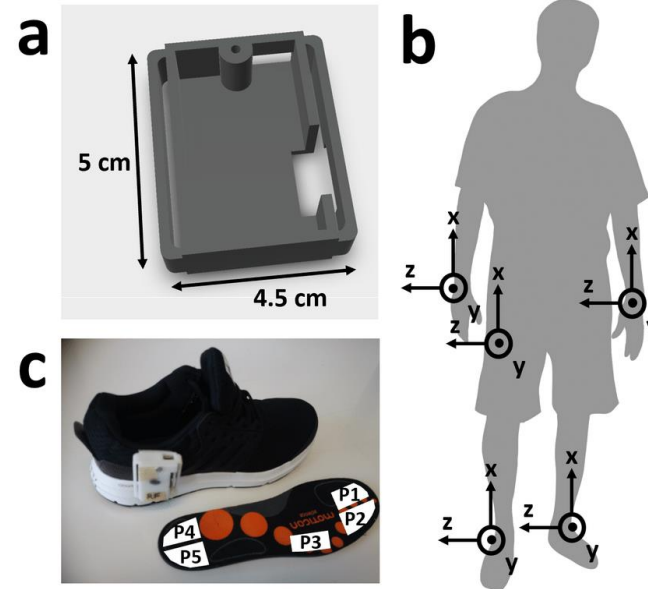
## Cons

- Compromises privacy in public and passive settings
- Dependent on field of view

# Inertial Measurement Units (IMUs)

Includes multiple signals:

- Accelerometer (linear motion)
- Gyroscope (rotational motion)
- Magnetometer (orientation), sometimes



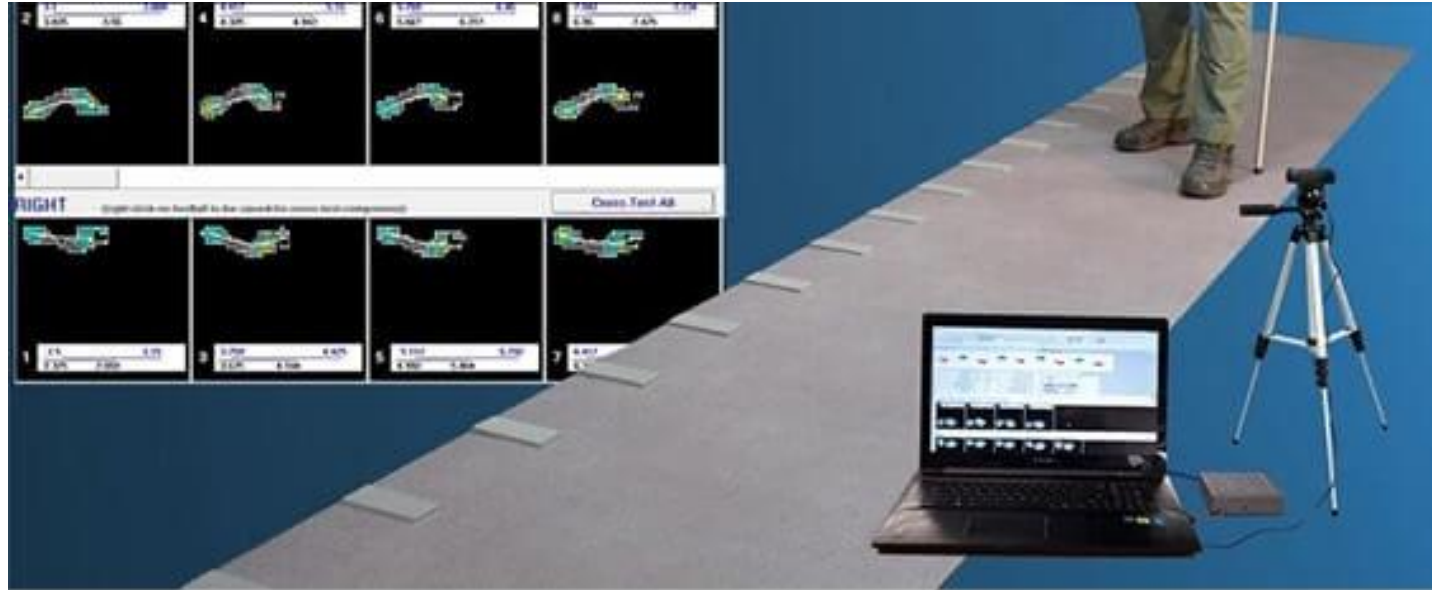
## Pros

- + Does not contain protected health information
- + Completely portable

## Cons

- Accuracy depends on sensor placement (e.g., step counting from pocket versus watch)

# Pressure-Sensitive Mats



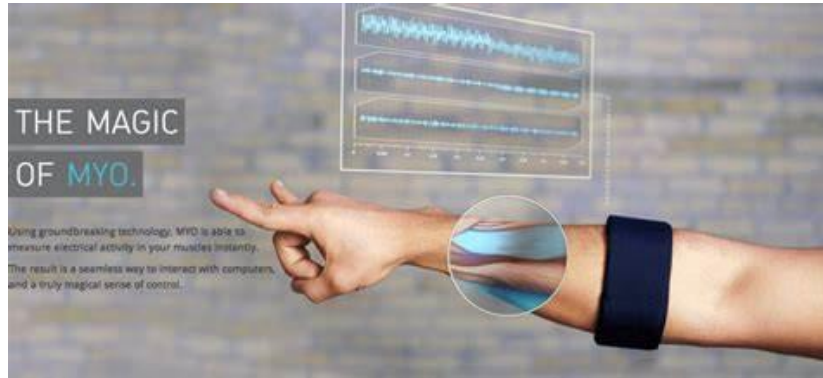
## Pros

- + Specifically designed for gait analysis
- + Simplifies measurements like stride length and gait speed

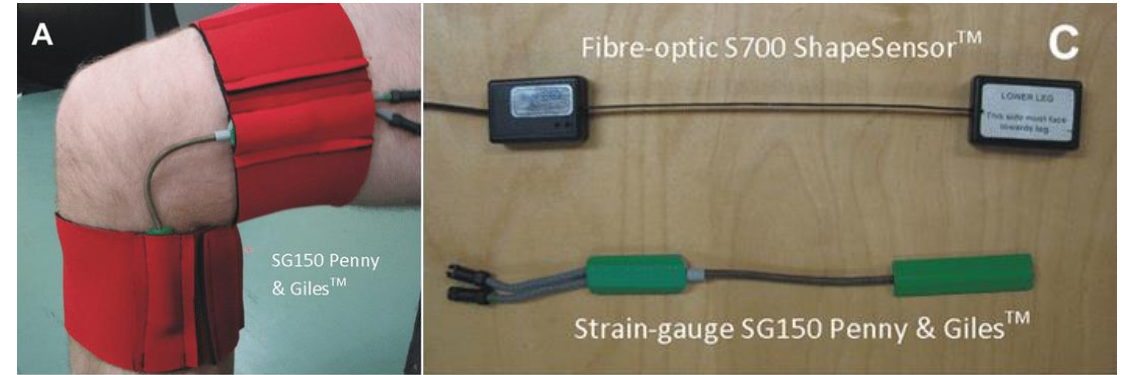
## Cons

- Only designed for gait analysis
- Fixed location
- Expensive

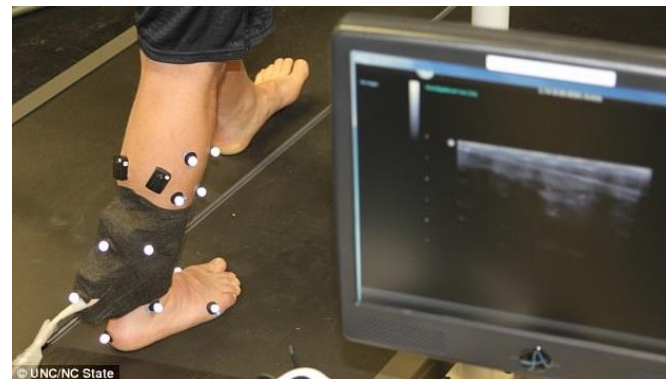
# Other Sensors



**Electromyography**  
(electrical activity in muscles)



**Goniometers / Strain gauges**  
(flexion of joints)



**Motion Capture System**  
(precise marker tracking)

# Resources

Gait Analysis: An Introduction  
([Whittle '91](#))