

# Vanderbilt University CREATE

Center for Rehab. Engineering & Assistive Tech.

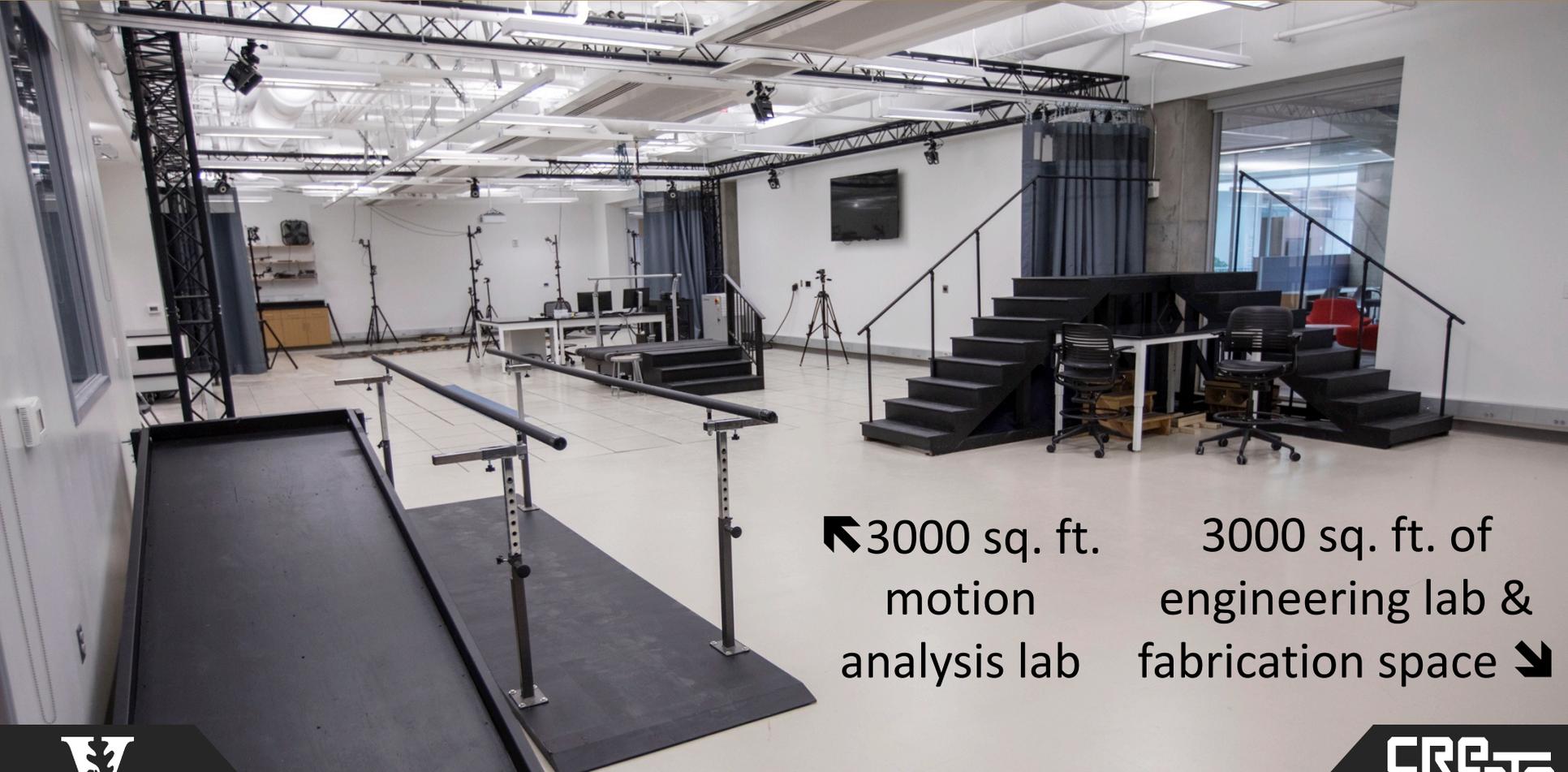


# Rehabilitation Engineering

Goal: restore mobility, independence & health to individuals with disabilities through advances in science and technology



CENTER FOR  
**REHABILITATION ENGINEERING  
+ ASSISTIVE TECHNOLOGY**



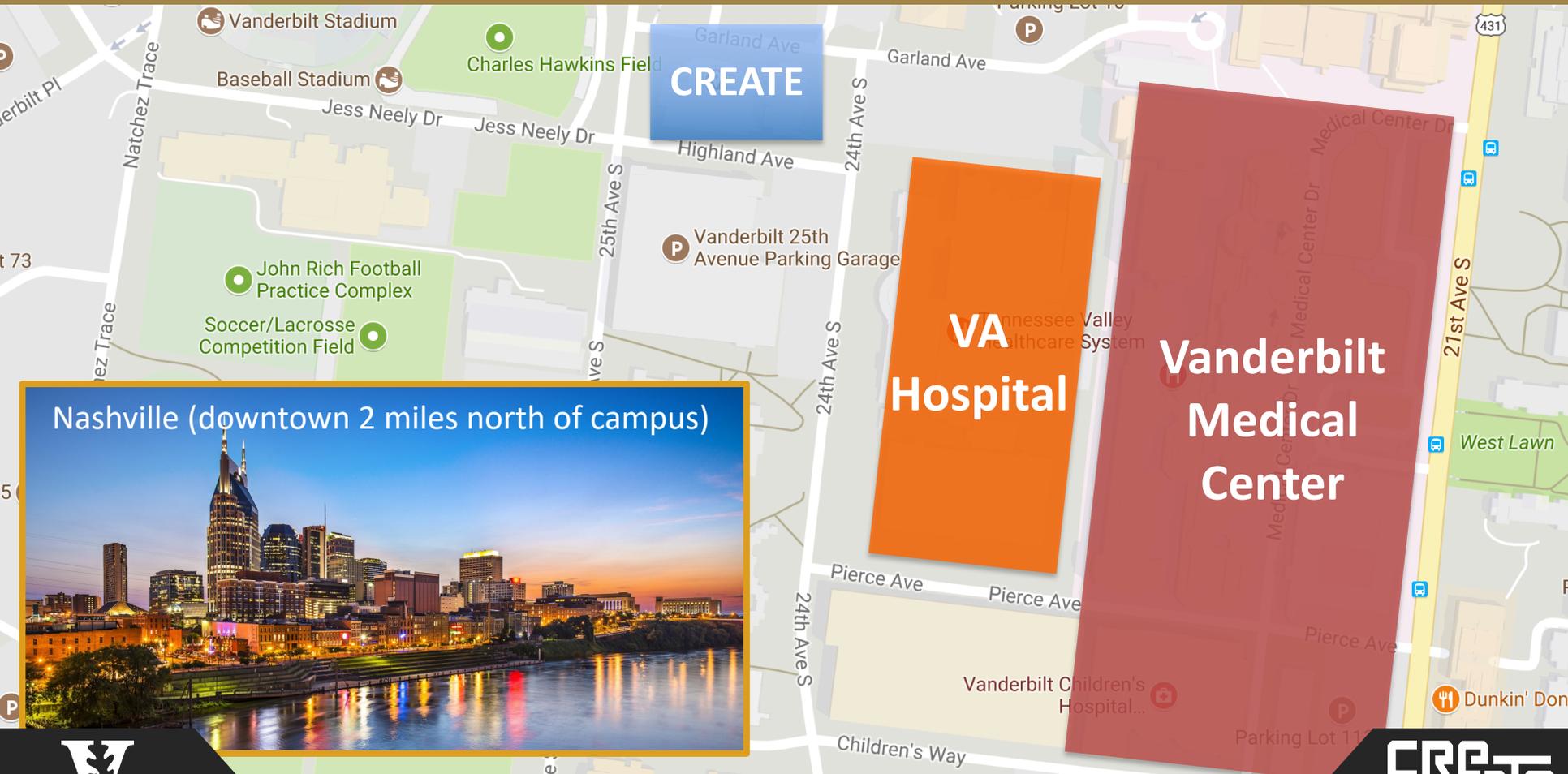
↖ 3000 sq. ft.  
motion  
analysis lab

3000 sq. ft. of  
engineering lab &  
fabrication space ↘





CENTER FOR  
**REHABILITATION ENGINEERING  
+ ASSISTIVE TECHNOLOGY**



Nashville (downtown 2 miles north of campus)

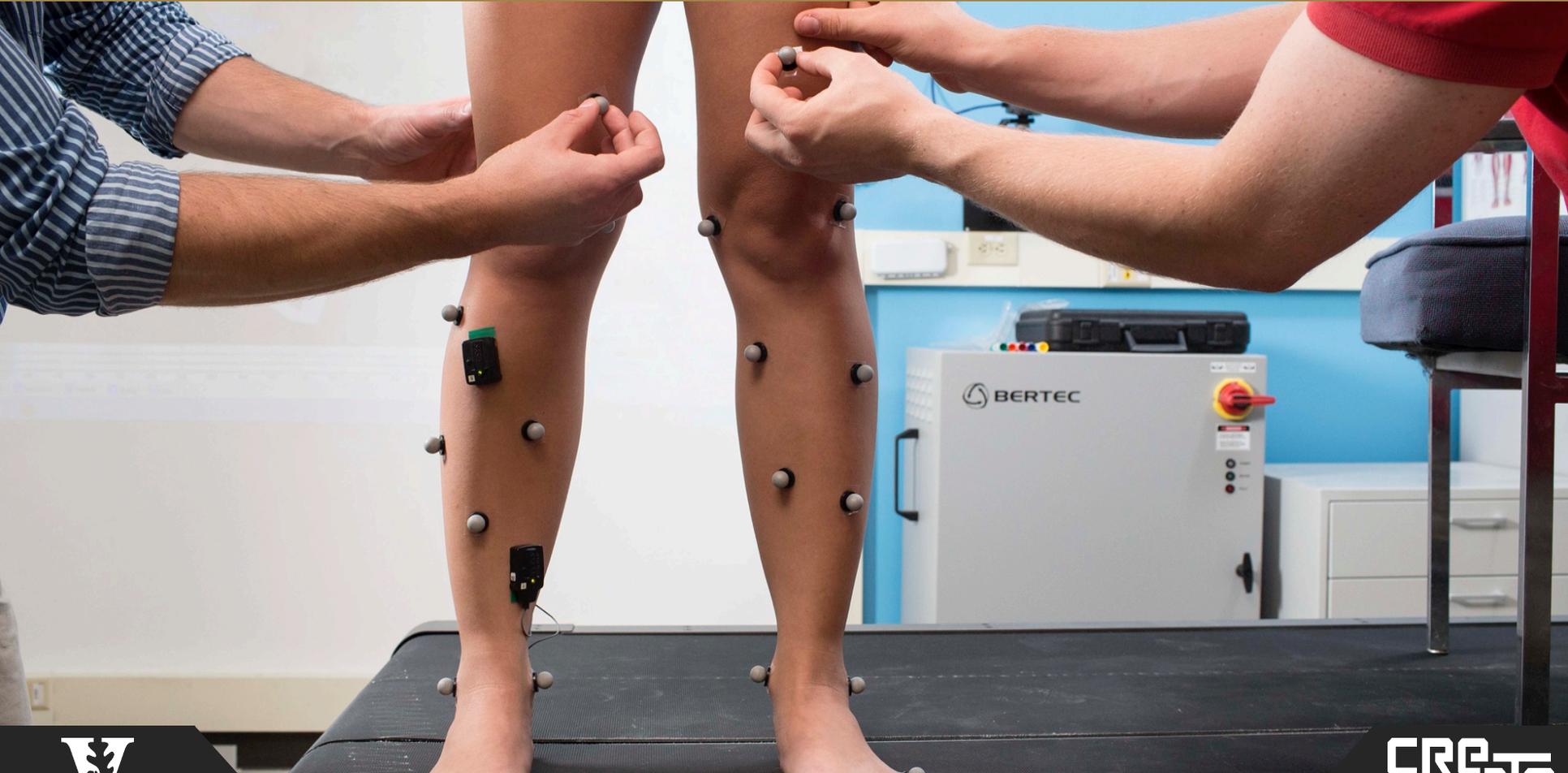


[engineering.vanderbilt.edu/create](http://engineering.vanderbilt.edu/create)

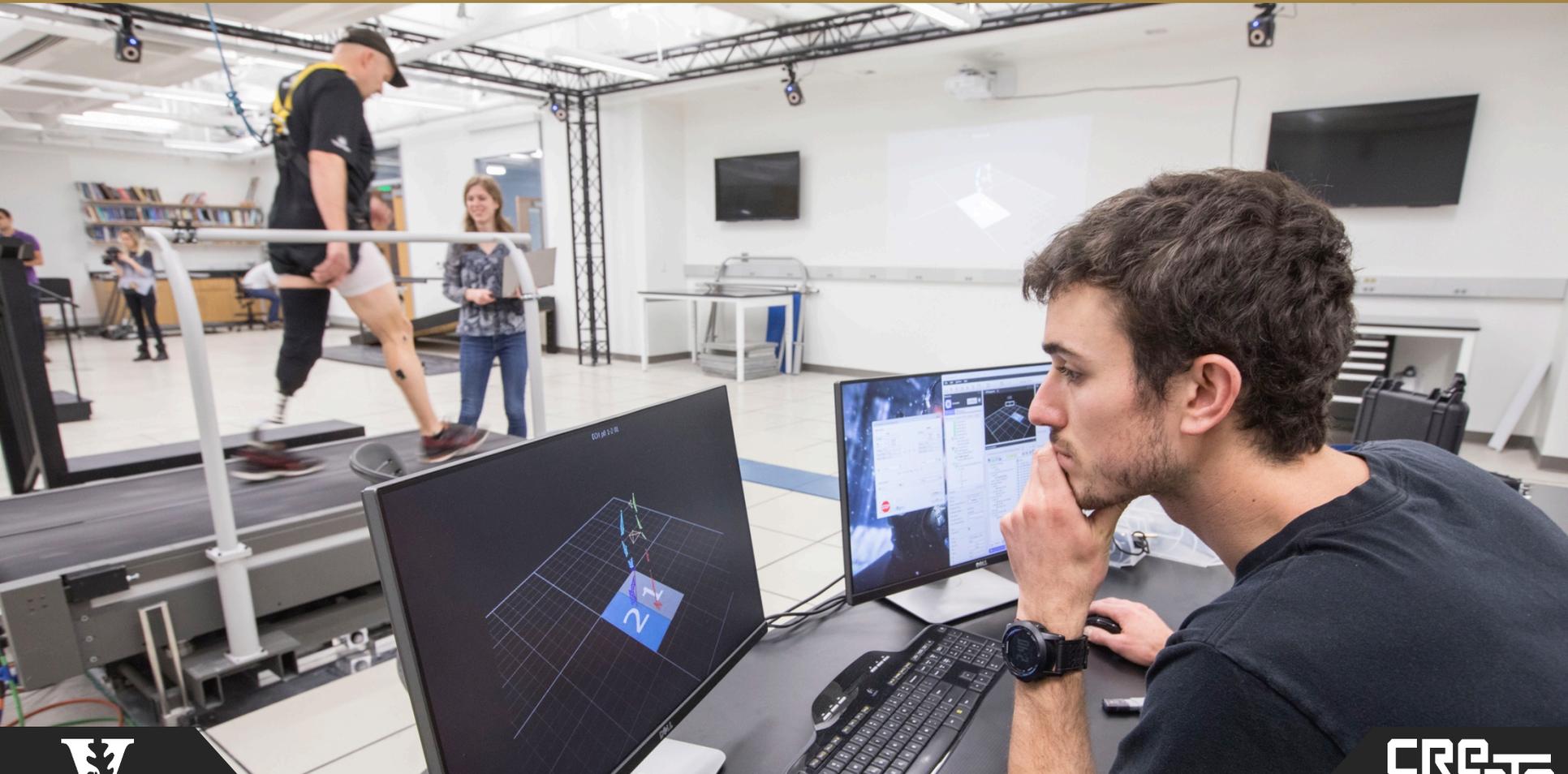




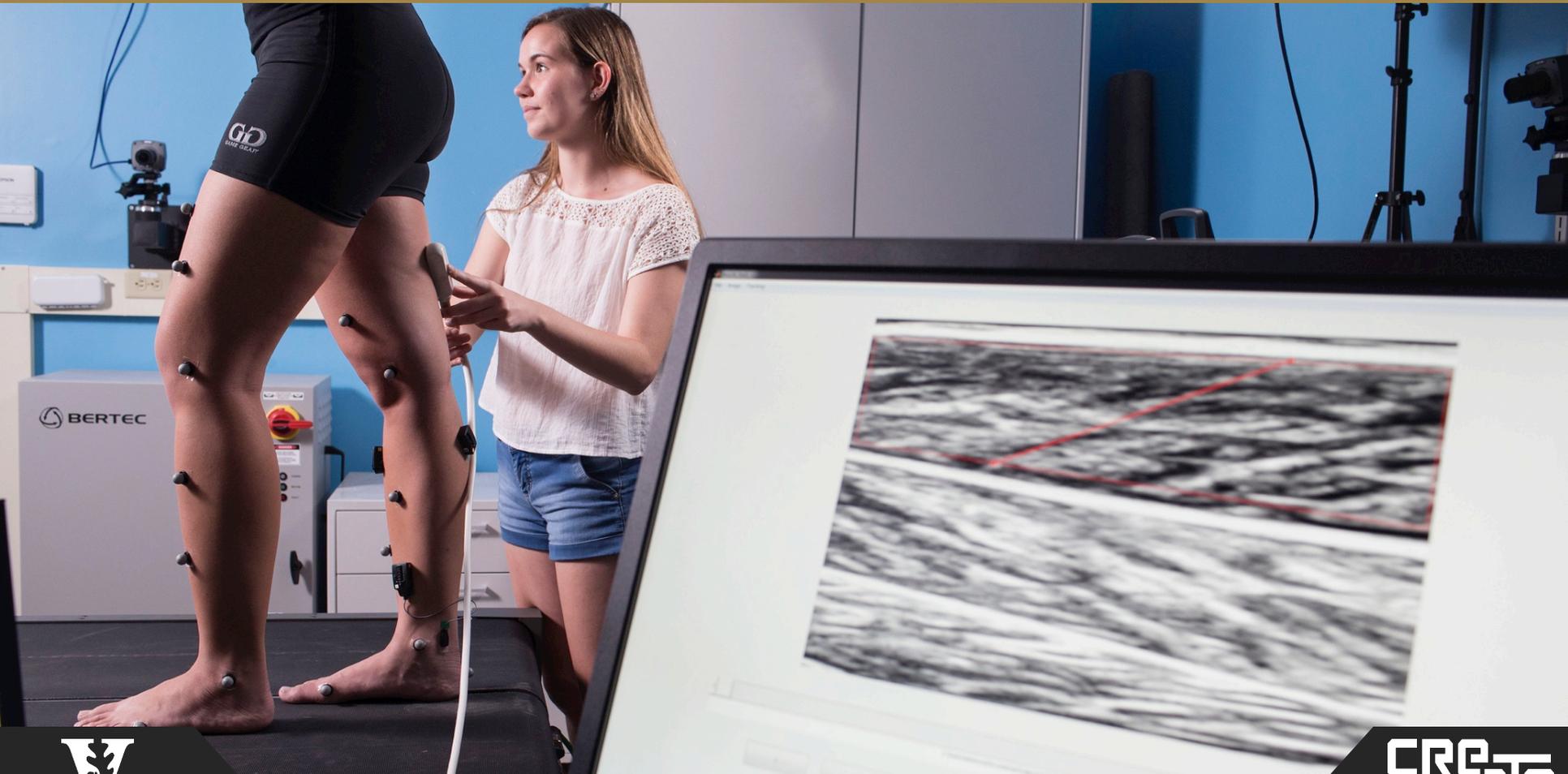
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## 2. Developing assistive tech (prostheses, exoskeletons, smart clothing)



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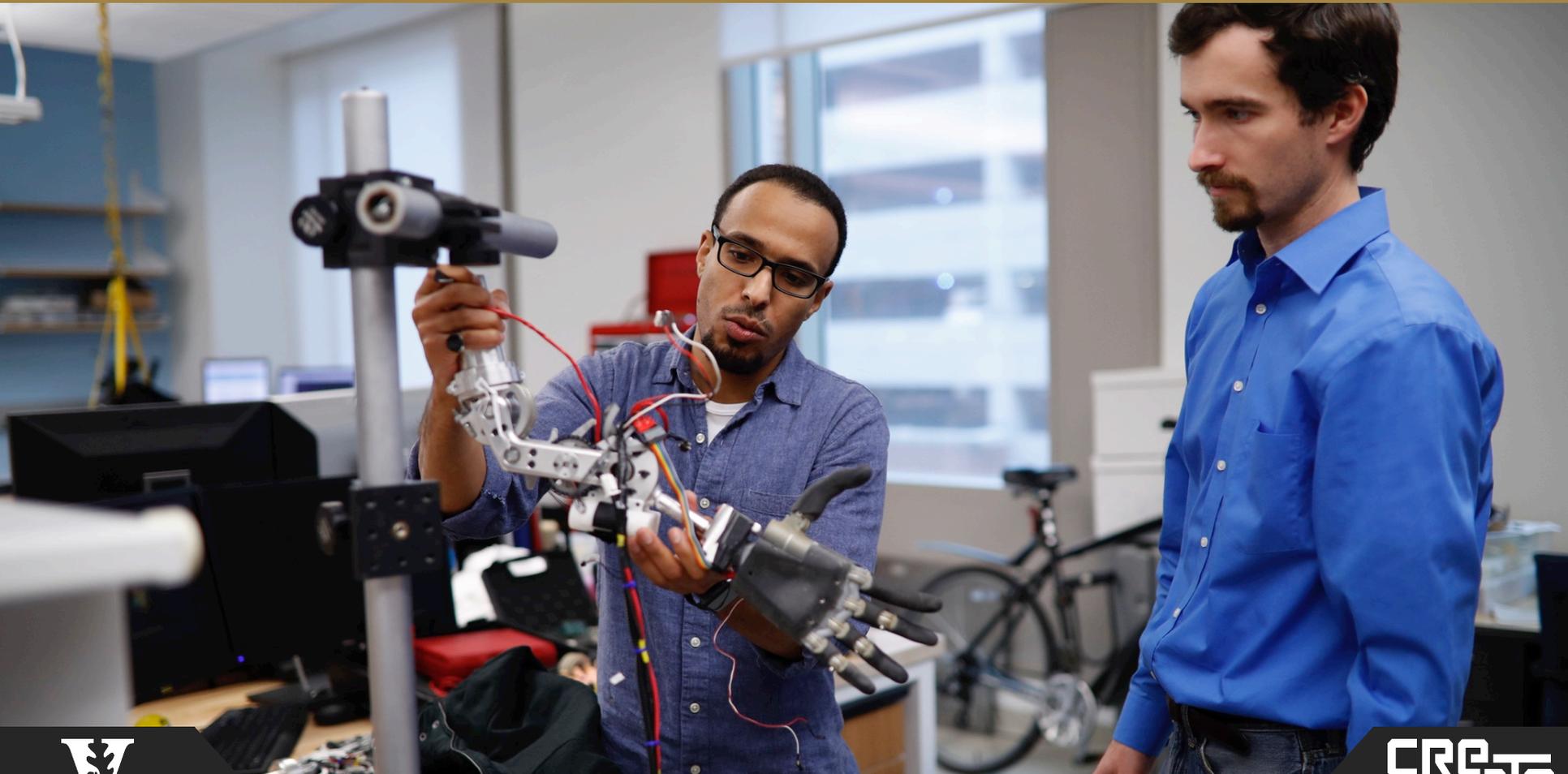
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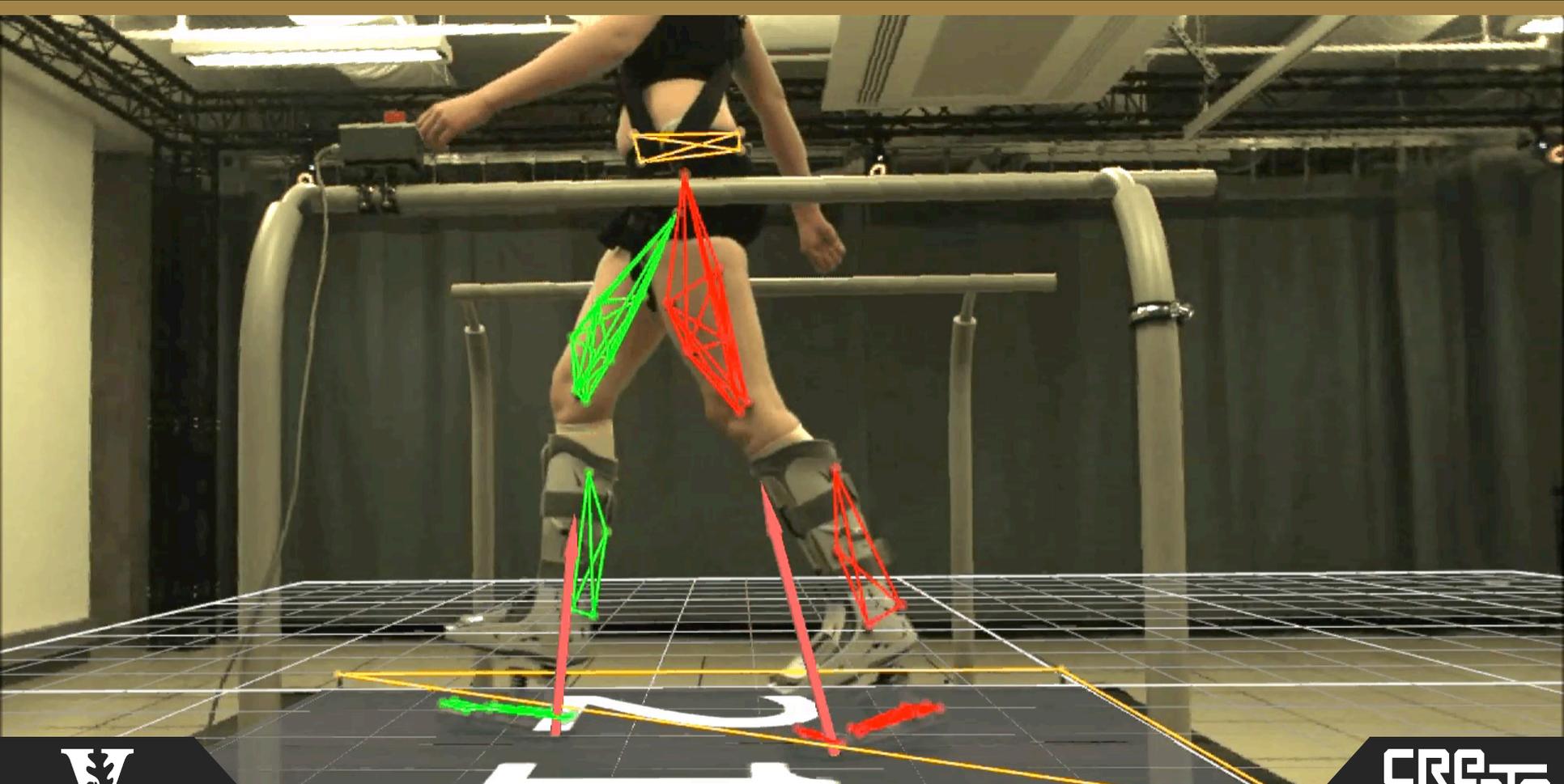
## 2. Developing assistive tech (prostheses, exoskeletons, smart clothing)



### 3. Performing experiments to measure benefits & refine devices



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# 4. Training next generation of engineers, scientists & innovators



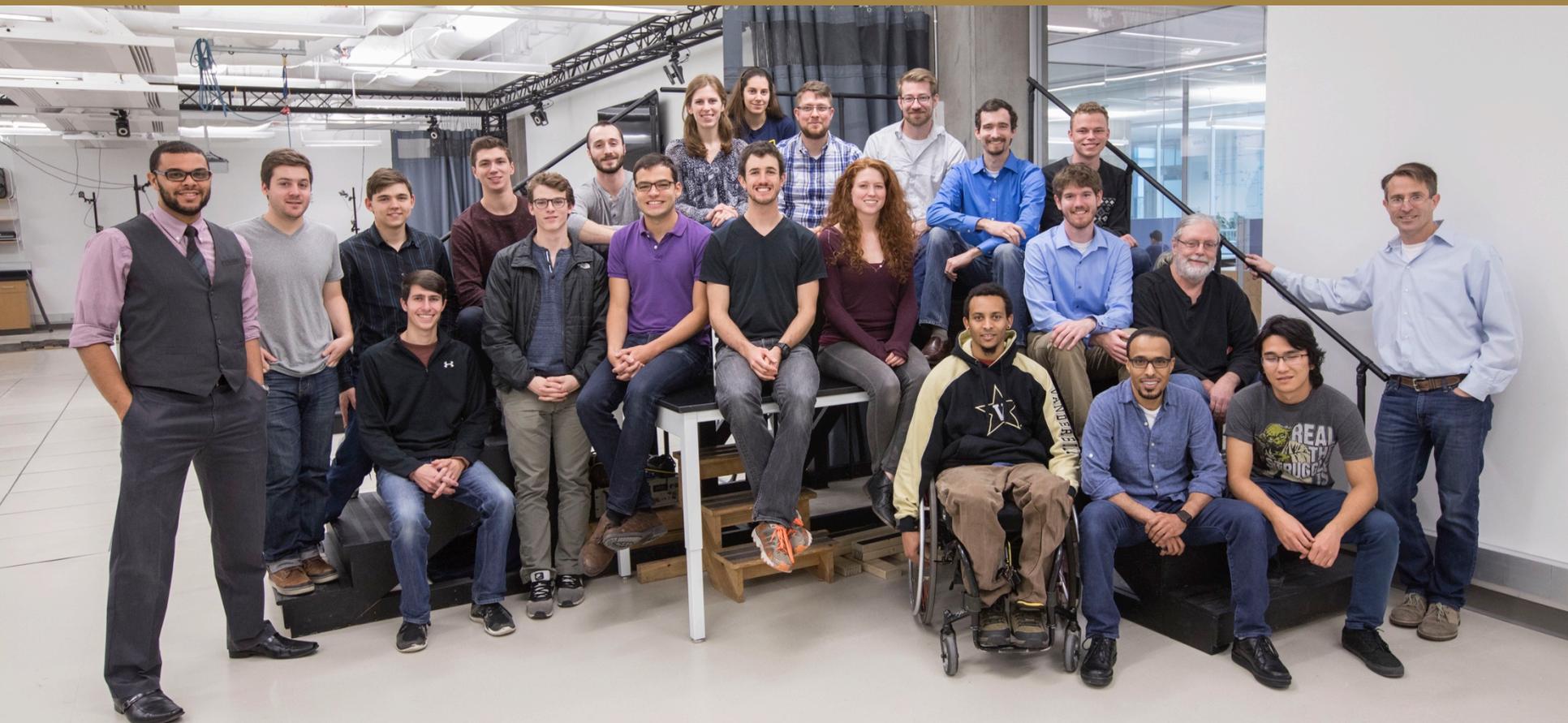
# 4. Training next generation of engineers, scientists & innovators

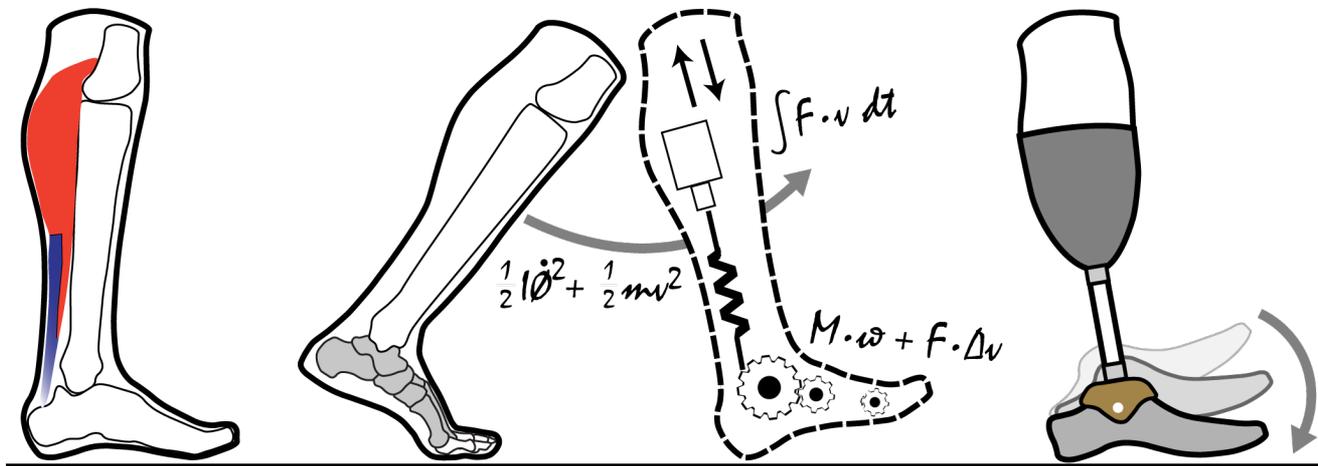


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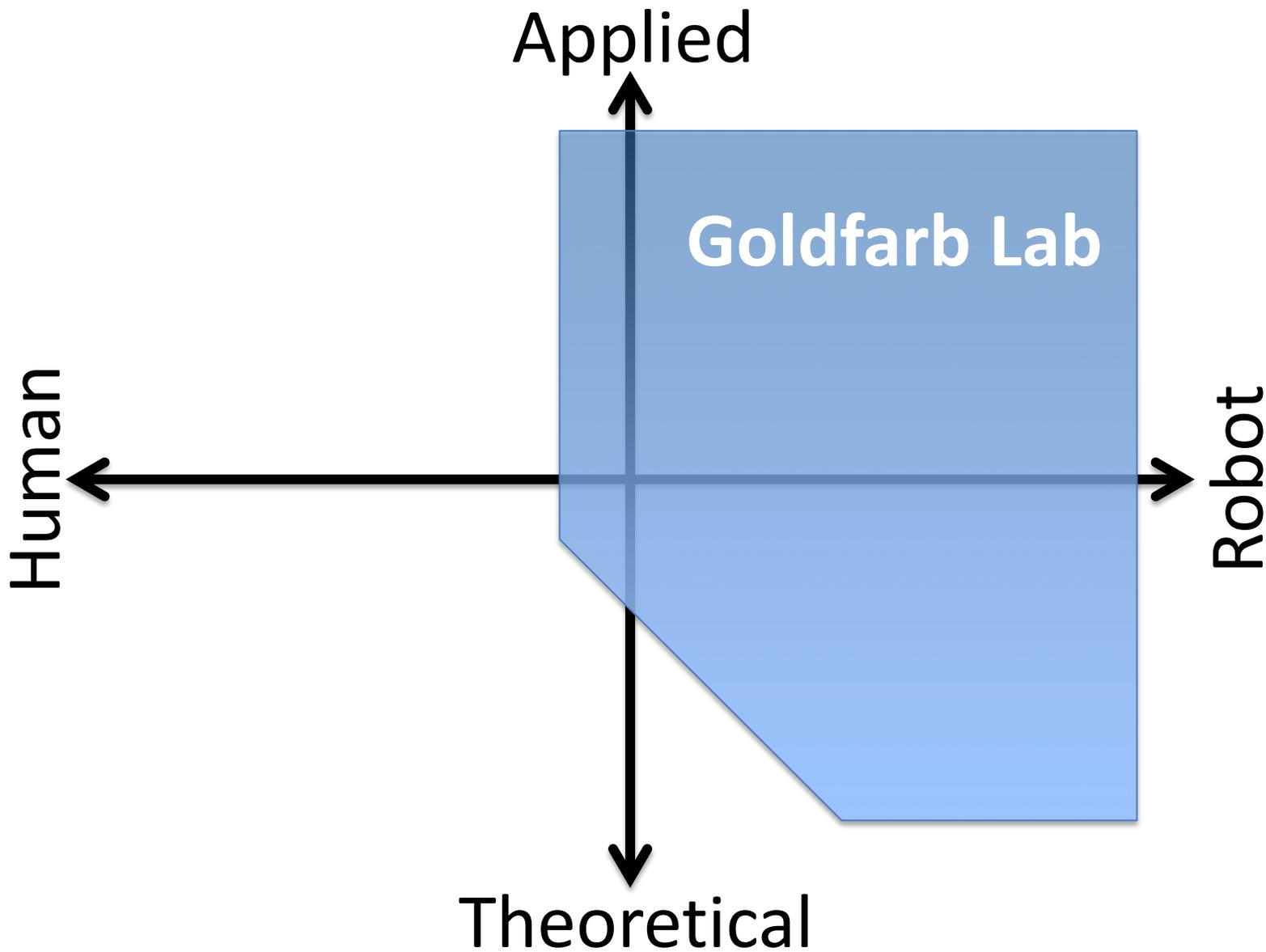


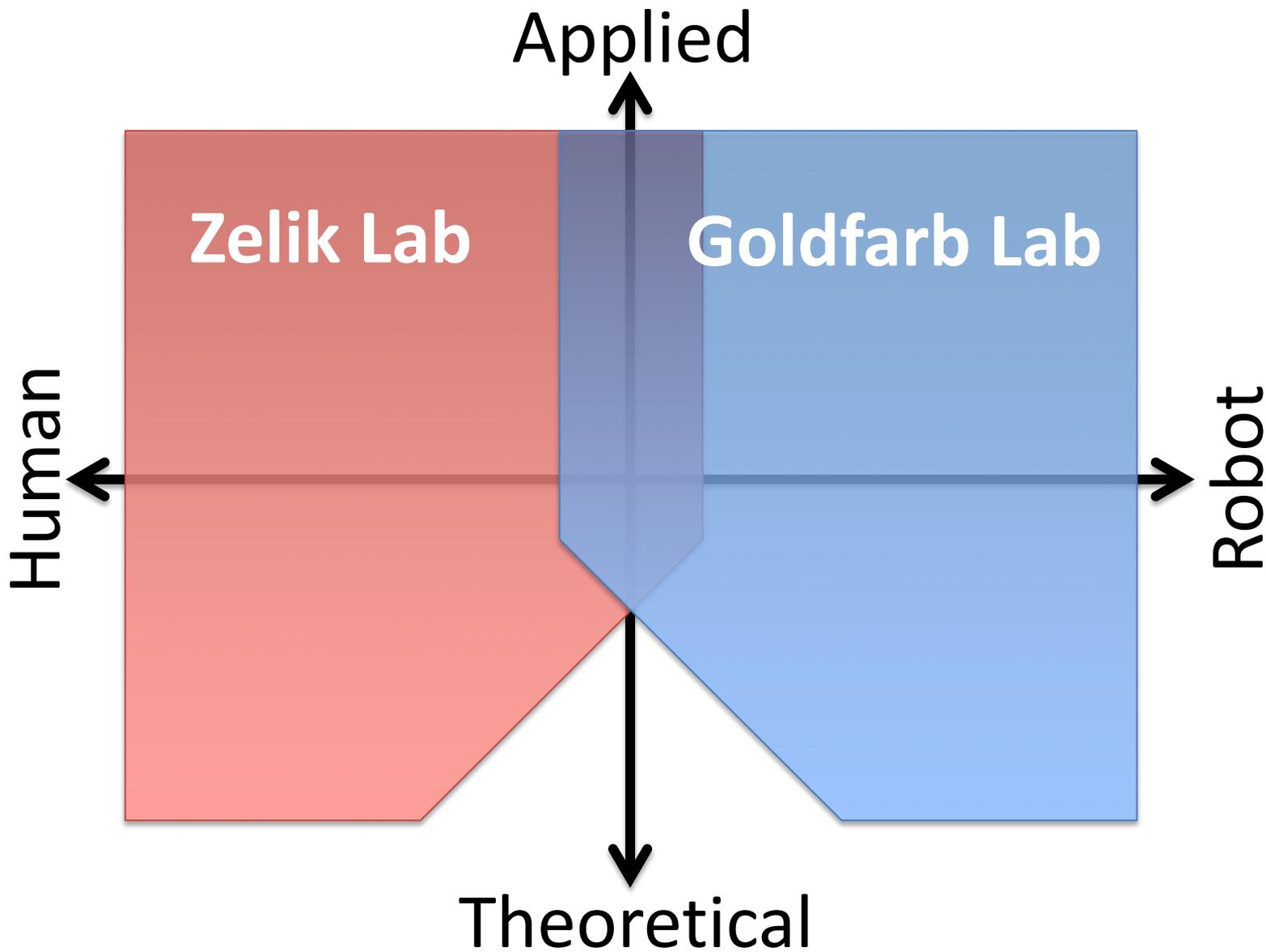


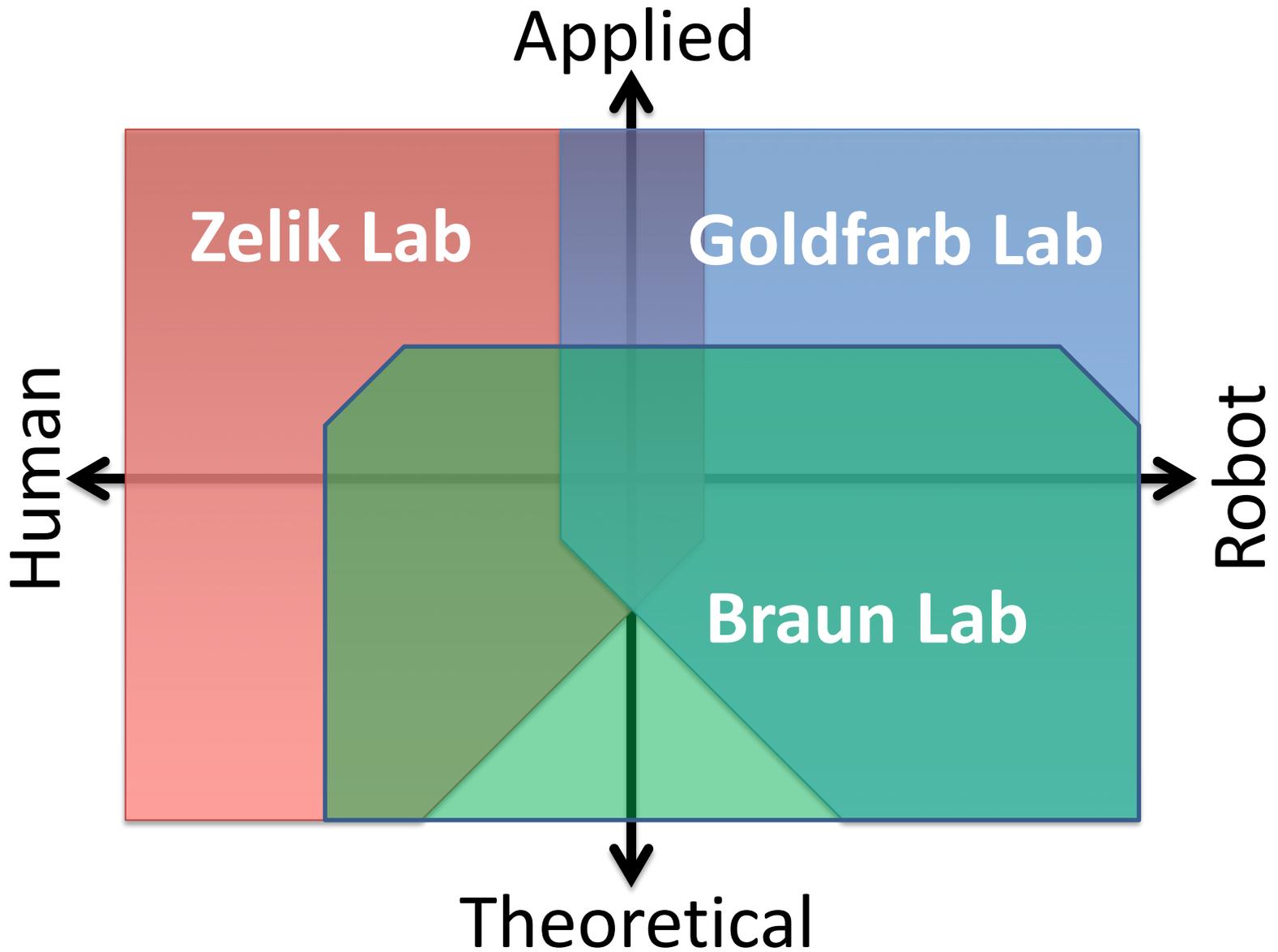
# Research Groups Within CREATE

Zelik & Goldfarb Labs

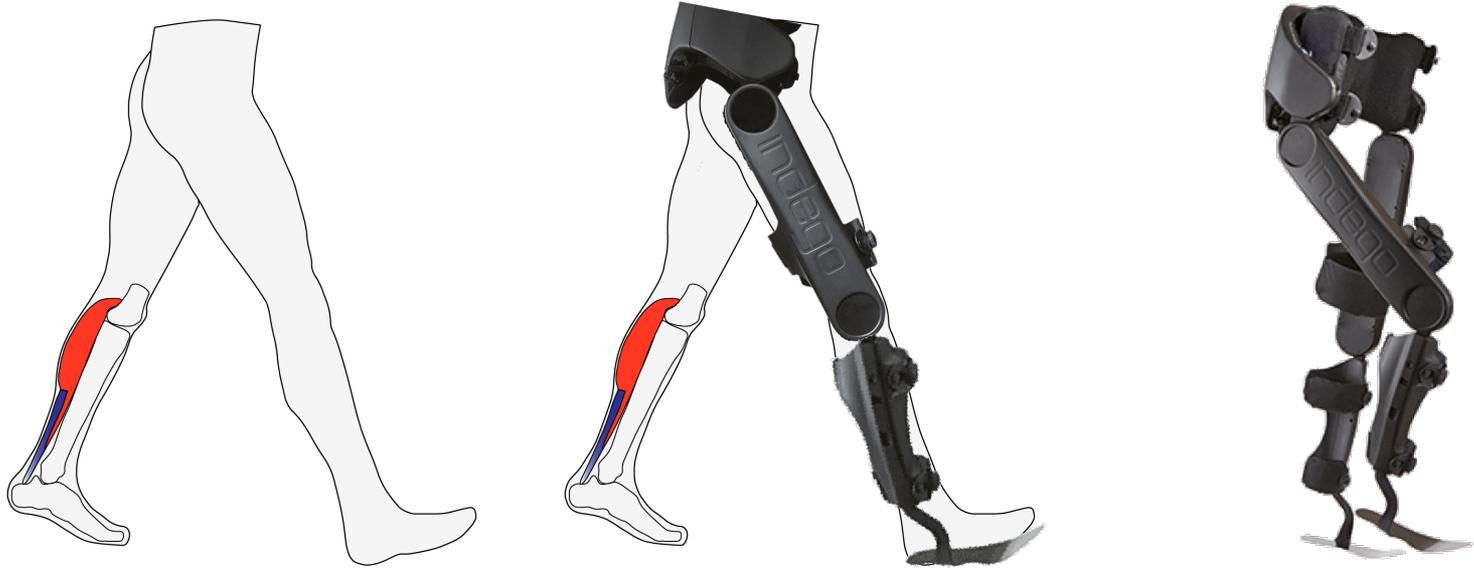




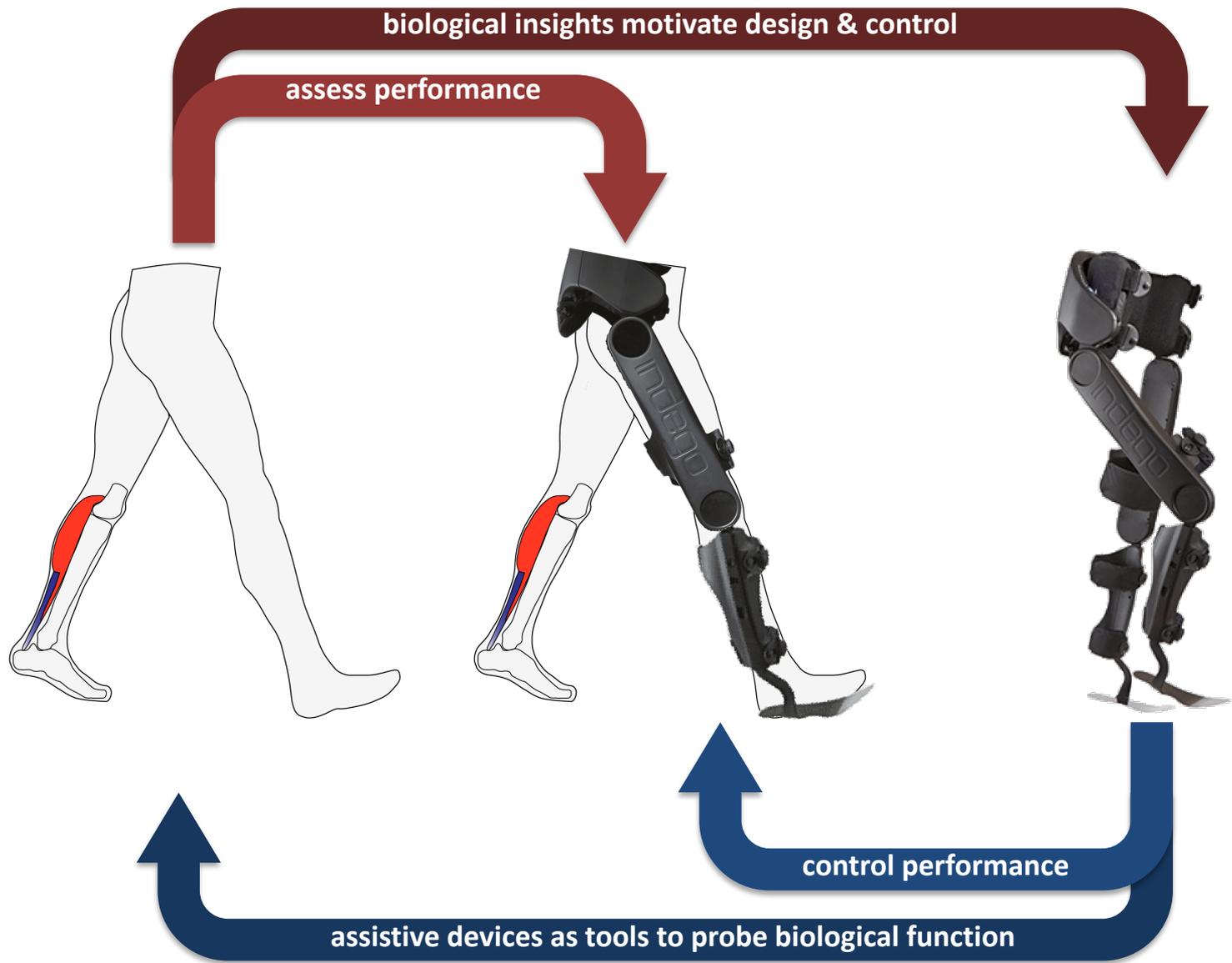




biological insights motivate design & control



assistive devices as tools to probe biological function



# CREATE extended family (VUMC clinical collaborators)



**Gerasimos Bastas,  
MD, PhD**  
(care for prosthetic  
users)



**Leon  
Scott, MD**  
(orthopedics, stress  
fracture)

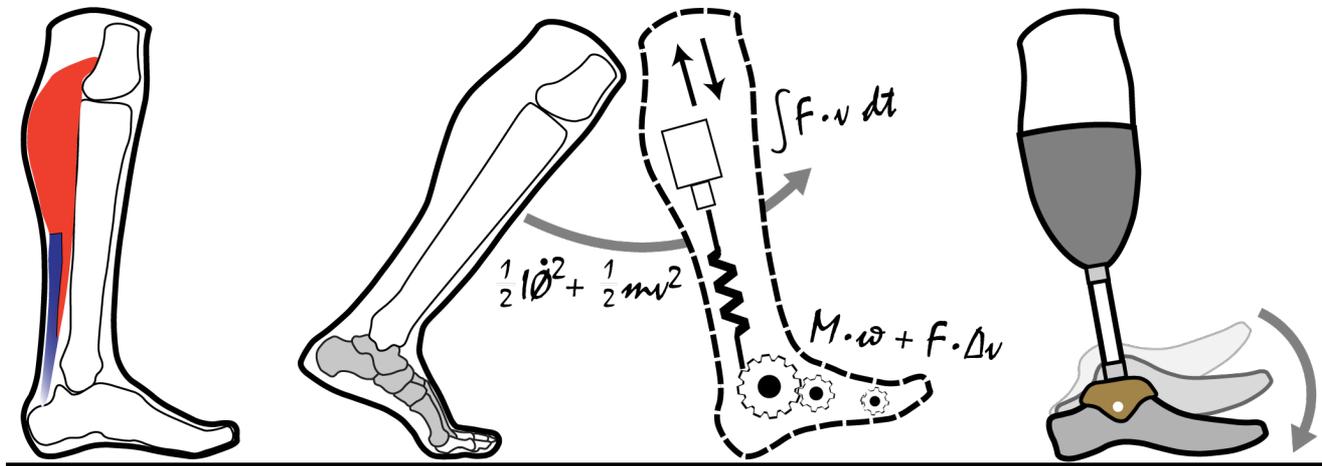


**Chrissy  
Durrough, PT, DPT, NCS**  
(spinal cord injury)



**Aaron  
Yang, MD**  
(low back pain,  
rehabilitation)





# Zelik Lab

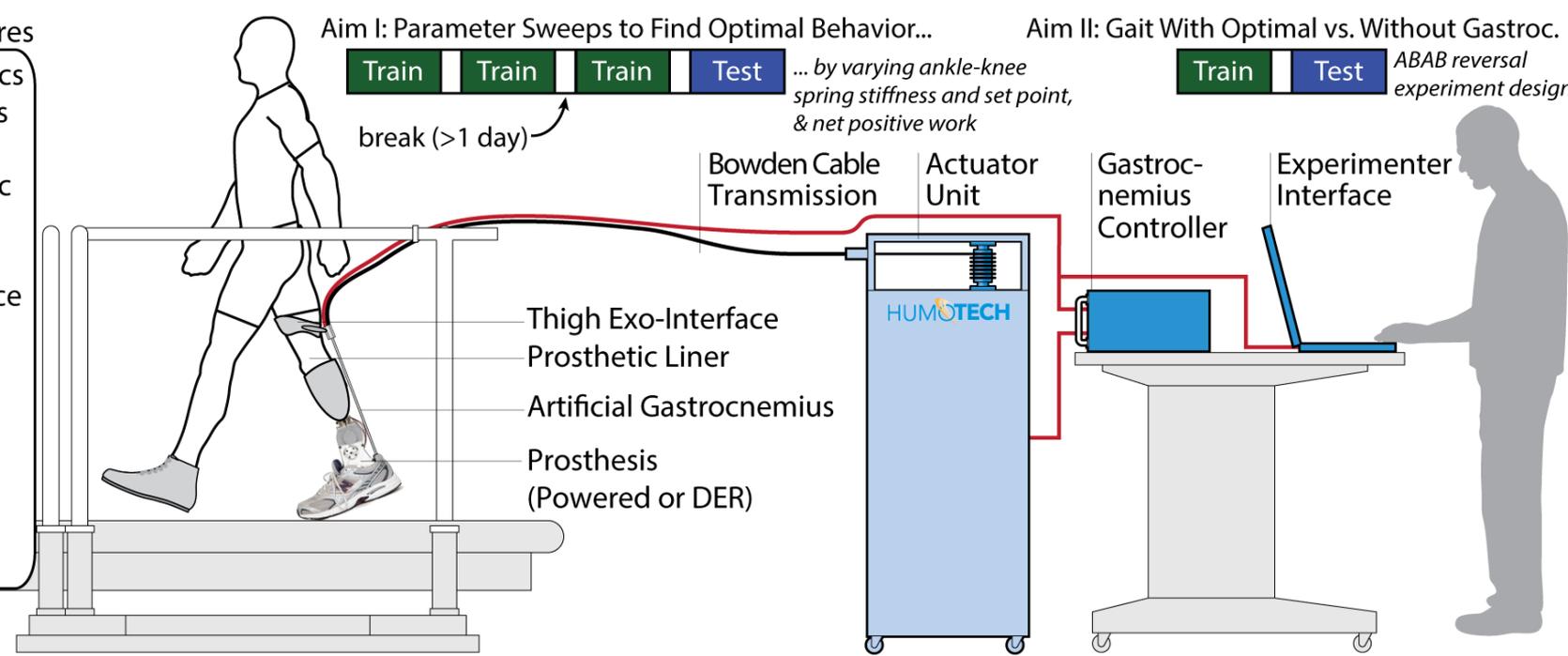
Example Research Projects Merging Biomechanics & Robotics



## Restoring bio-inspired ankle-knee coupling for prosthetic users

### Outcome Measures

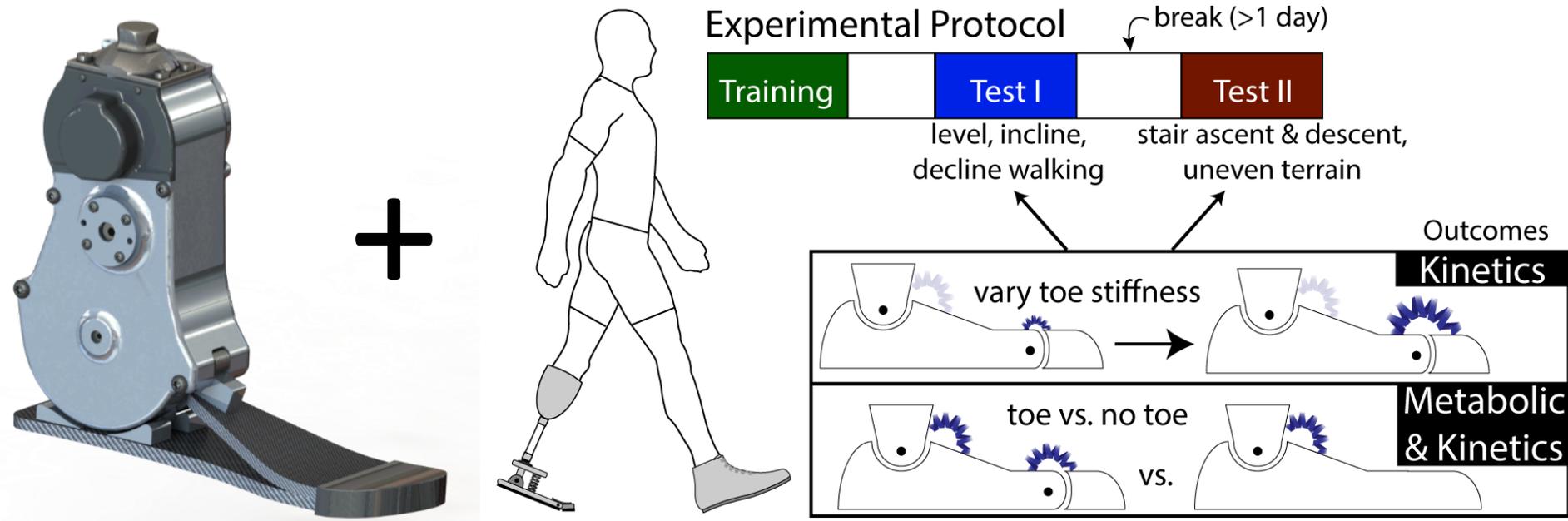
- Kinematics & Kinetics
- Metabolic Rate
- Preference Survey
- Ground Reaction Forces
- Muscle Activity



*Lab-based robotic actuator + prosthetics + biomechanics → enhance how assistive power is transmitted from the device to user, & better understand human ankle-knee muscles (gastrocnemius)*



## Using toe dynamics to improve powered & passive prostheses



*Vanderbilt powered ankle prosthesis + enhanced foot/toe design + biomechanics → enhance ambulation for prosthetic users on inclines, stairs and uneven terrain, & better understand biological ankle-foot dynamics*

