

2016

# Computing Human Arm Stiffness for the Purpose of Robotic Simulation

Nicholas Gehler  
*Cleveland State University*

Philip Sesco  
*Cleveland State University*

Follow this and additional works at: [https://engagedscholarship.csuohio.edu/u\\_poster\\_2016](https://engagedscholarship.csuohio.edu/u_poster_2016)

**How does access to this work benefit you? Let us know!**

---

## Recommended Citation

Gehler, Nicholas and Sesco, Philip, "Computing Human Arm Stiffness for the Purpose of Robotic Simulation" (2016). *Undergraduate Research Posters 2016*. 56.

[https://engagedscholarship.csuohio.edu/u\\_poster\\_2016/56](https://engagedscholarship.csuohio.edu/u_poster_2016/56)

This Book is brought to you for free and open access by the Undergraduate Research Posters at EngagedScholarship@CSU. It has been accepted for inclusion in Undergraduate Research Posters 2016 by an authorized administrator of EngagedScholarship@CSU. For more information, please contact [library.es@csuohio.edu](mailto:library.es@csuohio.edu).



This digital edition was prepared by MSL Academic Endeavors, the imprint of the Michael Schwartz Library at Cleveland State University.

# ***Computing Human Arm Stiffness for the Purpose of Robotic Simulation***

Washkewicz College of Engineering

**Student Researchers:** Nicholas Gehler and Philip SESCO

**Faculty Advisor:** Eric Scheerer

## **Abstract**

To replace a human during experiments, we've calculated the endpoint stiffness of a human arm to be simulated on a robot. The model used to calculate arm stiffness includes gravitational, short-range muscle, and muscle force-moment arm stiffnesses. The parameters of this model were estimated using data from the open source musculoskeletal MATLAB model, Dynamic Arm Simulator. The model will be used by a Barrett Proficio robot to simulate the stiffness of a human arm. The purpose of this human arm simulation is for experimentation during the development of a force sensing feedback system for functional electrical stimulation (FES). A robot that moves and produces similar stiffness to a human arm will be used in place of a human during experiments, for reproducibility and convenience. This requires the stiffness an arm produces under FES control to be computed and then replicated on the robot. Having an accurate representation of the stiffness an arm produces will create a better lab environment for the promotion of FES research.

*\*Partially Supported by the McNair Scholars Program*