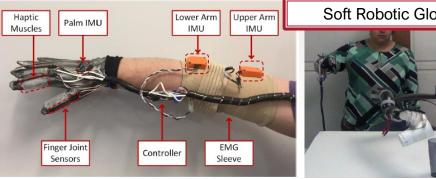
NSF Award #2024802 "Collaborative Research: NRI: INT: Transparent and Intuitive Teleoperation Interfaces for the Future Nursing Robots and Workers", 2020/09/01-2023/08/31. Funded by **NSF NRI** and **NIOSH**.

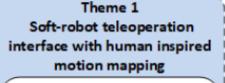
PI: Zhi Jane Li<sup>1</sup> (zli11@wpi.edu), Cagdas Onal<sup>1</sup>, Jie Fu<sup>1</sup>, Jeanine Skorinko<sup>2</sup>, Yunus Telliel<sup>2</sup>, Paula Bylaska-Davies<sup>3</sup>.



**Motivation & Significance** Tele-Nursing Robots for pandemic response (Ebola, Zika, COVID-19); Benefit 2.9 million US registered nurses and nursing practitioners; Support in-home care, clinics, and hospitals given the **shortage of nursing workers**; Prepare future workers through fusion of nursing and engineering education







Integrative Closed-Loop Haptic Control Architecture

Human-Inspired Intuitive Motion Mapping and Teleoperation Assistance

## **Education and Outreach**

WPI-WSU Collaboration

Graduate + Undergraduate Education

## **Experimental Platforms** and Evaluation

Integrated Soft Robotic Wearable Haptic Glove

Tele-Robotic Intelligent Nursing Assistant (TRINA)

Component Validation and System-Level Usability Evaluation

Evaluate the Social Impacts of the Proposed Interfaces

## Theme 2 Leverage haptic feedback for interactive human-robot training

Supporting the User to Learn Robot Teleoperation

Enhancing Robot Learning for Mutual Adaptation

TouchTomorrow + Frontiers

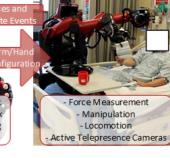
WIRE + FIRST

**NSF NRT Program** 

## Human-inspired Mapping & **Teleoperation Assistance**



Haptic Soft Force Feedback Vibrotactile Event Feedback





State of mind of the user

Blending

control (WR)

- Principled method to achieve human-robot mutual Adaptation
- feedback (WH)

State of mind of the robot

user

feedback

Worcester Polytechnic Institute (1 Department of Robotics Engineering, 2 Department of Social Science), <sup>3</sup> Worcester State of University (Department of Nursing)

