

# Discrete Variable Stiffness Actuators with Fast Stiffness Switch for Safe Human-Robot Interaction /#2131711 /9-1-2021/Dongming Gan, George T Chiu, Richard M Voyles, Purdue University

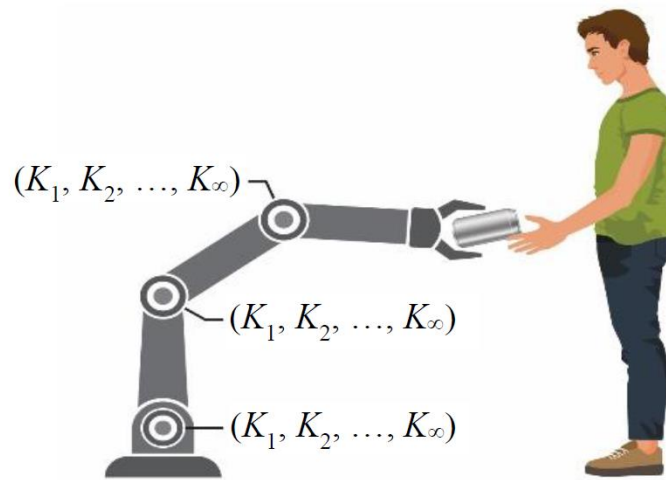
This project aims to fill the fundamental research gap in compliant robot actuation by proposing a new concept of discrete variable stiffness actuators (DVSA) and developing a systematic design methodology with high-performance control algorithms, validated by experimental tests.

## Challenge

- How to design compliant actuators to enable cobots to balance between performance and human-robot safety?

## Solution

- Design representative stiffness levels through discrete principles with consideration of safety of both human and robot
- Develop advanced adaptive control algorithms to cover the switching dynamics.



DVSA-based co-robots for safe human interaction with each joint actuator having discrete stiffness levels and fast stiffness change

## Scientific Impact

- A new development method in designing collaborative robots

## Broader Impact

- Enables new generation of cobots for safe human-robot co-working in industry manufacturing
- STEM workshops for Purdue Polytechnic High Schools (Nearly 70% of the student body is black) through the Indiana Manufacturing Competitiveness Center (IN-MAC)