

Mechanical and Aerospace Engineering Seminar Series

Carleton University

The role of redundancy in human motor learning

Dr. Puneet Singh

Wednesday July 20th, 1:00pm

Attendance: Online Link: <https://carleton-ca.zoom.us/j/94564267835> Or in-person: Room 3380ME.

Abstract: The number of joints in human arm are more than what is required for reaching the desired points in three-dimensional space. How the nervous system control and utilizes this redundancy is yet an unresolved problem in motor control. Additionally, how the reaching task is achieved reliably and repeatedly in the presence of motor variability is often treated as noise. In my presentation, we explore redundancy and investigate its significance and effect on motor learning. We propose that some parts of motor variability arise out of the redundancy. We show that greater use of redundancy lead to faster learning across subjects. Interestingly, we also observed differences in the redundancy uses between the dominant hand and non-dominant hand that explains differences in the learning of novel dynamics, suggesting that the redundancy is actively controlled by the nervous system. The results provide experimental support for the hypothesis that the exploration of redundancy aids in learning and that the redundancy component of the motor variability is not noise.

Biography:Dr. Puneet Singh is currently Postdoctoral Fellow at University of Moncton. He accomplished his Postdoctoral Fellowship from Harvard university on human motor adaptation with robotic exoskeletons. He completed his PhD in the field of Robotics and Neuroscience from Indian Institute of Science Bangalore, India. He is recipient of the Inspiring Science Award 2018. His research interests include Human motor control and learning, redundancy in robotics and variability in biomechanics.



Carleton Host: Professor Mojtaba Ahmadi, Advanced Biomechatronics and Locomotion (ABL) Laboratory.

NOTE: For MAAE graduate students, attendance will be counted towards your program requirements. To record your attendance, please email Janet (Janet.Perras@carleton.ca) with your "Name," "Student ID," and "Program" within two hours after the webinar. Mention whether you attended online or in person.