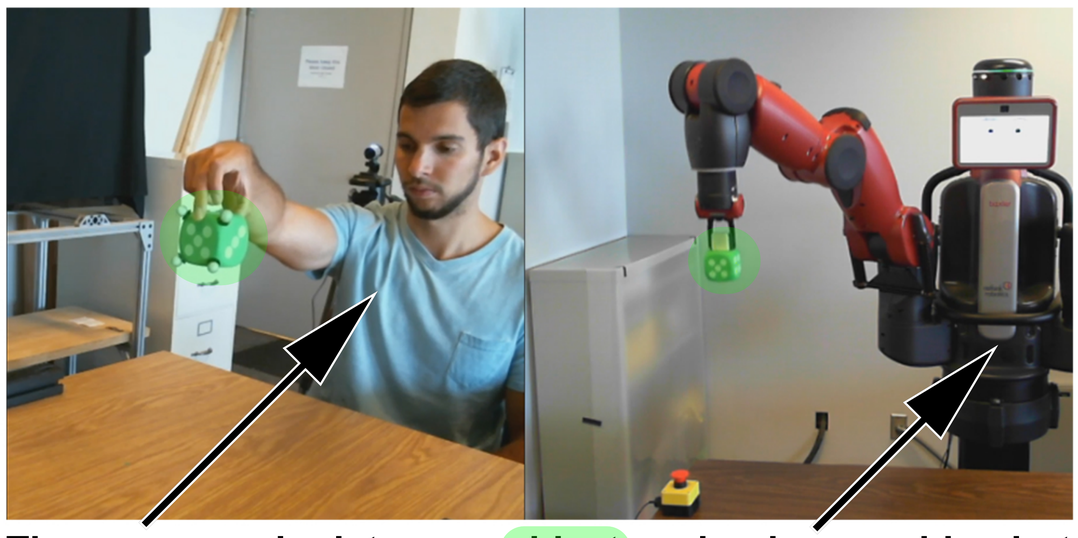
UNIVERSITY OF CALGARY [1]

htw saar [2] Hochschule für Technik und Wirtschaft des Saarlandes University of Applied Sciences

The Way You Move: The Effect of a Robot Surrogate Movement in Remote Collaboration

Martin Feick[1,2], Lora Oehlberg[1], Anthony Tang[1], André Miede[2], Ehud Sharlin[1]

ReMa – Remote Manipulator



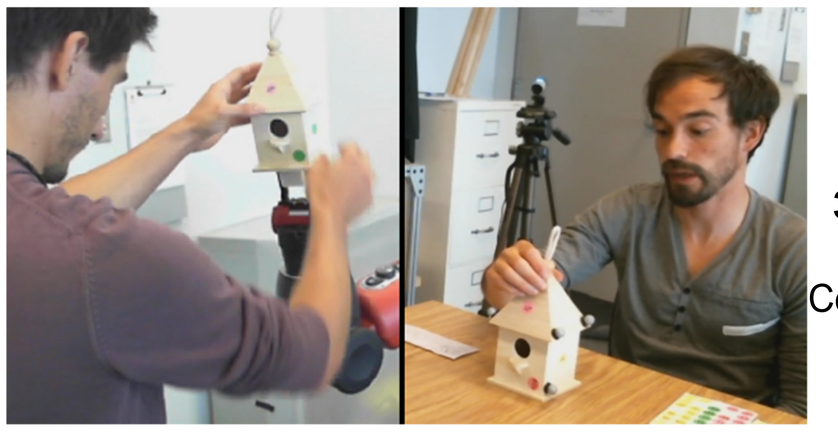
The user manipulates an object and a humanoid robot mimics these changes in object position and orientation at a remote location

Challenges

- ***Humans and robots have fundamentally different kinematics and speed capabilities***
- ***Robots will ultimately follow different pathways and velocity dynamics***

The robot's movement trajectory does not match the human motion due to the "wrist" joint limitation of the robot

Methodology



2 Studies

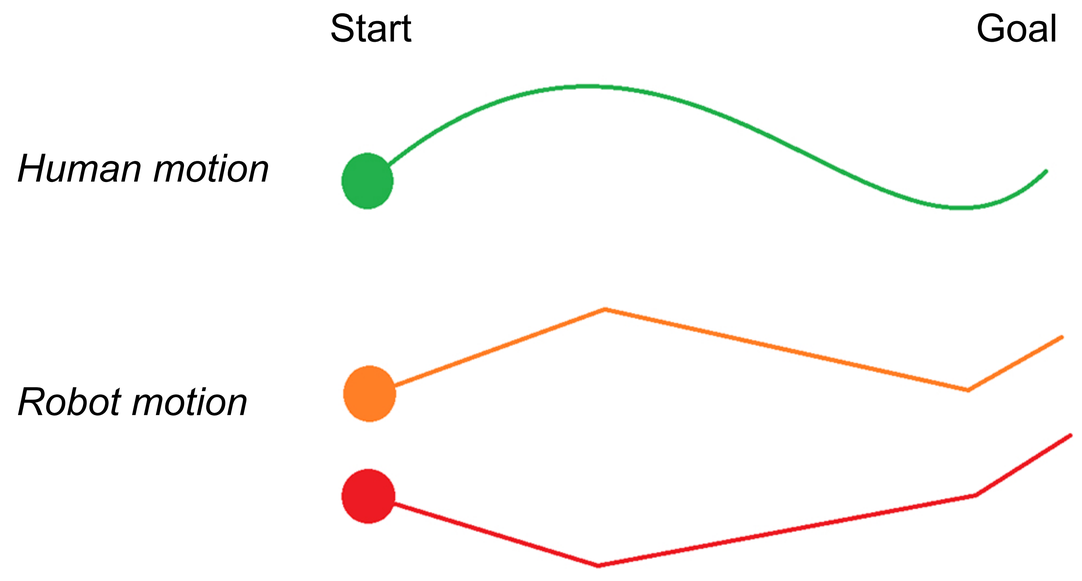
32 Participants

Collaborative task

Focus: How participants responded to movement aspects

Movement Aspects

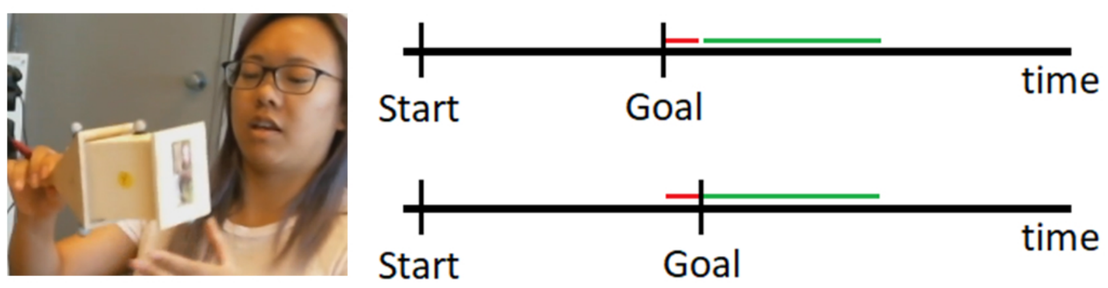
Trajectory: Required a certain motion, but the robot failed to fully replicate this motion.



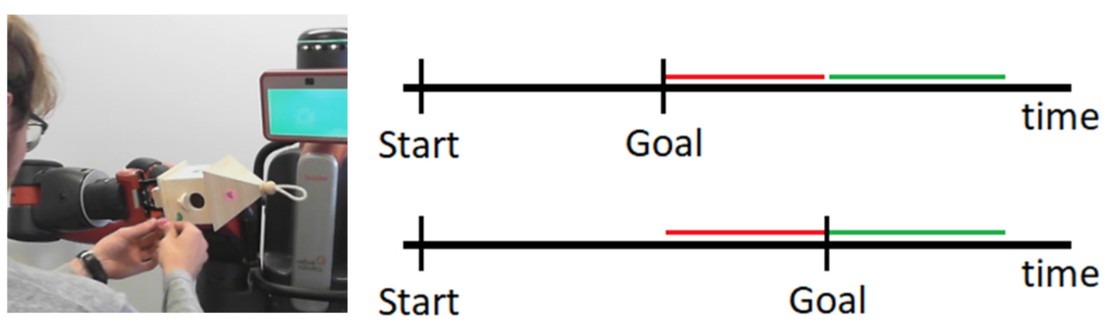
Human motion trajectory (top - green) compared to a similar robot motion (middle - orange), and a purely functional movement (bottom - red)

Velocity: Difference between robot joint speed and human motion speed.

Velocity shift between human-human collaboration,



and human-human robot-mediated collaboration



Summary

- ***Trajectory*** and ***Velocity*** are important to facilitate interaction
- Incorrect and unexpected movement aspects affected the remote collaboration
- Participants developed workarounds to support interaction (increased total time)

Contact: { martin.feick, lora.oehlberg, tonyt, ehud }@ucalgary.ca, andre.miede@htwsaar.de

Read here