



Discussion



Marcie O'Malley

Assistant Professor
 Mechanical Engineering and Materials Science
 Rice University
 Houston, TX



omalleym@rice.edu

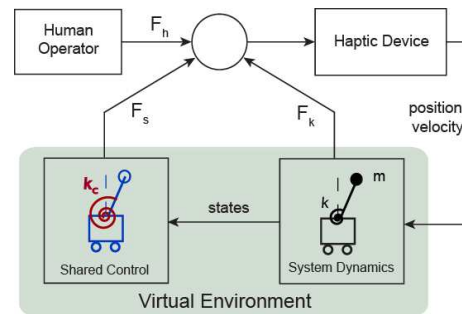
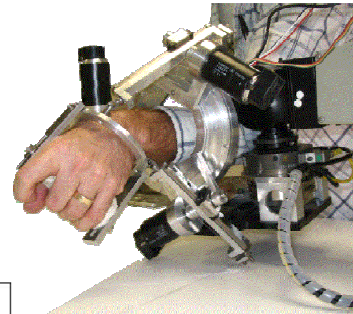
<http://mahilab.rice.edu>

Research Interests

- Haptics
 - Hardware design
 - Control
 - Psychophysics
- Robotic-assisted rehabilitation
- Vision-based control
- Computational motor control
- Nanorobotic manipulation
- Physical HRI

Research Highlights

Exoskeleton devices facilitate motor recovery post-stroke



Haptic guidance via shared control uses all states of system to be controlled



Master Manipulator (Phantom Haptic Interface)

Position Commands to Slave



Force Feedback to Master



Nanomanipulator (ZyveX)

Nanomanipulation with vision-based force sensing and feedback

Honors

- NSF CAREER 2005
- ONR YIP 2004
- George R. Brown Award for Superior Teaching (Rice University) 2008

Professional Activities

- ASME DSCD Robotics TC Co-Chair (and next Chair)
- IEEE Haptics TC Co-Chair
- IEEE Transactions on Haptics Associate Editor
- ASME/IEEE Transactions on Mechatronics Associate Editor (2009+)

Challenges and Opportunities

- Filter out themes
 - Power, actuation
 -
 - Human in the loop
 -
 - Emergent behaviors (swarms)
 -
 - Sensory feedback
 -
 - Sensors
 -
 - Interpreting human's intent
 -
 - Amputee, teleop...
 - Normal function versus impaired (amputee, brain injury)
- Killer app ... ?? Is one needed? What does it provide? Common challenge for the field...
 - Walking bi-ped that can traverse any terrain with multiple gaits
 - Intuitive (afferent + efferent) neural controlled human-capable prosthetic device
 - Swarms demonstrating emergent behaviors to solve new problems

Topics

- Power, actuation
 -
- Human in the loop
 -
- Emergent behaviors (swarms)
 -
- Sensory feedback
 - prosthetics / neural control
- Sensors
 -
- Interpreting human's intent
 - prosthetics /

Challenges and Opportunities

- Collaboration with other fields
 - Identify people, joint workshops, tutorials?
 - Spend custodial fund to bring in speakers to DSCC!

Workshops

- Neural control / prosthetics / sensory feedback (? Or does that cover too much)
 - Bring together two communities (proposed idea by MG)
 - Too much prior work – single perspective (NH)
 - Focus on PHYSICAL human interaction
 - Motor neurosciences (Shenoy, Schwartz, Pearson – NH – use care in picking list – willing to *advise*)
 - Experimental psychology
- Computational musculoskeletal analysis / biomechanicians (VK)
- Areas where need is not already being met by other groups (e.g., haptics IS)
- Identify that we are *mechanical* engineers (modeling, force/motion...)
 - Aim is to identify where WE can contribute
 - Neural control is not just signal processing!

Workshops

- Emergent behaviors, self-organization, reconfigurable, swarming (HA)
 - e.g. session that was at DSCC 2008, extended
 - Bring in some CS, math, and identify what ME/Robotics/DSC will contribute
 - Cell biology, self-assembly, materials...
 - Invite from outside

Education and Training

- How do we meet the challenges of pursuing interdisciplinary research?
 - Summer schools? (e.g. IEEE RAS model)
 - NSF funding (and custodial too)
 - Workshops?
 - Interesting work at confluence of 2 or more innovations in different areas
 - Prosthetics – neural integration + robotics
 - Emergent behaviors – animators + robotics/algorithms
 - Internationalizing
 - Other...
 - Repository
 - Links, videos (curator-managed)
 - Convince NIH – white paper – target for funding allocation
 - Dynamical systems for biology
 - ACC workshop proposals (due in November)

What's next?

■ DSCC 2009

- Workshops or tutorials?
 - good level of interest/support for one or more focused topics
- Special / invited / frontier sessions?
 -
 -
- Biorobotics track (all day) (+ Biosystems?)

■ Journal special issues

- IEEE/ASME TMECH focused section: Anthropomorphism in Mechatronic Systems (deadline 2/15/09)
-

■ Summer school



■ White paper



Thank you!

- ...for your attention and participation
- We'll create a website/Google Group for dissemination
 - please sign in so we can include your email address

Venkat Krovi, SUNY Buffalo
Marcie O'Malley, Rice University