# Northeastern University

**ROBOTICS FACULTY CANDIDATE**

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### Robot Learning from Demonstrations for Human-Robot Synergy

Tuesday, January 19th
12:30 PM – 1:30 PM

Zoom Link:
https://northeastern.zoom.us/j/93362216530

**Abstract:** Imagine a world where robots support and assist us in our everyday professional and personal life. To achieve a successful Human-Robot Synergy, robots will need to learn new tasks from humans seamlessly, to act on the new knowledge, and easily adapt to new situations and people around them. Robot Learning from Demonstrations (RLfD) is a method used to enhance the ability of robots to be easily teachable by people, a vital ability for a successful Human-Robot Synergy. RLfD enables non-expert users to 'program' a robot by simply guiding the robot through a task. However, current research in RLfD tends to disconnect low-level motor control and high-level symbolic reasoning capabilities.

In this talk, I will present a novel RLfD framework, which enhances a robot's abilities to learn and perform the sequences of actions for object manipulation tasks (high-level learning) and, simultaneously, learn and adapt the necessary trajectories for object manipulation (low-level learning). Then, I will present a 'hands-free' human-robot interaction modality that enables individuals with severe motor impairments, such as quadriplegia, to teach a robot an assistive manipulation task. I will discuss how the presented RLfD framework was evaluated in a dual-arm industrial robot for assembly tasks and in an assistive robotic manipulator for providing a drink. The experimental results demonstrate the potential of the developed robot learning framework to enable continuous human-robot synergy in industrial and assistive applications. Finally, I will conclude the talk with a brief discussion of my ongoing work and future research plans.

**Speaker bio:** Maria Kyrarini is a postdoctoral research fellow at the University of Texas at Arlington under the advisement of Professor Dr. Fillia Makedon. She is also the assistant director of the Heracleia Human-Centered Computing Lab. In 2019, Maria received her Ph.D. in Engineering from the University of Bremen under the supervision of Professor Dr.-Eng. Axel Gräser. The title of her Ph.D. thesis is: "Robot learning from human demonstrations for human-robot synergy". Before that, she received her M.Eng. degree in Electrical and Computer Engineering and her M.Sc. degree in Automation Systems both from the National Technical University of Athens (NTUA) in 2012 and 2014, respectively. Her primary research interests are in the fields of Robot Learning from Human Demonstrations, Human-Robot Interaction, and Assistive Robotics with a special focus on Enhancing Human Performance.

**Additional information at:**
https://sites.google.com/view/mariakyrarini/home