Turning Assistive Machines into Assistive Robots

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Abstract

For decades, the potential for automation to aid those with motor, or cognitive, impairments has been recognized. It is a paradox that often the more severe a person's motor impairment, the more challenging it is for them to operate the very assistive machines which might enhance their quality of life. A primary aim of my lab is to address this confound by incorporating robotics autonomy and intelligence into assistive machines---turning the machine into a kind of robot, and offloading some of the control burden from the user. Robots already synthetically sense, act in and reason about the world, and these technologies can be leveraged to help bridge the gap left by sensory, motor or cognitive impairments in the users of assistive machines. This talk will overview some of the ongoing projects in my lab, whose research lies at the intersection of artificial intelligence, rehabilitation robotics and machine learning. We are working with a range of hardware platforms, including a smart wheelchair and assistive robotic arm. A distinguishing theme present within many of our projects is that the machine automation is customizable---to a user's physical abilities, personal preferences or even financial means. A fundamental question that arises time and again in our work is how exactly to share control between the robot and the human user.