Review on Human-Robot Interaction Systems

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Abstract: Since the four last decades, classical robots including particularity serial robots and parallel robots have proven to be efficient in industry and in manipulation tasks. However, since about two decades, robotic systems are quickly evolving in structures as well as in capabilities. Shapes of robots such as cable-based robots, snakes, drones, animal-like robots and humanoid robots are actually becoming popular and proved to be capable to achieve relatively complex tasks in various environments such are hazardous and remote areas. Some examples of systems are war robots, space exploration robots and rovers, assistive robots, surgery robots, etc.

Considering the complexity and the diversity of these systems, the complexity of environments and conditions of works, the Human Robot Interaction (HRI) has emerged as a topic of a paramount importance which is dedicated to the study of interactions between human users and robots.

This presentation briefly reviews some robotic structures and then focuses on the most relevant HRI techniques with their evaluation. This includes basic interaction by programming, model-based interaction, voice interaction, gesture interaction, pointing on image interaction, learning by demonstration, myo-electric interaction, mind interaction and cognitive robotics. Some challenging issues will be discussed such as robot sociability, safety, the influence of human factors, the coordination among agents in case of distributed systems, the requirement of new control schemes to implement adaptive automation. Some application examples will be presented for illustration of these concepts and issues.