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Editorial

Socially Assistive Robots Serving Children with Special Needs (Autism, Cancer, Deafness/Hearing Loss)

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One of the main challenges in social and cognitive research is relevant to our understanding of how to perceive and interact with others in the world around us. With the dramatic growth of emerging technologies in our societies, such as social robots, computer graphic generated avatars, and virtual reality devices, the complexity of this challenge is growing. As a result, interdisciplinary educators and researchers strive to determine the extent neurocognitive mechanisms, which support human interaction with artificial agents and tools, have evolved. Hence, a growing number of researchers working within the field of social robotics and engineering are engaged in collaboration with other scientists to utilize their expertise in social cognition, neuroscience, linguistics, and psychology with mutual interests that benefits naturally developing children as well as children with some form of disability and/or illness (i.e. Kids with: autism, cancer, deafness/hearing loss, down syndrome, diabetes, etc.).

With the advancement of robotics technology, robots applications have been extended to more general-purpose practices in society such as: the use of robots in clinical and rehabilitation, nursing and elderly care, search and rescue operations, etc. However, for robotics technology to be successful in such environments it is necessary to gain new levels of strength, robustness, physical skills, and improved cognitive ability and intelligence. One faces many challenges on the path to design and construction of social-cognitive robots, the biggest is to build robots that comply with the needs and expectations of the human mind. How we communicate with machines with a higher quality physical and life-like appearance would differ with the way we interact with a computer, cell phone, or other smart devices. Therefore, as a follow up to the classical view of robotic systems, "socially interactive robots" with the capability of engaging social scenarios and interacting with humans have recently become a trendy and up-to-date topic. In recent years, the impacts of employing social robots as teaching assistants on enhancing learners' achievements notably in children with special needs were investigated by various researchers. In addition, these robots can be effectively employed in diverse health-care applications. For instance, the positive effects of utilizing social robots in decreasing the distress level of children with cancer through establishing affective connection with patients was highlighted. Furthermore, they have been successfully utilized to improve the imitation skills of children with Autism Spectrum Disorder (ASD), which is known to be one of the core symptoms. In addition, social robots have been designed to play an assistive role in expanding the communication level of deaf and ordinary children in teaching them Sign Language. For instance, it has been noted that for social robots to achieve success in their mission, adaptive user interfaces lead to greater user acceptance and increased teaching efficiency compared to non-adaptive ones. Hence, one need to design and build a robotic architecture capable of simultaneously adjusting the robot's teaching parameters according to both the user's past and present performance, adapt the content of training, and then implement it on the social robot to teach sign language based on these parameters in a manner similar to a human teacher. On the other hand, empowering a robot to direct its attention to the most appropriate target at all times during multi-party interactions is another interesting and useful task to establish natural communication between the robot and users. Implementing a social gaze control system suitable for multi-person interactions with the social robot is another challenging topic, which may be done such that the system takes some important verbal and non-verbal social cues into account and at each moment enable the robot to decide socially at which human it should direct its gaze.

Hence, the main goal of the interdisciplinary field of Social Robotics and/or Human-Robot Interaction (HRI) is to make robots emulate the way humans interact socially with each other. Mimicry during face-to-face interpersonal interactions is a meaningful nonverbal communication signal that affects the quality of communications and increases empathy towards the interaction partner. In human communications, facial expressions play an essential role in expressing and recognizing emotions, therefore, to enhance human-like performance these social robots need to be capable of comprehending the challenging area of human emotions.

In recent years, researchers with diverse background and expertise around the globe have successfully employed their scientific know-how through teamwork to tackle with many issues pertaining the emerging field of social and cognitive robotics and its impact on educational, assistive, entertainment, and therapeutic settings. I believe there exists much more distinct as well as interdisciplinary topics and subjects on social robots and applications that need to be investigated and resolved in order to achieve a reliable and ethical social impact.

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