Telemanipulation of Robotic Platform using Biological Signal Data for Enhancement of Human – Robot Interaction

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Abstract (300 word limit)

Regardless of the availability of highly sophisticated techniques and ever increasing computing capabilities, the problems associated with robots interacting with unstructured environments remains an open challenge. Despite great advances in autonomous robotics, there are unprecedented situations where a human-in-the-loop is still required, such as, nuclear, space, subsea and robotic surgery operations. In such scenarios, telemanipulation is introduced where the human operator will immerse into a remote environment and control a teleoperated robot on a motion / haptic feedback level. As haptic feedback and gestures are considered primary methods of telecontrol of a robot, there are still other vital parameters that can be measured through which interaction between human and robot can be enhanced. This paper is aimed to address the effects of human fatigue and stress induced errors in a teleoperation process due to strennous workload and prolonged working hours. The objective will be to implement an adaptive bilateral telemanipulation control strategy for a robotic platform using biological signals data (such as perspiration rate, glucose and lactose reading, muscle soreness detection) from the human operator for the enhancement of human – robot interaction. The goals of the paper will be to improve the transparency, stability of the teleoperation system and account for the errors due to muscle fatigue and stress.

Key-words: Telemanipulation, Human – Robot Interaction, Wearable biosensor, Remote data monitoring.

Image

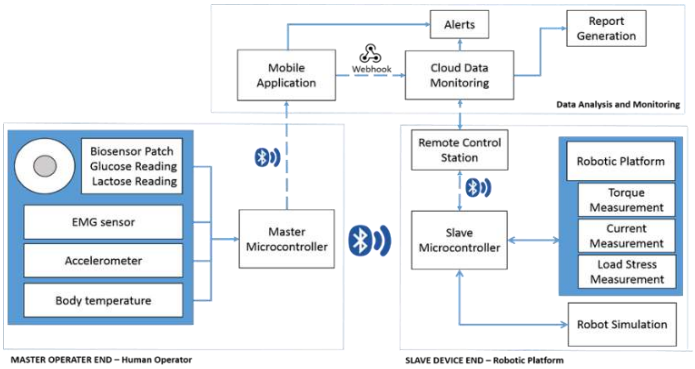


Figure 1. Proposed block diagram for telecontrol of robotic platform with biological signal inputs to reduce human fatigue and stress induced errors

Photograph



Varun Kumar is a post-graduate student in Robotics and Autonomous Systems at the University of Bath focusing on Robotic navigation, perception, control and telemanipulation. He is a resilient and self-motivated individual graduated in 2019 with a First Class and Distinction in Instrumentation and Control Engineering from Anna University. He received the prestigious Great Scholarship2019 by British Council to cover the full published tuition to pursue MSc Robotics and Autonomous Systems (full time) program at University of Bath for one year of study in the UK.His project work in the field of Robotics focussing on " Aircraft Navigation in GPS Denied Regions" has been recognized and funded by The Indian Ministry of Defence and Defence research and development organizations (DRDO) in Defexpo 2018.Recipient of the Young Scientist Award, IEEE Innovator Award, ISA Educational Foundation Scholarship, IEEE Richard E Merwin Scholarship,Abdul Kalam National Level Best Student award, IEEE Systems Council James O.Gray Award and Cognizant's Big Idea Challenge Winner Award.

Area of Interests :Robotics Perception and Localization, Telemanipulation Systems, Autonomous Systems, Systems-on-chips

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