ABSTRACT

In rehabilitation robotics, residual skill set of patient plays a vital role; aim is to make the patient recover their cognitive and physical disabilities by the use of assistive robots. In case of mobility assistance through a wheelchair, it must behave like a human! Cognitively enabled wheelchairs need to be collaborative. Keeping this in mind, we propose collaborative control architecture to achieve the shared control over the wheelchair between human patient and the machine.

In realistic simulation of our proposed architecture, we have considered to use a 3D robotic simulator called USARSim (Unified System for Automation and Robot Simulation) and a control framework (Robotic Operating System). A cognitive agent is designed which mimics the wheelchair. This agent will be the Pioneer 3-AT (P3AT) robot which will be tested on a maze environment that has been constructed in USARSim. The Robot Operating System (ROS) is fused into our collaborative architecture to build the cognitive agent. . The P3AT robot is currently treated as our wheelchair which imbibes our architecture. Thus the performance of P3AT on the simulation platform will evaluate the effectiveness of collaboration as well as our architecture. Test will be conducted upon the users to calculate the cognitive score. This functionality is provided through a ROS node which generates a priority configuration file which helps us to design our customized multiplexer. This research work envisages the integration of USARSIM / ROS combined framework to build the cognitive agent on top of our collaborative control architecture.