

Title: Online Reservoir Learning of Task Movements and Inverse Kinematics for Redundant Robots

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We present an application of online BPDC learning to represent full body motions of the HONDA Robot ASIMO and the 7-DOF redundant robot arm PA-10. The reservoir is fed with task variables in the world coordinate space and can simultaneously learn to predict the movement tasks and to implement inverse kinematics including redundancy resolution. Learning is based on reference joint angles driving the robot to the desired teaching world trajectory. It is characteristic for this approach that the reservoir output is high dimensional and refers to different working coordinate systems because it includes the target robot joint angles and the task values in cartesian world space. The results show excellent generalization to new movements in the whole region of the workspace in which the system was trained with a few prototypical cyclic tasks only.