Two-Wheeled Wheelchair Stabilization Control Using Fuzzy Logic Controller Based Particle Swarm Optimization

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Abstract—**Designing a control strategy of two-wheeled wheelchair is a very challenging task due to the unstable and highly nonlinear system. In the paper the system is modeled by mimicking a double-link inverted pendulum concept and the mathematical equations is derived using Euler-Lagrange method. Then the state-space representation is applied to the Simulink block diagram in Matlab. The control parameter of the system is compared between trial-and-error method and Particle Swarm Optimization (PSO) algorithm. This strategy is to find the optimal value for the system to get better performance. The system will be simulated using Fuzzy Logic Control (FLC) and FLC-PSO using Matlab/Simulink environment. Simulation results show that the FLC-PSO is better than FLC in terms of overshoot and settling time.**

Keywords—*two-wheeled wheelchair, double-link inverted pendulum, mathematical modelling, Fuzzy Logic Control, Particle Swarm Optimization.*