Abstract

In this paper a comparative study of the classical control methods for the testing of a mathematical model, which controls six actuators of a six degrees of freedom robotic arm with a single controller, is illustrated, aiming to the constructive simplification of the system. In more detail, a mathematical model of the system is designed which simulates all mechanical parts, including 5-way directional pneumatic valve, the pneumatic actuators/pistons and the mathematical model of the controller. The purpose of the above is the tuning of a Single Input, Multiple Outputs (SIMO) controller which will direct the motion of the six pneumatic pistons. The thorough analysis of the implementation of the pneumatic system in Matlab/Simulink environment is followed by experimentation and results using Proportional (P), Proportional-Integral (PI), Proportional-Derivative (PD) and Proportional-Integral-Derivative (PID) controllers. The simulation results show the advantages of the above classical control methods on the robotic human arm which imitating human motion and made by a well-known company in the field of pneumatic automation.
References

12. Lab Notes: Sensors-Interfaces, C. Tsonos, Department of Electronics Engineering, University of Applied Sciences, Central Greece, 2011.

Index Terms

Computer Science Circuits and Systems

Keywords

Single input-multiple output systems, pneumatic positioning systems, simulation environment,
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