

DESIGN OF PID FUZZY CONTROLLER IC USING FPGA

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ABSTRACT

IN RECENT YEARS, THE PID (DIGITAL PROPORTIONAL INTEGRATION DERIVATIVE) FUZZY CONTROL SYSTEM IMPLEMENTED WITH MICRO-CONTROLLER HAS BEEN WIDELY USED IN MODERN INDUSTRIES. IN ORDER TO ACCELERATE THE PROCESS SPEED OF REAL-TIME MULTI-TASKING, MORE INTRICATE AND HIGH-SPEED SYSTEM ADOPTING DISTRIBUTED OPERATION OF MICRO-CONTROLLER IS REQUIRED. INSTEAD OF SOFTWARE IMPLEMENTATION, IN THIS THESIS, A PID FUZZY CONTROLLER CHIP HAS BEEN DESIGNED. THE DESIGN CAN MEET THE REQUIREMENT OF HIGH-SPEED INFERENCE. MOREOVER, IN A COMPLICATED ENVIRONMENT, IT CAN AVOID MALFUNCTIONS AND ERROR INFERENCES RESULTED FROM EXTERIOR NOISES. THEREFORE, THE RELIABILITY OF THE PID FUZZY CONTROLLER IS GOOD. DURING THE DESIGN PROCEDURE, FIRST, WE USE MATHCAD TO VERIFY THE BEHAVIOR MODEL OF PID FUZZY INFERENCE. THEN, WE USE VERILOG HDL (HARDWARE DESCRIPTION LANGUAGE) AND ALTERA FPGA (FIELD PROGRAMMABLE GATE ARRAY) TO DESIGN AND SIMULATE THE CIRCUIT. FINALLY, WE USE THE PERSONAL COMPUTER AND LOGIC ANALYZER TO TEST OUR DESIGN.

Keywords : PID, FUZZY, FPGA, INTELLIGENT

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