On designing mixed-signal programmable fuzzy logic controllers as embedded subsystems in standard CMOS technologies

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RESUMEN

A digitally-programmable analogue fuzzy logic controller (FLC) is presented. Input and output signals are processed in the analog domain whereas the parameters of the controller are stored in a built-in digital memory. Some new functional blocks have been designed whereas others were improved towards the optimisation of the power consumption, the speed and the modularity while keeping a reasonable accuracy, as it is needed in several analogue signal processing applications. A nine-rules, two-inputs and one-output prototype was fabricated and successfully tested using a standard CMOS 2.4µ technology, showing good agreement with the expected performances, namely: from 2.22 to 5.26 Mflips (mega fuzzy logic inferences per second) at the pin terminals (@CL= 13pF), 933 µW power consumption per rule (@Vdd=5V) and 5 bits of resolution. Since the circuit is intended for a subsystem embedded in an application chip (@CL≤5pF) up to 8 Mflips may be expected.

TEMAS: T Tecnología > TA Ingeniería de asistencia técnica (General). Ingeniería Civil (General)

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