Embedded control in space and aeronautic applications requires compact, minimal latency, low power solutions, with degree of SW / HW reconfigurability. HW redundancy is often required as well. We present flexible single chip architecture, which fulfills these requirements. It is based on 1-master, 4-workers network of compact, 8-bit PicoBlaze processors from Xilinx. Processors are complemented with dedicated optimized 18-bit floating point acceleration HW modules. Proposed compact architecture is benefiting from 18-bit wide, dual-ported block-rams and multipliers of Spartan 3 family. Spartan 3 delivers typically 125 Mips and 300 MFLOPS (in case of 3 pipelined floating point MAC engines) and 50 MHz clock.

Paper will describe effective design methodology enabling bit and cycle accurate HW/SW modeling and debugging, export of bit-exact S-Function models to Matlab/Simulink as well as synthesis to Xilinx FPGAs. Performance, power consumption, and interrupt-service latency will be reported for the implementation of an advanced controller on Virtex II, Spartan 3, Spartan 3L (low power), and for the Xilinx rad hard parts as well. Prototype can be demonstrated.