

# Software developments oriented to space projects and missions



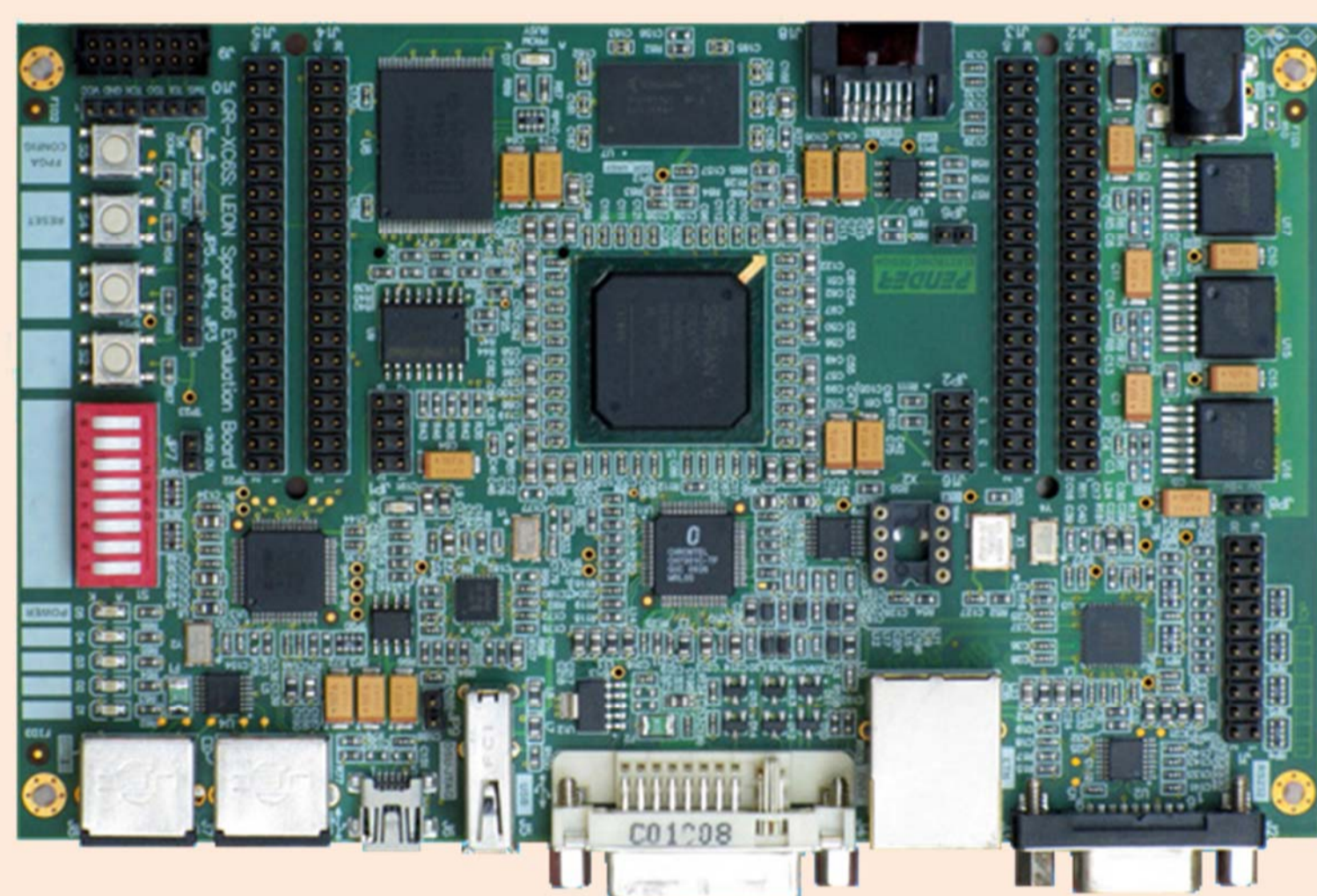
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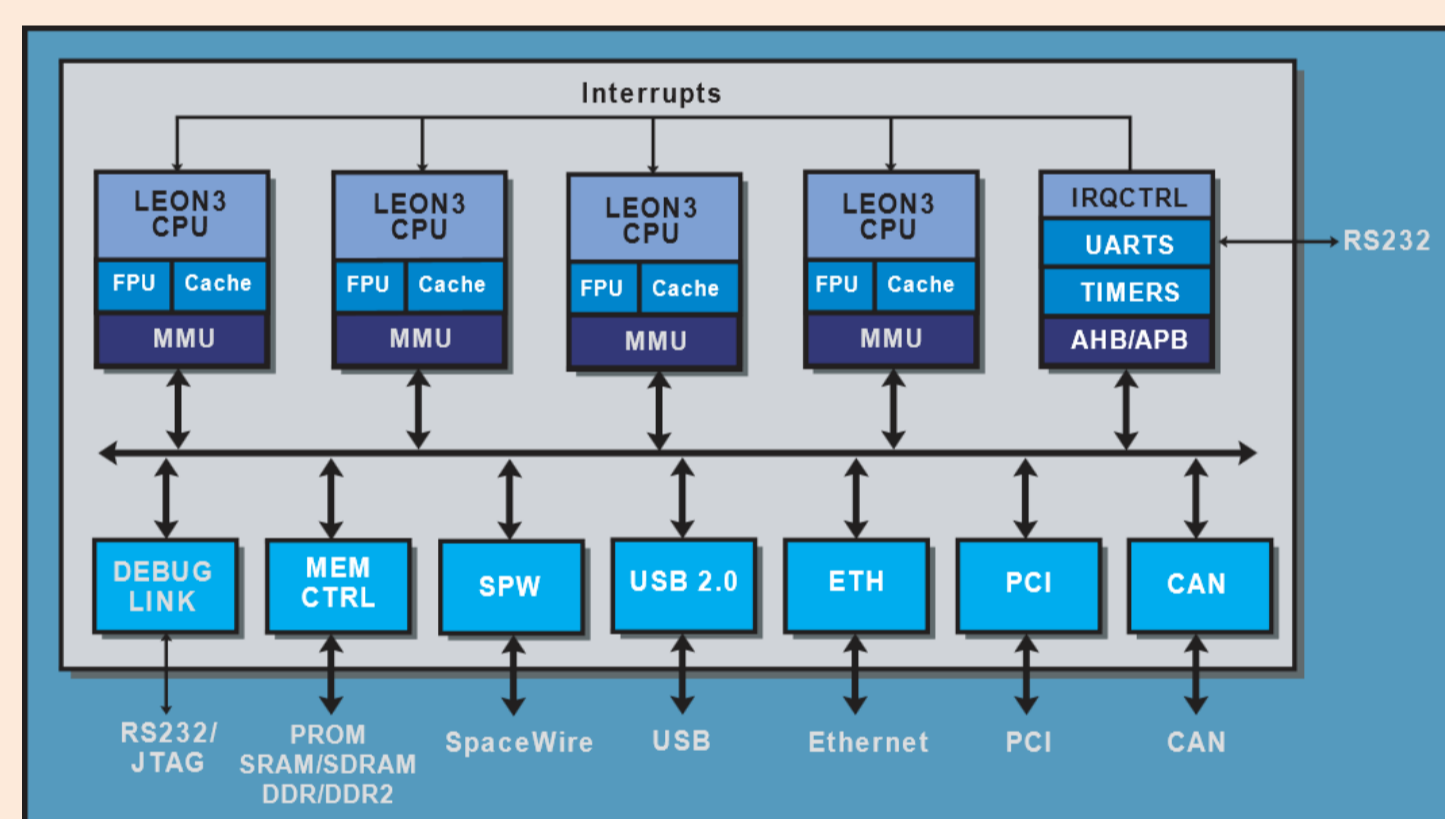
## Introduction

The space projects and missions require design of simulators and test equipment, which allow the further development of different parts or subsystems. That may be done in parallel without the need to interconnect them until the final step of the design process.

In this sense, the Instituto de Astrofísica de Andalucía-CSIC is working on a software development oriented to reduce costs and working time. These developments are based on hardware off-the-shelf and small breakout boards to add more functionality.



Commercial hardware used in this design. The board includes a Spartan6 FPGA, on-board memory and some interfaces.

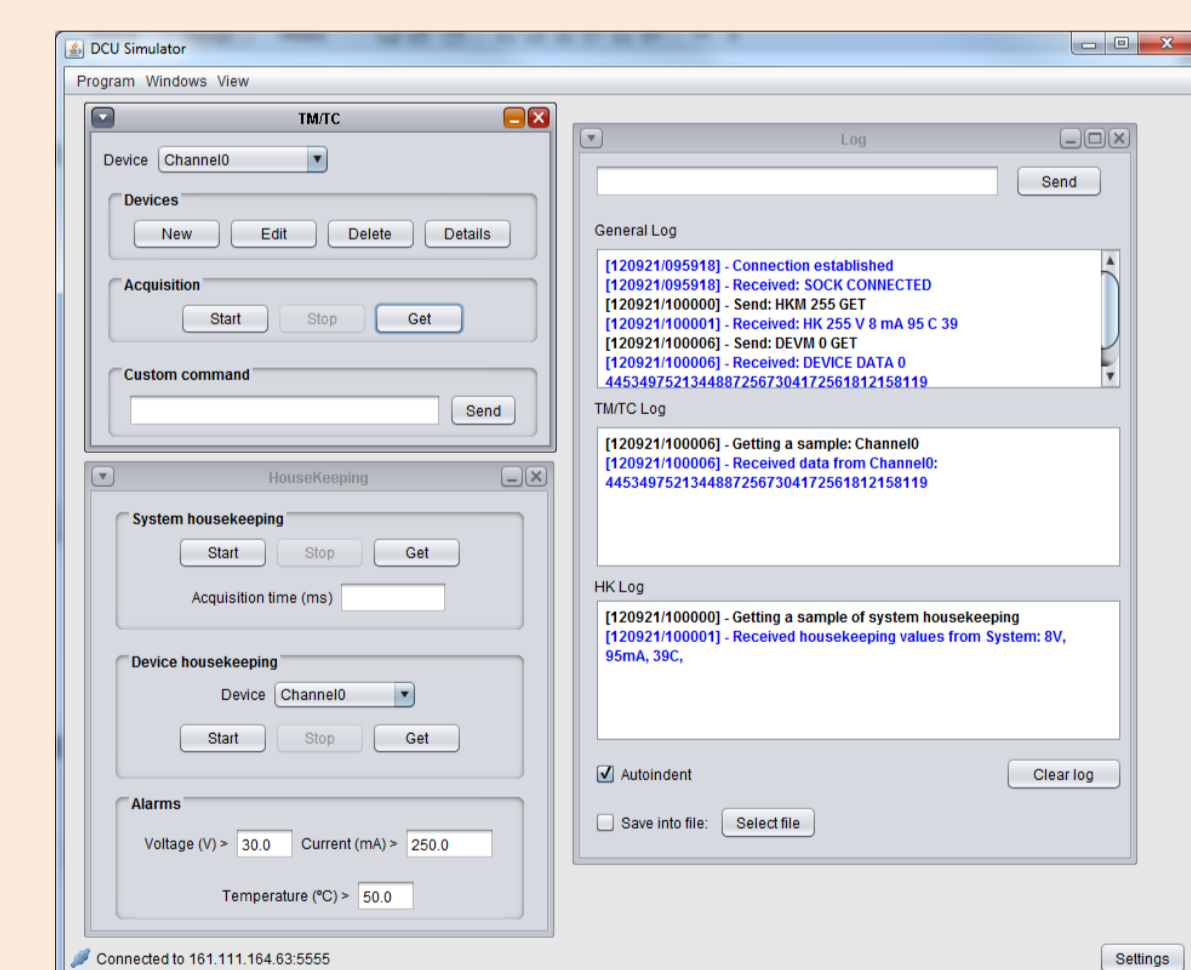
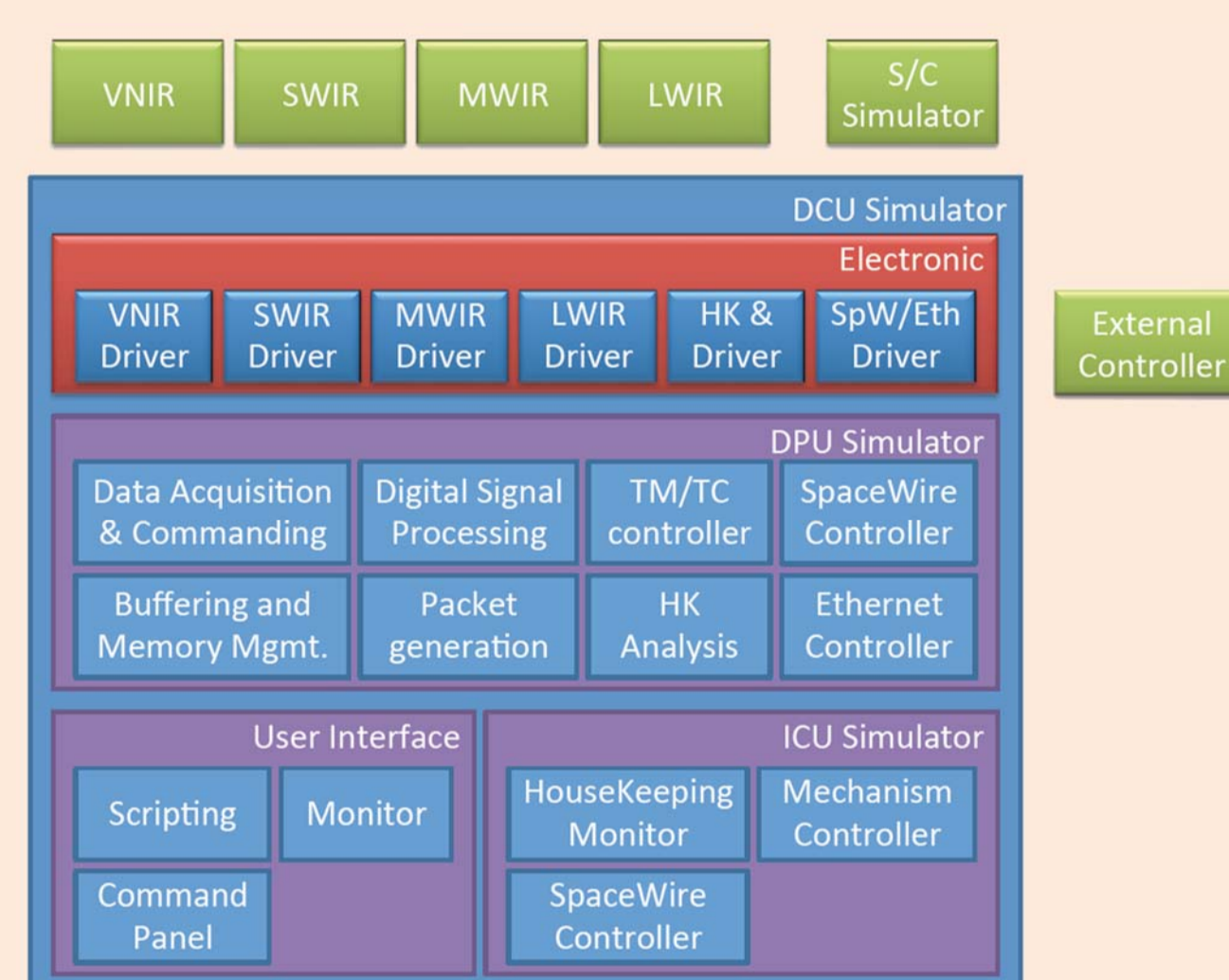
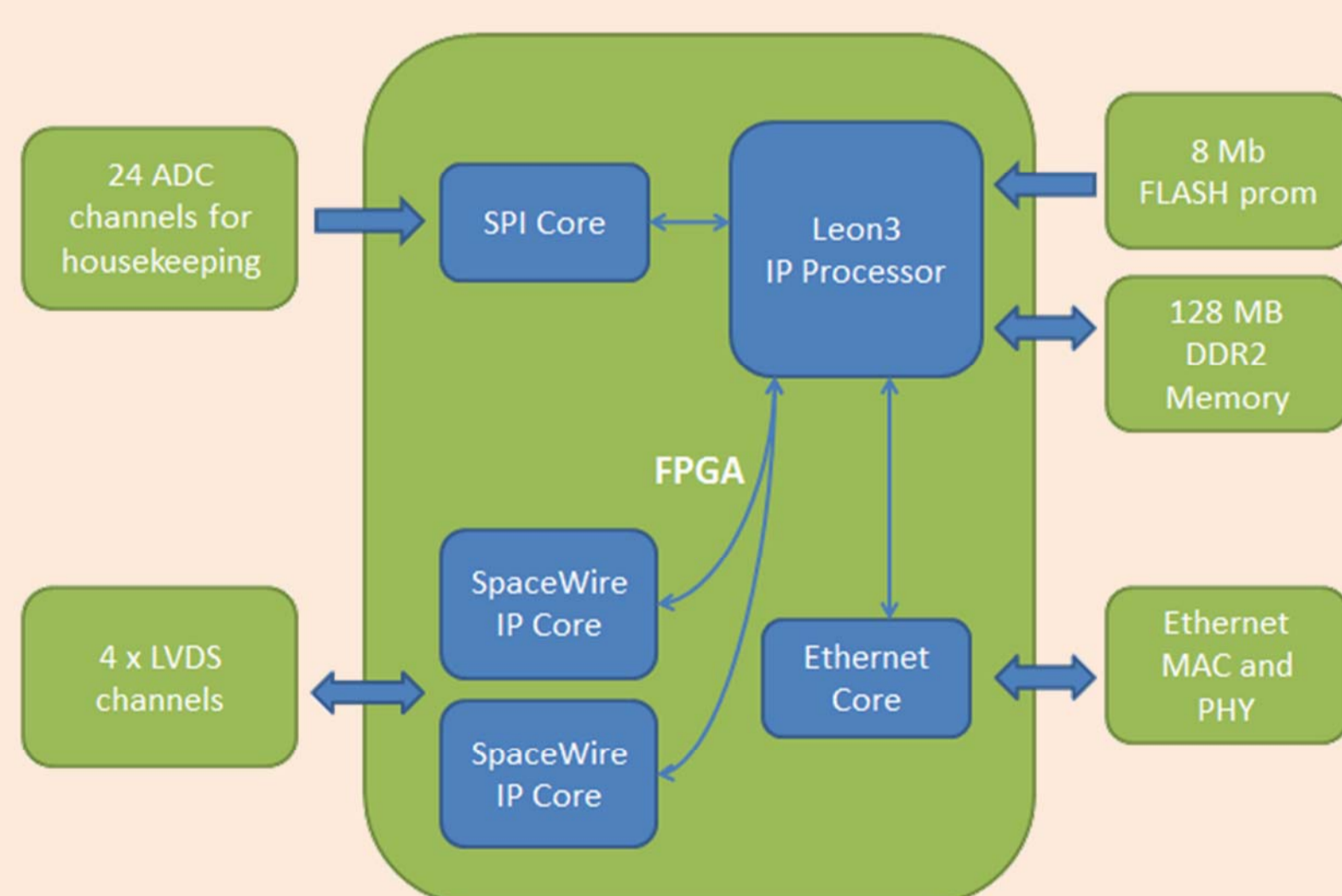


A Leon3 processor (Gaisler Aeroflex) is the base of the software design (VHDL core).

## Our work

Our team is working on an Electrical Ground Support Equipment (EGSE) and a Data Control Unit (DCU) simulator for the MarcoPolo-R (MaRIS instrument) and EChO missions. These developments are based on a PC connected to the hardware with boards through ethernet or PCI.

Furthermore, taking advantage of the acquired knowledge, the group is developing a General Data Processing Unit (GDPU) based on a FPGA for future space missions, (including Earth observations) which requires high data rates.



Besides using VHDL, in the current project have been used other programming languages such as C (to program the processor) and Java (to design the user interface). In the case of the simulator, the software must include the same parts that the real hardware, as well as a user interface and drivers to access the hardware.

## Conclusions

- Open source hardware IP-cores and software are potential development tools for future space projects.
- Development time and cost reduction has been achieved.