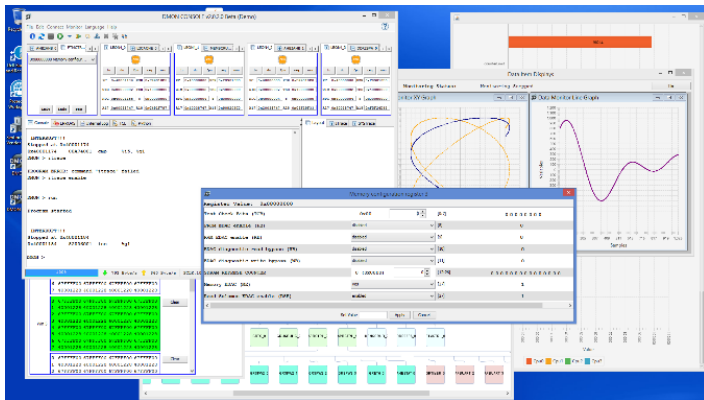




# O.C.E. Technology - on the ground but looking at the stars!

In the old days debugging embedded applications was simpler. There were discrete chips for different functions, e.g. processor, memory controller, serial lines, memory, etc. To figure out what was happening it was possible to replace the processor with an in-circuit emulator, attach a logic analyser, use an oscilloscope, and so on. However, on today's SOCs with all the functional units encased in a single chip, a different approach must be taken and hence the need for advanced debug tools.

Irish company O.C.E. Technology started with the development of debug software for a range of SPARC V8 processors such as those used by the European Space Agency (ESA). ESA quickly cooperated with OCE to fund the development of a next generation debug tool with unique features for its contractors in Europe.

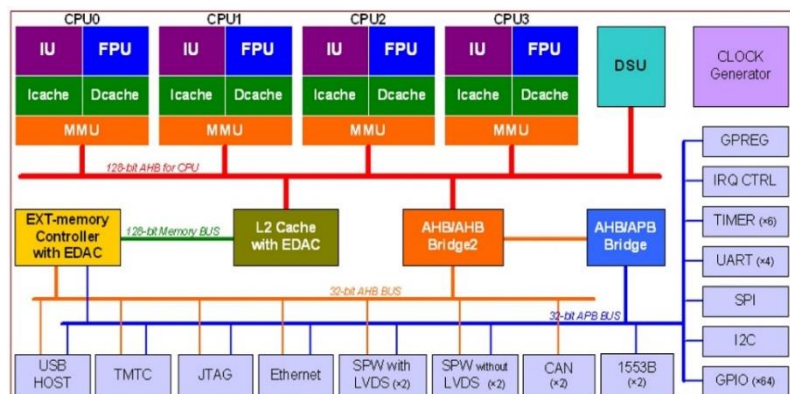


Debug tool screenshot

OCE's debug tool DMON connects to the target system-on-chip through an interface that is a bus master on the SOC's internal bus. This interface can be serial, Ethernet, USB, JTAG, or Spacewire. A functional unit called a DSU provides access to processor registers, all other functional devices are memory mapped. The tool when started identifies the SOC to which is connected and creates a dynamic schematic of the units on the chip.

Developers can graphically drill-down through this to view and control functional units. Software can be loaded and its activity monitored. Test scripts can be written in TCL or Python. These facilities, combined with data monitoring and graphing and remote client/server access make DMON unique and the debug tool of choice for use with SOCs.

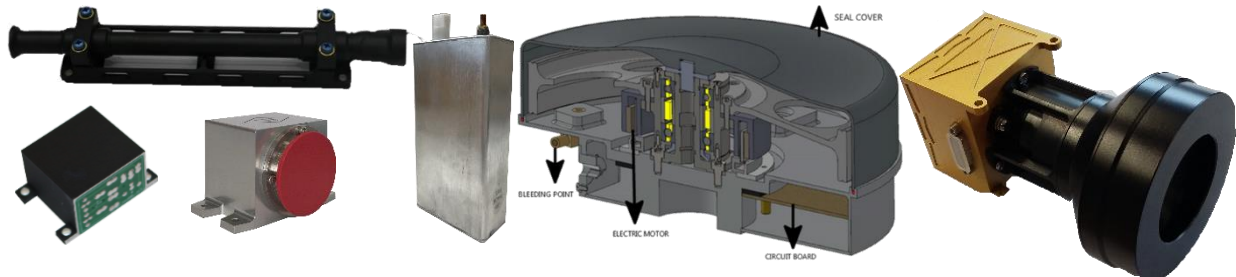
The next phase of OCE's development was the release a radiation-hardened quad-core SPARC LEON4 SOC with a variety of interfaces and suitable for use on satellites small and large. In conjunction with a range of radiation tolerant system-in-package memories this posed a very attractive package to European companies wishing to reduce their costs while maintaining quality. These products are now flying and at various stages of design-in for future missions.



E698PM Quadcore LEON4 SOC

OCE's manufacturing and distribution partner in China is supplying the components into Chinese organisations designing subsystems for the Chinese Space Programme. As all satellites involve similar subsystems for stabilisation, attitude control, power supply and other functions there is a market outside China for these subsystems. Restrictions on travel can make it difficult for high technology companies in China to address this market and they were happy to sign agreements with OCE to promote their products outside of China. Many of the established global satellite manufacturing companies are considering a buy rather than make model in an effort to reduce their costs.

*Satellite Subsystems*



The subsystems adopted by OCE are primarily used for power or to bring a satellite into a desired orientation in space and to a desired spin rate. These subsystems include star trackers, sun sensors, magnetorquers, magnetometers, batteries, solar cells and arrays all of which can be customised to meet mission requirements. The subsystems are of the highest quality standard, designed and manufactured by the top organisations that supply the Chinese space program, and have flight heritage on many satellites.

It was no surprise to find that not only European customers were interested but also those from other regions and OCE has setup a distribution network covering India, South Korea, Japan, Singapore, and Russia. OCE is showcasing these products in the US for the first time at Space Tech Expo 2018 in Pasadena.

So what next? OCE's partner is launching a constellation of 34 low orbit Earth observation satellites for high resolution imaging & video, hyperspectral and SAR data. Two satellites were launched last year and a further ten are launching in 2018. Three groundstations are already operational in China with others to be located in Ireland and Australia. OCE is licensing this satellite data to interested parties.



*China Launch*



*Proposed Irish Ground Station*

Given the ability of its partner to build small satellites and access launch facilities in China the next logical step for O.C.E. Technology is to offer complete satellite builds and launch services. This is a while away, but the company believes in reaching for the stars, or at least low Earth orbit as a start.

To find out more about O.C.E. Technology visit our booth 6008.