

LYRTECH: MULTICHANNEL ACQUISITION BASED ON FPGAs

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INTERVIEWEE. MARTIN TURGEON
 PRODUCT MANAGER
 TEL. 418-877-4644 EXT. 2311
 E-MAIL. martin.turgeon@lyrtech.com
 COMPANY. LYRTECH
 WEB. www.lyrtech.com

Q. First of all, tell us a little bit about yourself and your responsibilities at Lyrtech.

A. I joined the Lyrtech research and development team in 1998. At that time, it was a very small engineering group whose goal was to build Lyrtech's product portfolio. Later, I held the position of project manager in charge of new product generations for multichannel acquisition based on FPGA technology. Between 2002 and 2005, I worked more closely with the sales and marketing department, which was slowly growing at the time, as a field application and sales engineer. In 2005, I filled the role of product manager of Lyrtech's portfolio. As product manager, my responsibilities include preparing business cases for introducing new products on the market, defining products in terms of processing, features, performances, cost, and positioning compared to competition, elaborating value propositions and competitive analyses, planning product launches, elaborating sales and marketing material, determining features and strategies for future products, and many more.

Q. Would you outline for us, briefly, Lyrtech's products and solutions and the special connections to FPGA technology?

A. Lyrtech offers a wide range of FPGA-only and hybrid FPGA–DSP development boards. The main features of our development boards are that they are surprisingly scalable when it comes to processing power and the variety of add-on I/O modules that can be coupled to the boards. Another key note of our products is the high-level software abstraction made possible by our model-based design kit, which offers users the possibility of targeting all the features of the boards and design FPGA applications within the Simulink environment. Going back on scalability, Lyrtech's own *RapidCHANNEL* (an 8-Gbps, full-duplex interface) allows interfacing boards with other boards, establishing a very-high-data throughput link and allowing users to virtually scale up FPGA resources necessary for their applications. Our add-on modules—such as high-speed, multichannel ADC/DAC; video I/O; audio I/O; high-speed, digital interface; additional memory; and analog RF (GSM, Wi-Fi, WiMAX, others) modules—allow users to design complete systems matching their applications and represent the systems in the user-friendly Simulink environment. Lyrtech's products are primarily aimed at wireless, MIMO, software-defined radio, audio, medical imaging, vision, accelerated computing, and DAQ systems.

Q. FPGAs are used more and more for DSP applications. What special expertise does Lyrtech have with respect to FPGAs for DSP?

A. Lyrtech's expertise spans, among other things, technology used in interfacing FPGA hardware and software to external components such as DSPs, GPPs, Ethernet, fiber, LVDS, RocketIO, Serial RapidIO, MGTs, and other very-high-speed interfaces. This expertise is poured into every advanced development platform we make and, in most cases, becomes simple-to-use Simulink

blocksets. We've also developed a wide variety of digital signal processing application FPGA cores, as Lyrtech also offers engineering services to those customers interested in FPGA–DSP technology. Through the years, we've also gained a vast amount of expertise in developing our own FPGA GSM PHY interfaces, four-port SDRAM model-based video framework, and DSP-FPGA-based femto base transceiver station/femtocell reference design, to name just a few.

Q. How are your products integrated to development tools provided by the FPGA vendors like Xilinx and independent vendors like The MathWorks?

- A. This is where Lyrtech truly shines when compared to its competition. Most (but more likely all) of our competitors have at some time claimed a complete System Generator for DSP (Xilinx) and *Simulink* (The MathWorks) integration. Yet, the tools are only integrated through what we call a “semi-automatic approach”. The semi-automatic approach aims to design digital signal processing applications within the Simulink/System Generator for DSP environment, and then map the application netlists from an empty ISE Foundation (Xilinx) project supplied by the vendor. Our approach is much more thorough. Users can completely design, simulate, compile, test, and troubleshoot their FPGA applications in the same Simulink model. Lyrtech supplies all the necessary external FPGA interfaces mapped into blocksets on top of a wide range of troubleshooting tools such as a recording and playback blockset and free-running or shared-memory co-simulation. The ability to use all the tools under simulation allows users to design complete simulated applications before generating a single line of code, applications where I/Os are simulated along with DSP algorithms, not simply by themselves.

Q. Are there particular vertical industries in which you have had a lot of success? Which ones? Why are your products particularly suited to these sorts of applications?

- A. Lyrtech's main success lies with its FPGA development boards in the telecommunications (BTS prototyping, MIMO), scientific (beamforming, astronomy, OTHR), military (Software defined radio, security) and medical (PET, gamma ray) industries. Most of this success in these markets came about because we can provide complete functional systems that fit our customers' requirements, simply by combining our existing platforms and add-on modules turning them into turnkey systems. These systems come with high-level model-based design software (within Simulink). The ability to offer such complete software–hardware integration from RF to baseband to wireless applications, the ability to offer the necessary large number of high-speed A/D channels on one FPGA board to MIMO applications, the ability to offer the essential tools to easily transfer Simulink concepts into real-time prototyping hardware solutions to scientific applications, and the ability to offer low-cost-per-channel solutions to medical applications are all reasons for Lyrtech's success.

Q. For this 2nd edition of our FPGA Guide, we have a special focus on “design services.” Would you share with us what sorts of “design services” you offer and how these work?

- A. Lyrtech's been developing products with digital signal processing technologies for the past twenty-five years. Since our beginnings, we've managed to put together an engineering team consisting now of about 50 highly skilled engineers, programmers, and technicians. This team of experts exists for one purpose—cover all the elements necessary in designing a complete product, end to end. Thus, our engineering team can assist customers in a multitude of areas such as analog and digital hardware design (audio, video, communications, and RF), electrical and mechanical CAD, FPGA and DSP programming, embedded and high-level software design, as well as product assembly and manufacturing.

Customers usually retain Lyrtech design services to develop complete turnkey products, but Lyrtech also offers its designs services piecemeal, for those of its customers who only need specific expertise to round off their own in an attempt to accelerate development cycles.

Q. Thank you for this interview.