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Ultrasound Platform Opens Business Opportunities

CEPHASONICS offers an ultrasound platform that's well designed and getting smaller with each generation. But the company also has introduced a business model to sell and market products that serve very specialized niches.

Basically, Cephasonics turns customers into salesmen. That's more than having customers trumpet the virtues of their products. Cephasonics puts customers in charge of extending the product's utility within their own niches.

CUSTOMERS FIND CUSTOMERS

Cephasonics' products range from rack-mount down to pocket-watch sizes that can make and deliver real-time ultrasound images to a PC, laptop, or tablet. In the classic business model, the company would conduct research, find a niche, and build a market by attending medical tradeshows and finding potential customers.

The Cephasonics Dragonfly shrinks the embedded ultrasound host hardware into a 5- by 4.5-in. package.

Instead, Cephasonics goes to shows and finds physicians with particular specialties who aren't intimidated by the prospect of writing code or having it written. Doctors who write their own code to fill their own needs alone, though, would waste a lot of time. Cephasonics addresses this conundrum as well.

Take an anesthesiologist who needs to provide proof that he performed a procedure to get paid for it by an insurance company. Sometimes, he delivers a very small amount of anesthetic to a very precise point in a patient's body. The needle goes in and is guided by an ultrasound device that also records an image of the delivery. A generic ultrasound device would not document the process automatically, though.

The Cephasonics platform enables the anesthesiologist to write code that matches the captured image to the patient, the time of day, and all of the documentation that the insurer requires. While this would help this particular physician, many other anesthesiologists are in similar situations. The doctor now can market the complete platform to other doctors with far more credibility than the best sales reps that Cephasonics can hire. The doctor shares in the profits from each sale as well.

Yes, the government will license each new instance of an application based on the same qualification data for the platform, which is somewhat simplified because the platform is battery-powered. You can guess what happens next when another doctor in a related field discovers what's going on. And while that's all happening in the medical arena, Cephasonics already is looking at non-destructive testing.

HARDWARE AND SOFTWARE

Cephasonics started with the cQuest Cicada, a complete 64-channel ultrasound front-end system that connected on one end to an ultrasound transducer and on the other to a PCI Express or USB interface to a back-end host PC or laptop. Launched in 2012, Quest Ultrasound application programming interface (API) software offers the means of developing complete ultrasound-based products.

The API is a set of C++ libraries and header files providing user access to thousands of system parameters, and it could be used to acquire data from and control all Cephasonics cQuest Ultrasound platforms while abstracting the underlying hardware. Version 3.0 of the API software supports multiple focal zones, full control of Doppler processing parameters, common imaging modes, and dual and quad parallel-beam processing.

Earlier this year, Cephasonics entered the ultrasound research market with the cQuest Griffin and cQuest Firebird research systems. In 1024-, 2048-, and 4096-channel configurations, the rack-mounted cQuest Griffin is the world's first commercial large-channel-count ultrasound research platform. The cQuest Firebird is a flexible and configurable 64-channel baseline ultrasound research platform in a desktop package. These products target institutions that are exploring new applications of ultrasound technology in capacitive micromachined ultrasonic transducers, unique-geometry transducers, elastography, and photoacoustics.

According to Cephasonics CEO and president Richard Tobias, the large-channel-count cQuest Griffin research system

allows researchers to conduct beamformation research with large-element-count 2D matrix arrays that could translate into clinical breakthroughs.

"It provides an unrivaled ultrasound generator and data-acquisition system of up to 4k channels for RF or baseband operation with an optional beamformed B-mode path for positioning," he said. When research institutes are grappling with a difficult make-or-buy decision, the cQuest Griffin affords an enormous savings in development resources, time, and money, he added.

The Cephasonics hardware and software helps researchers by allowing them to use the familiar front-end MATLAB user interface while concentrating on ultrasound-research advancements. "Researchers can start writing code immediately on the compact, lower-cost cQuest Firebird and then switch once they take delivery of the larger-channel-count cQuest Griffin," Tobias said.

The cQuest Griffin comprises Nx128-channel transmitter modules that include delay and pulsing circuitry for each channel, Nx128-channel receiver modules that include time gain correction (TGC) and analog-to-digital conversion circuitry, and Nx128-channel DSP modules that include demodulation, filtering, and optional decimation.

An optional beamformed data path allows quick imaging or verification of probe placement. The acquisition, processing, and control blades are housed in a rack with the acquired ultrasound data available to the user via a shared memory interface.

SHRINKING PLATFORM

The Cephasonics cQuest Dragonfly is a complete 32- or 64-channel embedded-ultrasound host module in a standalone, 5- by 4.5-in. form factor *(see the figure)*. The Dragonfly will also interface to an external host. It is intended to provide an easy and fast way to develop ultrasound-based products ranging from portable standalone imagers to application-specific appliances, adding ultrasound capabilities to existing equipment in both medical and industrial applications.

Like its predecessors, the cQuest Dragonfly uses the cQuest Ultrasound API, providing a scalable development platform across all of the company's hardware. The system hardware includes all the ultrasound-specific front-end transmit and receive analog, digital, and power circuitry along with an embedded miniature host computer module.