

AbstractID: 4159 Title: The Ultrasound Research Interface: A New Tool for Biomedical Investigations

Digitally controlled ultrasound scanners offer extensive levels of programmability, which enable manufacturers to explore and to readily incorporate alternative beam formation, signal and image processing, networking, and interfacing capabilities. Recent efforts have led manufacturers to share these tools for innovation with academic and clinical researchers. This discussion will present capabilities of two such machines and present examples of research uses.

The Axius Direct Ultrasound Research Interface (URI) available on the Siemens SONOLINE Antares<sup>TM</sup> scanner enables users to acquire raw radio frequency data from regions of interest throughout the image plane. Echo data are available in B-mode, M-mode, pulse Doppler and color flow imaging modes. Data can be acquired to a file with a simple button press. Also, user defined scripts can be used to record and reproduce RF acquisitions for combinations of front panel control settings such as transmit level, center frequency, beam angle, and focal depth. The NIH supported development of the interface is complemented by a set of Matlab tools developed at the University of California at Davis, which read echo and image data and perform image processing operations.

The Sonix RP research system from Ultrasonix is based on an open PC platform, in which the conventional exam software can run either as a single application or as one of separate windows on the display. The PC also runs connectivity, interface and control software in parallel. The computer can control imaging parameters and apply various post-processing and display methods in real-time on RF, I/Q and envelope data to output and store the ultrasound information. When in research mode, users can build, develop, and run client software applications in the Microsoft Visual Studio environment to do customized signal processing, carry out special echo acquisition sequences, and synchronize with external devices, such as stepper motors. These tasks can be accomplished either locally or over a network.

Examples of the use of these systems that will be outlined include parametric ultrasound imaging, elasticity imaging, and measuring the speed of sound in pulse-echo mode.