Axius Direct Ultrasound Research Interface
Research on your terms

Axius Direct Ultrasound Research Interface
Insights beyond the data

The same commitment to innovation that has made Siemens a worldwide leader in ultrasound technology now finds expression in a new breakthrough for clinical researchers: the Axius™ direct ultrasound research interface.

The intent of the project, sponsored under contract by the NCI Cancer Imaging Program, is to allow biomedical engineers and physics researchers to develop new research protocols and explore ultrasound characterization of specific diseases within a broader clinical research community.

Developed for the flexible and powerful processing engine of the SONOLINE Antares™ ultrasound system, the Axius research interface provides easy access to clinical radiofrequency (RF) data and gives researchers control of instrument parameters offered on a commercially available ultrasound system. The Axius research interface may be purchased as a software upgrade to any Antares system or as an option on new Antares systems.[1]

Users are offered access to the online Research Support Group,[2] a network of academic researchers utilizing the Axius research interface. The group, led by the University of California, Davis Biomedical Engineering Department, provides a forum for peer-to-peer applications support. The website may be accessed at:

http://www.bme.ucdavis.edu/URI/

The Axius research interface provides:

Access to RF data

- Easy, efficient access to RF data and acqustion of beamformed RF data with existing user interace
- Acquisition of up to 200 MB of 16-bit beamformed RF data in most standard 2D and trace-imaging modes
- Transparency and reproducibility for RF data, which can be easily collected in the clinic or the lab

Researcher control of technical parameters

- Supports versatile, individualized experimentation via parameter access not available on other clinical scanners
- Provides control over receive beamforming parameters and color flow ensemble size, helping to eliminate random variables

Incorporation of script mechanism

- Enables script recording and playback
- Simplifies repetitive tasks and ensures experiment reproducibility
- Allows sharing of scripts with other researchers, promoting collaboration between research and clinical practice for the enhancement of medical ultrasound

The Axius research interface enables acquisition of RF data in a file and transfer of files from the system to a separate workstation using a CD writer or a LAN connection. For customers with MATLAB® software, a set of MATLAB-based processing tools is available on the Research Support Group website to provide users of the Axius research interface with a basic framework for experimenting with new processing methods.

Rapid implementation of research projects

- Intuitive system user interface and ability to modify system parameters enables rapid implementation of new experiments
- Access to RF data avoids proprietary "black-box" processing that can complicate data analysis
- Easily integrated into existing clinical setting for data collection
- Data file headers store system parameters useful for recall of data acquisition conditions and offline processing
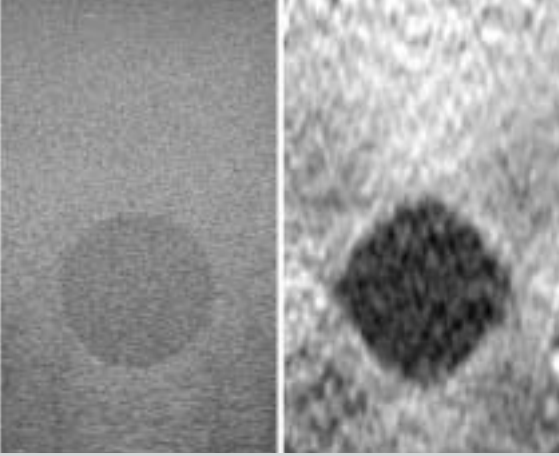
Technical Specifications

RF data collection

- Up to 200 MB of 16-bit beamformed RF data
- Record length of 2.5 seconds or more
- Region of Interest (ROI) control over axial range of RF data
- Modes supporting RF data collection include B-mode, Tissue Harmonic Imaging (THI), color Doppler, pulsed Doppler and M-mode
- 2D modes (B and C) are displayed live during data collection
- RF acquisition initiated by menu selection or ECG trigger (with physio module[4])

Data file

- Structured data file is documented in user manual
- File header stores system parameters such as position and orientation of RF vectors
- Custom header field allows inclusion of notes in data file

Additional system controls

B-mode
- Disable receive aperture growth/dynamic focusing
- Receive aperture position, size and focal position

Color Doppler
- Disable color vector interleaving
- Selection of ensemble size

Ultrasound system requirements

- Antares system with software version 3.0 or higher

Real-time parameter display

- Additional display can be shown or hidden
- Parameters include:
  - Number of cycles in Doppler pulse
  - Ensemble size in color Doppler mode
  - Line density

Macros

- Ability to record and play back macros of user events
  - Simplifies execution of a large number of experiments
  - Ensures repeatability of experiments
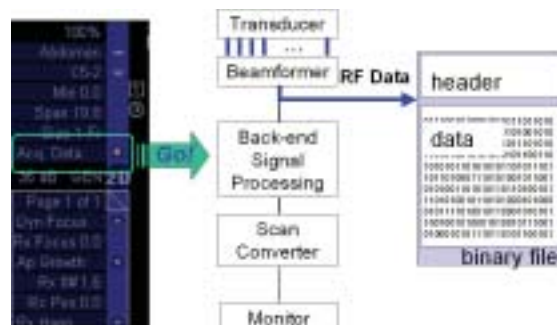- Supports linkage of individual scripts

Supported Antares system transducers

- CH4-1, CH6-2
- C5-2[5]
- VF7-3, VF10-5, VF13-5
- EC9-4
- PH4-1

File management

- HTML-based file management allows transfer of data between the Antares system, CD-R/W and workstation on LAN

Data Flow in the Axius Research Interface

At the single press of a button, beamformed RF data is transferred to a file stored on the Antares system. Because the data is untouched by signal processing algorithms, researchers enjoy total flexibility to experiment with their own processing algorithms offline.

1. Some imaging modes, such as 3-Scape™ real-time 3D imaging and Cadence™ contrast agent imaging technology,* are not compatible with the Axius research interface.
2. Not affiliated with Siemens Medical Solutions USA, Inc.
3. Hall TJ, Jiang JF. University of Wisconsin.
4. Requires additional purchase.
5. Quantities limited to stock on hand.
* At the time of publication, the U.S. Food and Drug Administration (FDA) has cleared ultrasound contrast agents only for use in LVO. Check the current regulation for the country in which you are using this system for contrast agent clearance.

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