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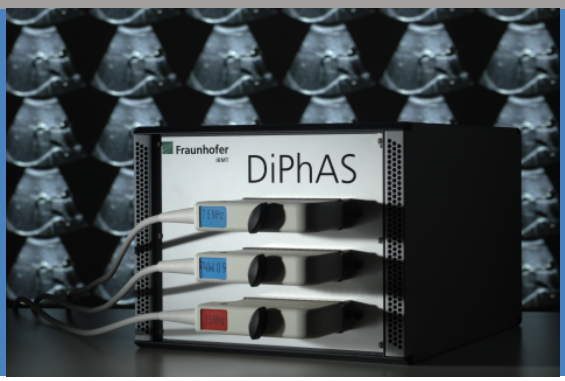

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1 *DiPhAS user frontend*
2 *DiPhAS beamformer*

Ultrasound Research Platform

System Description

Diagnostic imaging quality of ultrasound systems is defined by the beamformingcharacteristics of the ultrasonic device. Dynamic focusing, steering, amplitude weighting, pulse coding and controlling the size of the aperture of an array probe are the techniques which are used to form the acoustic beam. Using multiple beams simultaneously shortens the time to acquire one image. Especially for research and development work it is interesting to have complete controlling possibilities over the parameters that determine the geometry, the direction, the number and the acoustical properties of the sound beams. The Ultrasound Research Platform DiPhAS (Digital Phased Array System), which is in its sixth generation of development, provides full control over these parameters like delays, amplitude-weighting-factors, pulse form, frequency and size-control of the aperture.

RF- or Channel-Data Acquisition

Research in the field of ultrasonic diagnosis includes the development and use of advanced methods of processing high frequency data (RF-data) and single channel date (RAW-data).
DiPhAS allows full access to the high frequency signals coming from each single receiving element of the array-probe. Amplifying as well as amplitude weighting, pulse forms and the delays can be programmed individually.
The system includes a PC or it is possible to connect to an external PC via USB. The complete RF-A-Scan can be transmitted to the PC for processing, scan converting or storing which provides the possibility of offline signal processing.
DiPhAS is controlled and programmed by a PC. Beyond basic routines provided by its operating system different numbers of extended functions for control are implemented.

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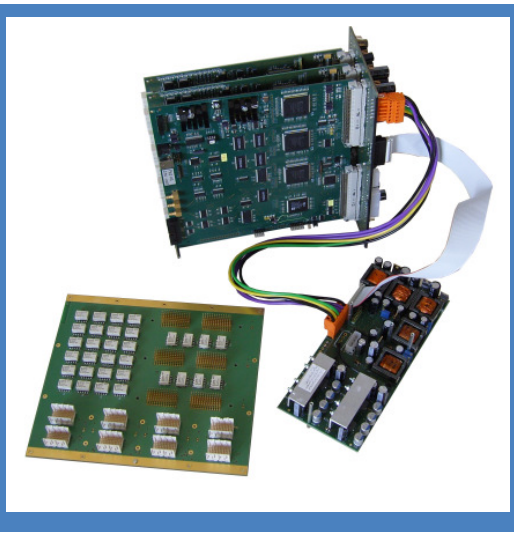

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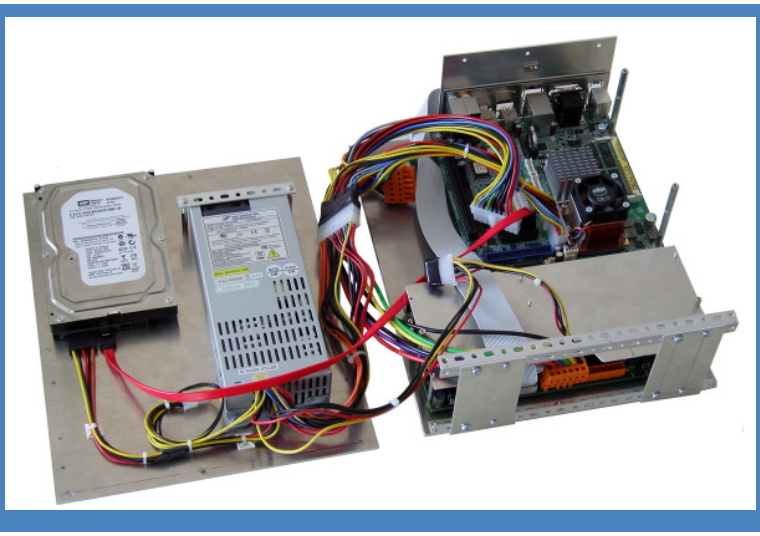

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Modular and Scalable

DiPhAS is structured modularly and can be scaled from 32 up to 256 channels in its standard release.
The system is already adapted to several commercially available or self-developed linear, curved, phased and 2D-array probes.

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Specifications

Transmitter

Number of transmit channels: 32 up to 256
Max. Output voltage (50 Ohm) 120V
Max. Output current (peak-peak): 0.4 A
Transmit Pulse Form:
rectangular, bipolar, Burst1, Burst3, Burst8, free form
Digitalization resolution: 8.3 ns
Number of output voltage steps: 5
Min Beamforming delay resolution: 8.3 ns
Max transducer midfrequency: 15 MHz
Number of transmit focus: 4

Receiver

Receive channels: 32 up to 256
Input bandwidth (-6 dB): 15 MHz
Analog Gain: 42 dB
fix Gain: 12 dB
dyn.TGC: 30 dB
Digital Gain: 40 dB
A/D conversion: 12 Bit, 40MHz per channel
Max recording depth: 20 cm

Transducer support

Types: phased, curved, linear, custom transducer with known geometry, pitch and transducer pin out

transducer connectors: 3
(parallel use possible)

channels per connector 64

Data I/O – Interfaces, PC

The system uses a High-Speed USB 2.0-connection for data acquisition and programming and is connected to a PC with Mini ITX form factor.
It uses 4GByte main memory and a Quad Core processor with a large hard disc for data storage and the Windows® XP (32bit) or Windows 7 (32bit/64bit) operating system. For more processing power a GPU with approx. 200 cores is also included in the system.
Furthermore a keyboard, mouse and a 20 inch display is included. It is possible to use an external pc for data acquisition and processing.

General

Power supply: 230 V / 110V
Case: 240 / 380 /330 mm
Weight 12 kg

3 *DiPhAS beamformer hardware*
4 *DiPhAS PC-hardware*
5 *DiPhAS integrated in a cart for medical applications*