Implementation of a versatile research data acquisition system using a commercially available medical ultrasound scanner - DTU Orbit (28/02/2019)

This paper describes the design and implementation of a versatile, open-architecture research data acquisition system using a commercially available medical ultrasound scanner. The open architecture will allow researchers and clinicians to rapidly develop applications and move them relatively easy to the clinic. The system consists of a standard PC equipped with a camera link and an ultrasound scanner equipped with a research interface. The ultrasound scanner is an easy-to-use imaging device that is capable of generating high-quality images. In addition to supporting the acquisition of multiple data types, such as B-mode, M-mode, pulsed Doppler, and color flow imaging, the machine provides users with full control over imaging parameters such as transmit level, excitation waveform, beam angle, and focal depth. Beamformed RF data can be acquired from regions of interest throughout the image plane and stored to a file with a simple button press. For clinical trials and investigational purposes, when an identical image plane is desired for both an experimental and a reference data set, interleaved data can be captured. This form of data acquisition allows switching between multiple setups while maintaining identical transducer, scanner, region of interest, and recording time. Data acquisition is controlled through a graphical user interface running on the PC. This program implements an interface for third-party software to interact with the application. A software development toolkit is developed to give researchers and clinicians the ability to utilize third-party software for data analysis and flexible manipulation of control parameters. Because of the advantages of speed of acquisition and clinical benefit, research projects have successfully used the system to test and implement their customized solutions for different applications. Three examples of system use are presented in this paper: evaluation of synthetic aperture sequential beamformation, transverse oscillation for blood velocity estimation, and acquisition of spectral velocity data for evaluating aortic aneurysms.

General information
State: Published
Organisations: Department of Electrical Engineering, Biomedical Engineering, Center for Fast Ultrasound Imaging, Copenhagen University Hospital
Pages: 1487-99
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: IEEE Transactions on Ultrasonics, Ferroelectrics and Frequency Control
Volume: 59
Issue number: 7
ISSN (Print): 0885-3010
Ratings:
BFI (2019): BFI-level 2
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 2.94 SJR 1.183 SNIP 1.447
Web of Science (2017): Impact factor 2.704
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.73 SJR 0.986 SNIP 1.402
Web of Science (2016): Impact factor 2.743
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 2.43 SJR 0.814 SNIP 1.494
Web of Science (2015): Impact factor 2.287
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 2.18 SJR 1.086 SNIP 1.627
Web of Science (2014): Impact factor 1.512
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2