

# Dr. Chris Daft

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## SUMMARY

Award winning, Oxford Educated scientist whose areas of expertise include medical imaging, electronics, semi-conductors, medical devices, sensors, MEMS, signal processing and image processing. Experience in industries/applications including medical devices, imaging, consumer electronics, biometric security, and electrical power delivery. Extensive Intellectual Property experience including patent development, analysis, licensing, and strategy. Serial inventor who holds 22 U.S. Patents with several pending. Diverse industry experience including multi-nationals such as GE, Medtronic, Samsung and Siemens as well as several start-ups. Well published. Winner of grants from National Institute of Health and DARPA. Extensive international consulting experience. IEEE Senior Member since 2004. Three years' experience teaching electrical and computer engineering. Holds BA and MA in Physics from Oxford as well as Doctorate from Oxford in Materials Science.

## CURRENT WORK includes:

- Consulting on litigation involving medical devices, wearable electronics patents, and trade secrets.
- Advising start-ups on patent strategy, product positioning and business strategy
- Development of wearable cancer monitoring device
- Portable point-of-care imaging (research supported by a grant to River Sonic Solutions from the National Institutes of Health)
- Design of beam formation and image reconstruction techniques
- Acoustics and transducer design for medical and industrial applications
- Design of MEMS devices, front-end electronics and integrated circuits

## EXPERT WITNESS EDUCATION

- SEAK Expert Witnessing courses attended:
  - Starting/building/running an Expert Witness Practice

- How to be an Effective Expert Witness
- How to Excel at Deposition
- Advanced Testifying Skills for Experts
- How to Write a Bulletproof Expert Witness Report
- Expert Witness Conferences attended:
  - Forensic Expert Witness Association National Conference, San Francisco, CA, 2016
  - National Expert Witness Conference, Clearwater, FL, 2017

#### HONORS AND AWARDS

- Senior Key Expert, Siemens AG, February 2009: Siemens defines the Key Expert position as “a career path for key technology experts analogous to that for our top managerial talents.”
- Willis R. Whitney Technical Achievement Award, GE Global Research, August 2000: For participating in the development of a Six-Sigma software toolkit, which was widely deployed within GE.
- Six-Sigma Certified Green Belt, GE Global Research, April 1998: A certified Green Belt at GE has taken classes and completed several projects resulting in cost savings for the company. In my case these involved Design for Six-Sigma (DFSS).
- Dushman Award, GE Global Research, June 1994: GE’s highest-ranking team award for contributions to the introduction of their first premium ultrasound product, the LOGIQ 700.

#### ISSUED PATENTS

- Redistribution layer in an ultrasound diagnostic imaging transducer: United States Patent 9,274,088
- Switch for aperture control in medical diagnostic ultrasound imaging: United States Patent 8,795,182
- Volume mechanical transducer for medical diagnostic ultrasound: United States Patent 8,647,279
- Aperture synthesis using cMUTs: United States Patent 8,641,628
- Multi-dimensional CMUT array with integrated beam formation: United States Patent 8,465,431
- Piezoelectric and CMUT layered ultrasound transducer array: United States Patent 8,277,380
- Ultrasound imaging transducer array for synthetic aperture: United States Patent 7,963,919
- Apparatus for two-dimensional transducers used in three-dimensional ultrasonic imaging: United States Patent 7,824,338

- Method and apparatus for improving the performance of capacitive acoustic transducers using bias polarity control and multiple firings: United States Patent 7,780,597
- Apparatus for two-dimensional transducer used in three-dimensional ultrasonic imaging: United States Patents 7,719,166 & 7,679,263
- Electric circuit for tuning a capacitive electrostatic transducer: United States Patent 7,670,290
- Microfabricated ultrasonic transducer array for 3-D imaging and method of operating the same: United States Patent 7,618,373
- Apparatus for two-dimensional transducers used in three-dimensional ultrasonic imaging: United States Patent 7,508,113
- Microfabricated ultrasonic transducers with bias polarity beam profile control and method of operating the same: United States Patent 7,087,023
- System and method for statistical design of ultrasound probe and imaging system: United States Patent 7,006,955
- Method and system for conducting medical imaging transactions: United States Patent 6,931,270
- Ultrasound imaging system having post-beamformer signal processing using deconvolution algorithm: United States Patent 6,245,016
- Ultrasound imaging system with dynamic window function generator: United States Patent 5,817,023
- Focused ultrasound surgery system guided by ultrasound imaging: United States Patent 5,769,790
- Method for adaptively filtering doppler signals using a complex time domain filter: United States Patent 5,445,156
- Color flow imaging system utilizing a time domain adaptive wall filter: United States Patent 5,349,524
- Ultrasound imaging system with dynamic window function: United States Patent 5,345,939

#### PEER-REVIEWED PUBLICATIONS

##### Invited Papers

- Daft, C.M.W., "Neural networks for image analysis," Ultrasonics Symposium, 1990. Proceedings., IEEE 1990, pp.1425,1433 vol.3, 4-7 Dec 1990
- Daft, C.; Wagner, P.; Bymaster, B.; Panda, S.; Patel, K.; Ladabaum, I., "cMUTs and electronics for 2D and 3D imaging: monolithic integration, in-handle chip sets and system implications," Ultrasonics Symposium, 2005 IEEE, vol.1, pp.463,474, 18-21 Sept. 2005

- Daft, C.M.W., "Conformable transducers for large-volume, operator-independent imaging," Ultrasonics Symposium (IUS), 2010 IEEE , pp.798,808, 11-14 Oct. 2010

#### Other Papers

- Daft, C.M.W.; Briggs, G.A.D.; O'Brien, W.D., Jr., "Frequency dependence of tissue attenuation measured by acoustic microscopy," Ultrasonics Symposium, 1988. Proceedings., IEEE 1988 , pp.971,974 vol.2, 2-5 Oct 1988
- Conrath, B.C.; Daft, C.M.W.; O'Brien, W.D., Jr., "Applications of neural networks to ultrasound tomography," Ultrasonics Symposium, 1989. Proceedings., IEEE 1989 , pp.1007,1010 vol.2, 3-6 Oct 1989
- Daft, C.M.W.; Siddiqi, T.A.; Fitting, D.W.; Meyer, R.A.; O'Brien, W.D., Jr., "In-vivo fetal ultrasound exposimetry," Ultrasonics Symposium, 1989. Proceedings., IEEE 1989 , pp.1053,1056 vol.2, 3-6 Oct 1989
- Daft, C.M.W.; Smith, L.S.; O'Donnell, M., "Beam profiles and images from two-dimensional arrays," Ultrasonics Symposium, 1990. Proceedings., IEEE 1990 , pp.775,779 vol.2, 4-7 Dec 1990
- Daft, C.M.W.; Wildes, D.G.; Thomas, L.J.; Smith, L.S.; Lewandowski, R.S.; Leue, W.M.; Rigby, K.W.; Chalek, C.L.; Hatfield, W.T., "A 1.5D transducer for medical ultrasound," Ultrasonics Symposium, 1994. Proceedings., 1994 IEEE , vol.3, no., pp.1491,1495 vol.3, Oct. 31 1994-Nov. 3 1994
- Daft, C.M.W.; Engeler, W.E., "Windowing of wide-band ultrasound transducers," Ultrasonics Symposium, 1996. Proceedings., 1996 IEEE , vol.2, no., pp.1541,1544 vol.2, 3-6 Nov 1996
- Daft, C.M.W.; Leue, W.M.; Thomenius, K.E.; Macdonald, M.C.; Odegaard, L.A., "Comprehensive imager simulation for improved acoustic power control," Ultrasonics Symposium, 1999. Proceedings. 1999 IEEE , vol.2, no., pp.1571,1575 vol.2, 1999
- Daft, C.; Calmes, S.; da Graca, D.; Patel, K.; Wagner, P.; Ladabaum, I., "Microfabricated ultrasonic transducers monolithically integrated with high voltage electronics," Ultrasonics Symposium, 2004 IEEE , vol.1, no., pp.493,496 Vol.1, 23-27 Aug. 2004
- Daft, C.; Wagner, P.; Bymaster, B.; Panda, S.; Patel, K.; Ladabaum, I., "cMUTs and electronics for 2D and 3D imaging: monolithic integration, in-handle chip sets and system implications," Ultrasonics Symposium, 2005 IEEE , vol.1, no., pp.463,474, 18-21 Sept. 2005
- Daft, C.; Panda, S.; Wagner, P.; Ladabaum, I., "Two Approaches to Electronically Scanned 3D Imaging Using cMUTs," Ultrasonics Symposium, 2006. IEEE , pp.685,688, 2-6 Oct. 2006
- Daft, C.; Brueske, D.; Wagner, P.; Liu, D., "A Matrix Transducer Design with Improved Image Quality and Acquisition Rate," Ultrasonics Symposium, 2007. IEEE , pp.411,415, 28-31 Oct. 2007

- Liu, D.; Brueske, D.; Willsie, T.; Daft, C., "Sigma-delta dynamic receive beamforming," Ultrasonics Symposium, 2008. IUS 2008. IEEE, pp.1270,1273, 2-5 Nov. 2008
- Daft, C.; Wagner, P.; Panda, S.; Ladabaum, I., "Elevation beam profile control with bias polarity patterns applied to microfabricated ultrasound transducers," Ultrasonics, 2003 IEEE Symposium on , vol.2, no., pp.1578,1581 Vol.2, 5-8 Oct. 2003
- Daft, C.M.W.; Siddiqi, T.A.; Fitting, D.W.; Meyer, R.A.; O'Brien, W.D., Jr., "In-vivo fetal ultrasound exposimetry," Ultrasonics, Ferroelectrics, and Frequency Control, IEEE Transactions on , vol.37, no.6, pp.501,505, Nov. 1990
- Weaver, J.M.R.; Daft, C.M.W.; Briggs, G.A.D., "A quantitative acoustic microscope with multiple detection modes," Ultrasonics, Ferroelectrics, and Frequency Control, IEEE Transactions on , vol.36, no.5, pp.554,560, Sept. 1989
- Wildes, D.G.; Chiao, R.Y.; Daft, C.M.W.; Rigby, K.W.; Smith, L.S.; Thomenius, K.E., "Elevation performance of 1.25D and 1.5D transducer arrays," Ultrasonics, Ferroelectrics, and Frequency Control, IEEE Transactions on , vol.44, no.5, pp.1027,1037, Sept. 1997
- Daft, C.M.W.; Briggs, G.A.D., "Wideband acoustic microscopy of tissue," Ultrasonics, Ferroelectrics, and Frequency Control, IEEE Transactions on , vol.36, no.2, pp.258,263, March 1989
- Daft, C. M. W.; Briggs, G. A. D., "The elastic microstructure of various tissues," The Journal of the Acoustical Society of America, 85, 416-422 (1989)
- Daft, Christopher M. W.; Briggs, G. A. D., "Wideband acoustic microscopy of tissue," The Journal of the Acoustical Society of America, 83, S110-S110 (1988)
- Daft, C. M. W.; Briggs, G. A. D.; O'Brien, W. D., Jr. "Frequency dependence of tissue attenuation measured by acoustic microscopy" The Journal of the Acoustical Society of America, 85, 2194-2201 (1989)

#### PROFESSIONAL MEMBERSHIPS

- Member-at-Large of Board of Directors, IEEE Consultants' Network of Silicon Valley: member from 2012 to Present. The Silicon Valley chapter of the IEEE Consultants' Network brings together consultants, clients and interested parties.
- IEEE Senior Member: September 1987 to Present. The Institute of Electrical and Electronic Engineers is the world's largest professional association dedicated to advancing technological innovation and excellence for the benefit of humanity.
- IEEE International Ultrasonics Symposium, Member of Technical Program Committee: October 2005 to Present. This committee is responsible for the technical content of the IEEE International Ultrasonics Symposium.
- Associate Member, American Bar Association, July 2016 to Present. Member of Intellectual Property Law section.

## EMPLOYMENT EXPERIENCE

RIVER SONIC SOLUTIONS LLC (2012 – present)

Consultant in the areas of ultrasound, MEMS, electronics, patent strategy and expert witnessing.

CEPHASONICS, INC. (previously Samplify; 2011 - present)

Chief Scientist

- Responsible for technical direction of a start-up seeking to commoditize front-end and beam formation electronics.
- Advised CEO on all technical matters, deeply involved in angel and VC fundraising.
- Extensive customer interaction: marketed products to imaging and non-traditional customers.

SIEMENS HEALTHCARE, ULTRASOUND DIVISION

Senior Manager, Engineering, Mountain View, CA: 2005-2011

- Delivered 3 ASICs on tight schedule to support new Silicon Ultrasound product line.
- Managed team of eight engineers to design, test and manufacture all electronics needed for introduction of Silicon Ultrasound transducers.
- Technology evangelist presenting weekly to customers at Siemens' Innovation Center.

SENSANT CORPORATION

Manager, Research and Development, San Leandro, CA: 2003-2005

- Managed group which created electronics for first 2D and 3D images using silicon ultrasound transducer.
- Co-authored successful grant proposal to DARPA on battlefield ultrasound imaging and surgery. \$7.5 M was awarded to Sensant and its collaborator.

Senior Staff Engineer, San Leandro, CA: 2000-2003

- Design of new types of imaging systems using capacitive micro-fabricated ultrasound transducers (cMUTs, also known as Silicon Ultrasound.)
- Co-authored several successful SBIR grant proposals.

#### GENERAL ELECTRIC COMPANY

Physicist, Corporate R&D, Niskayuna, NY: 1990-2000

- Designed algorithms for IC implementation; resulting beamforming IC was the heart of GE's successful entry into the premium ultrasound market.
- Developed statistical methods (now patented) for robust simultaneous design of transducer and imaging system to six-sigma quality standards.
- Much transducer design, acoustic field simulation and measurement.
- Research in signal processing for improved image quality and blood flow estimation. Several of these signal processing innovations are used in current GE products.

#### UNIVERSITY OF ILLINOIS

Assistant Professor of Electrical and Computer Engineering, Urbana, IL: 1987-1990

- Research in scanning laser acoustic microscopy to characterize tissue, and applications of neural networks to ultrasonic imaging.
- Taught courses in circuit theory, medical imaging and acoustics.

#### EDUCATION

- D. Phil. (equal to Ph. D.) in Materials Science, Oxford University, UK: 1984-1987.
- B.A. and M.A. in Physics with 1<sup>st</sup> class honors, Oxford University, UK: 1981-1984.