

## John O'Donnell

[info@digitalfilterdesign.com](mailto:info@digitalfilterdesign.com)

### *Professional Experience Since 1982.....*

In 1982 started Signix Corp. as a one man operation, with the intent of getting back to doing detailed technical work. The initial effort was the creation of the first digital filter design program for the IBM PC, with the first packages delivered in the Fall of 1983. In 1983 and 1984, under a contract with Texas Instruments, developed the materials and did the presentation of an introduction to DSP and a survey of TMS32010 applications in the mornings of ten two-day seminars which introduced the '32010 and its development tools.

TMS32010 consulting activities: (1) designed and coded a multiple filter bank for use in a sonar triangulation system for oceanographic applications; (2) designed and coded a system that used several bandpass filters in a specialized audio enhancement system.

Employed during 1986-1987 by Zoran Corp. as the Eastern Systems Engineering Manager, developing applications and supporting customers of their digital filter and FFT chips.

From late 1988 to mid-1989 consulted on a project to implement the government's LPC10E 2400 bps digital secure speech system (full-duplex) on an ADSP2100 processor. Working from a floating-point FORTRAN simulation program, redesigned all computational blocks to operate in 16-bit arithmetic by simulating the architectural features of the ADSP2100, and by taking advantage of six years of development work in low-data rate speech systems. Also participated in the final coding activity.

From mid-1990 to late 1990 implemented, as a consultant, the CCITT (ITU) G.722 8-KHz wideband audio, 64 kb/s, system on a pair of TMS320C25s. This involved converting a C-language program supplied by Bellcore to a structure appropriate to the 'C25, and partitioning the transmitter and receiver functions to separate 'C25s. Achieving compatibility with the U.S. rate of 56 kb/s out of a DSU necessitated building a histogram-based synchronization algorithm using statistics of the 7-bit code word. Implemented a complete demonstration system using a 'C25 add-in board for the PC, plus interface and control routines in 'X86 ASM and C.

Joined Star Semiconductor in late 1990, who had licensed Signix' digital filter design software as part of their SPROClab development system which provided a "sketch-and-realize" graphical approach to programming their multi-CPU DSP chip, the SPROC-1400. Provided the first user's manual, which required analyzing and modifying the assembly language modules which constituted the blocks of the block-diagram programming paradigm. Prepared the materials for a two-day training session for the initial customers. Coded additional signal-processing blocks for specific customers, added those blocks and others to the SPROC library, and wrote application notes.

At Signix in 1992 and, as a consultant to Star Semiconductor, designed and coded in Visual Basic a control loop design and simulation program which allowed the user to implement a loop compensator, check the open and closed loop responses, and download the compensator to the SPROC chip in the development system. With the development system in the loop, this provided the user with the capability for specifying pole and zero locations for the compensator and implementing the modified compensator in real-time.

During late 1993 and early 1994 contracted with NEC Electronics to code in assembly language digital filtering and FFT modules for a C-callable library for the  $\mu$ PD77016. These subroutines were customized to work with the C compiler being developed by Intermetrics

During 1994 and 1995, for a manufacturer of instrumentation systems, developed traditional and wavelet based algorithms for the extraction of features from a class of transient electrical signals.

In early 1996, as a consultant, created and simulated a discrete-time AGC loop around a  $\Delta$ - $\Sigma$  ADC for an all-digital wireless receiver.

Also in 1996, completed a consulting task for the creation of a TMS320C31-based digital feedback system used in the writing of embedded servo information in disk drive production. The deliverables consisted of (1) a TMS320C31 assembly language code template for performing program initialization and all compensator/filter computations, and (2) a Windows program (in Visual Basic) which would convert an analog transfer function to digital form for inclusion in the TMS320C31 code template.

In 1996 consulted to Hewlett-Packard (later Agilent Technologies), becoming a full-time employee in late 1997. Was the principal analyst and algorithm developer for an instrument that measured the performance of telephone line twisted pairs, for POTS and xDSL services. Developed all algorithms based on definitions of measurements in ANSI and ITU-T standards, simulated their performance in MATLAB, converted to C with critical portions in assembly language, debugged and tuned algorithm performance using Code Composer (for processor TMS320LC31). Sample measurements are: level and frequency values for tones from 50 Hz to 2 MHz, weighted noise (designed all digital filters), and PSD to determine interference for ADSL application. Developed Visual Basic programs for controlling high-speed data acquisition board to measure actual instrument performance. Left Agilent as of 31 Jan. 2002.

When not engaged as a consultant or an employee of other companies, worked on the upgrading and marketing of the DISPRO<sup>®</sup> digital filter design software package, which was distributed in the U.S and Canada by Spectrum Signal Processing, in Europe by STAC Electronics of Germany, and worldwide by Star Semiconductor as SPROCfil under license to Signix. [Signix Corporation was dissolved in 1997.]

***Professional Experience Prior To 1982.....***

During several years of working on military electronics applications have participated in signal processing activities on a number of programs, some of which are listed here: ● Developed a large software package for designing optimal waveforms for probing of multi-path communications channels. ● Managed a project for characterizing the detectability of spread-spectrum signals. ● Initiated and managed a multi-year project to develop novel techniques for achieving very-low data rates for digital speech (first applications of “vector quantization”). ● Surveyed and implemented the class of Sande-Tukey FFT algorithms using a unifying format based on the Kronecker product notation. ● Analyzed a nonlinear communications circuit using stiff differential equation integration method, and corroborated results with laboratory measurements. ● Contributed to the performance analysis of several high-performance digital communications systems.

***Summary of Employment History .....***

Hewlett-Packard (Agilent Technologies) — *Engineer/Scientist* ● Signix Corporation — *Chief Engineer*  
● Star Semiconductor Corporation — *Sr. Technical Fellow* ● Zoran Corporation — *Eastern Systems Engineering Manager* ● Bolt Beranek and Newman, Inc. — *Senior Scientist* ● TASC — *Sr. Member Technical Staff* ● CNR, Inc. — *Senior Scientist* ● Proteon Associates — *Partner* ● Signatron — *Sr. Engineering Specialist* ● GTE Sylvania Applied Research Lab. — *Sr. Engineering Specialist* ● Bellcomm, Inc. — *Member Technical Staff* ● Carnegie-Mellon Univ. — *Instructor* ● Westinghouse Electric — *Sr. Engineer*

***Programming Languages & Numerical Techniques.....***

Extensive work with MATLAB (and various toolboxes) and C for DSP applications. ● Considerable experience with various Microsoft languages: Visual Basic, Basic 7.1 compiler (DOS), FORTRAN 5.1 (DOS 16-bit EXEs), FORTRAN Powerstation (DOS 32-bit EXEs). ● Special projects experience with MathCad 4.0 and 5.0.

Extensive application of numerical techniques in problem solving: stiff differential equation integration, linear algebraic systems, matrix eigenvalue problems,

***Education .....***

B.S.E.E. Northeastern University ● Ph.D. in E.E. Carnegie-Mellon University

***Other.....***

Instructor in Northeastern University’s Evening Graduate Program (Linear Systems, Optimal Control, Stochastic Control), and State-of-the-Art Program (Speech Analysis, Introductory and Advanced DSP courses using MATLAB for course examples and student projects) .

Member IEEE , Eta Kappa Nu, Tau Beta Pi, Sigma Xi

**Selected Publications**.....

"Finite Time Filtering: One Dimensional Case", *IEEE Trans. On Automatic Control*, January, 1964.

"Investigation of Problems in the Optimal Control of Linear Multi-Dimensional Systems", Ph.D. Thesis, Carnegie-Mellon University, June, 1963.

"Bounds on Limit Cycles in Two-Dimensional Bang-Bang Control Systems with an Almost Time-Optimal Switching Curve", *IEEE Trans. on Automatic Control*, October, 1964.

"Asymptotic Solution of the Matrix Riccati Equation of Optimal Control", *Proc. Fourth Allerton Conference on Circuit and System Theory*, University of Illinois, October, 1966.

"Status of Real-Time Estimation Techniques and Their Application to Tracking and Navigation", *NEREM Record*, November, 1970.

"Nonlinear Transfer Functions from Circuit Analysis: Strong Excitation", *Proc. Int. Conf. on Communications*, Philadelphia, Pa., June, 1972.

"A System for Very Low Data Rate Speech Communication", *Proc. International Conf. on Acoustics, Speech, and Signal Processing*, Atlanta, 1981.