

BOJAN VRCELJ

Qualcomm Corporate R&D Dept.
5775 Morehouse Dr, San Diego, CA 92122
Formerly: Department of Electrical Engineering
California Institute of Technology
Mail Code 136-93
Pasadena, CA 91125

Tel : (858) 651-5411 (Qualcomm)
Fax : (858) 845-2651
Tel : (626) 395-2209 (Caltech)
Fax : (626) 795-8649
E-mail : bojan@systems.caltech.edu
URL : <http://www.systems.caltech.edu/bojan>

EDUCATION **California Institute of Technology** Pasadena, California
Ph.D. degree in Electrical Engineering June 2003
Advisor: Professor P. P. Vaidyanathan
Thesis: Multirate signal processing concepts in digital communications

California Institute of Technology Pasadena, California
Masters of Science degree in Electrical Engineering June 1999
Field of specialization : Digital Signal Processing GPA: 4.2/4.0

University of Belgrade Belgrade, Yugoslavia
Bachelor of Science degree in Electrical Engineering August 1998
Graduated with high honors CGPA: 9.48/10.0
Thesis: Wavelets in compression: zerotree coding, supervised by Prof. Miodrag Popović

AWARDS

- Schlumberger Fellowship (2002-03)
- Caltech Division Fellowship (1998-99)
- Fellowship and full scholarship awarded by the Serbian Ministry of Education (1992-98)

RESEARCH INTERESTS

Multirate signal processing and applications in digital communications, especially channel equalization, general prefix-based, multicarrier and multiuser communication systems. Time and frequency synchronization in multiuser communication systems. Signal detection and classification; applications such as cognitive radio. Adaptive signal processing.

TEACHING EXPERIENCE

Teaching assistant, California Institute of Technology 1999-2003
Assisted in teaching the following courses:

- Digital Signal Processing
- Signals, Systems and Transforms
- Speech Processing
- Random Processes for Communications and Signal Processing
- Introduction to Communications

PROFESSIONAL MEMBERSHIPS AND ACTIVITIES

IEEE Signal Processing and Communications Societies 1998-present
I am a member of the IEEE Signal Processing and Communications Societies. I have been acting as a regular reviewer for the following journals: IEEE Transactions on Signal Processing, IEEE Transactions on Communications, IEEE Transactions on Image Processing, IEEE Transactions on Circuits and Systems, and IEEE Signal Processing Letters. I have also helped in reviewing papers for several conferences organized by the Signal Processing and Communications Societies.

RESEARCH EXPERIENCE**Qualcomm, Inc.**

2003-present

I have been with Qualcomm, Corporate R&D division since August 2003, as a Senior Engineer. My current title (since October, 2005) is Staff Engineer. I have been one of the first researchers involved in a baseband design work for a novel multicast system developed within Qualcomm. The developed technology is called MediaFLO, and is scheduled for US deployment at the beginning of 2006. The focus of my research has been on channel estimation, time/frequency synchronization and interference mitigation techniques. Thus far, six US patent application have been filed and seven other patent applications are in the filing process, all based on my work at Qualcomm.

California Institute of Technology

1998-2003

I was involved in a variety of research projects, most of them having in common the use of multirate systems and filter banks. These projects included signal modeling, sampling and interpolation, development of biorthogonal partners in the scalar, multiple-input multiple-output (MIMO) and fractional settings and their application in channel equalization, some results on multicarrier systems and recent work on oversampling and block equalization of multiuser CDMA systems, as well as general transceivers for multicarrier communication systems.

University of Illinois at Chicago

Summer 1996

Participated in a project on electric dipole localization using the surface potentials.

King Mongkut's Institute of Technology, Bangkok, Thailand

Oct-Dec 1996

Participated in a project on Thai speech recognition.

SKILLS

- Software packages: MATLAB, MATHEMATICA
- Programming languages : C, C++, Assembly Language
- Operating Systems : Windows, Linux, UNIX
- Miscellaneous : TEX, LATEX, Microsoft Office, Adobe Photoshop
- Languages : Serbian (native), intermediate-level Spanish, elementary-level Russian

MISCELLANEOUS

My favourite activities are swimming, water polo (member of the US Water Polo Association), skiing, and sailing. I also enjoy roller-blading and hiking. Music is an important part of my life. I started playing classical guitar when I was ten and later moved on to rock and bass guitar. Recently I have taken interest in Latin-dance and choir singing.

INVITED PRESENTATIONS

- EECS Special Seminar at Massachusetts Institute of Technology, March 2003.
- ECE Special Seminar at University of Victoria, British Columbia, May 2003.
- Several invited presentations at Asilomar Conference on SS&C, 2001 and 2002.

LIST OF PUBLICATIONS**Journal Publications :**

- (J1) B. Vrcelj and P. P. Vaidyanathan, "Efficient implementation of all-digital interpolation," *IEEE Transactions on Image Processing*, vol. 10(11), pp. 1639–46, Nov. 2001.
- (J2) P. P. Vaidyanathan and B. Vrcelj, "Biorthogonal partners and applications," *IEEE Transactions on Signal Processing*, vol. 49(5), pp. 1013–27, May 2001.
- (J3) B. Vrcelj and P. P. Vaidyanathan, "MIMO biorthogonal partners and applications," *IEEE Transactions on Signal Processing*, vol. 50(3), pp. 528–42, Mar. 2002.

- (J4) B. Vrcelj and P. P. Vaidyanathan, "Fractional biorthogonal partners in channel equalization and signal interpolation," *IEEE Transactions on Signal Processing*, vol. 51(7), pp. 1928–40, July 2003.
- (J5) B. Vrcelj and P. P. Vaidyanathan, "Equalization with oversampling in multiuser CDMA systems," *IEEE Transactions on Signal Processing*, scheduled for publication, May 2005.

Special Publications :

- (S1) B. Vrcelj, A. Mantravadi, and K. Mukkavilli, "Timing synchronization based on channel estimates in an OFDM system," *Qualcomm Research and Development Technical Journal*, first issue, submitted for publication, January 2006.

Conference Publications :

- (C1) B. Vrcelj and P. P. Vaidyanathan, "Theory of MIMO biorthogonal partners and their application in channel equalization," *Proceedings ICC*, Helsinki, Finland, June 2001.
- (C2) B. Vrcelj and P. P. Vaidyanathan, "Results on vector biorthogonal partners," *Proceedings ICASSP*, Salt Lake City, Utah, May 2001.
- (C3) P. P. Vaidyanathan and B. Vrcelj, "On sampling theorems for non bandlimited signals," *Proceedings ICASSP*, Salt Lake City, Utah, May 2001.
- (C4) B. Vrcelj and P. P. Vaidyanathan, "On the general form of FIR MIMO biorthogonal partners," (invited paper) *Proc. 35th Asilomar Conference on Signals, Systems and Computers*, Pacific Grove, CA, Nov. 2001.
- (C5) B. Vrcelj and P. P. Vaidyanathan, "Least squares signal approximation using multirate systems: multichannel nonuniform case," *Proc. 35th Asilomar Conference on Signals, Systems and Computers*, Pacific Grove, CA, Nov. 2001.
- (C6) B. Vrcelj and P. P. Vaidyanathan, "Pre- and post-processing for optimal noise reduction in cyclic prefix based channel equalizers," *Proceedings ICC*, New York, Apr-May 2002.
- (C7) P. P. Vaidyanathan and B. Vrcelj, "Fast and robust blind-equalization based on cyclic prefix," *Proceedings ICC*, New York, Apr-May 2002.
- (C8) B. Vrcelj and P. P. Vaidyanathan, "Fractional biorthogonal partners in fractionally spaced equalizers," *Proceedings ICASSP*, Orlando, FL, May 2002.
- (C9) P. P. Vaidyanathan and B. Vrcelj, "Theory of fractionally spaced cyclic-prefix equalizers," *Proceedings ICASSP*, Orlando, FL, May 2002.
- (C10) B. Vrcelj and P. P. Vaidyanathan, "Fractional biorthogonal partners and application in signal interpolation," *Proceedings ISCAS*, Scottsdale, AZ, May 2002.
- (C11) P. P. Vaidyanathan and B. Vrcelj, "On power allocation for generalized cyclic-prefix based channel equalizers," *Proceedings ISCAS*, Scottsdale, AZ, May 2002.
- (C12) B. Vrcelj and P. P. Vaidyanathan, "The role of biorthogonal partners in sampling theory for non bandlimited signals: a review," (invited paper) *Proc. 36th Asilomar Conference on Signals, Systems and Computers*, Pacific Grove, CA, Nov. 2002.
- (C13) P. P. Vaidyanathan and B. Vrcelj, "Filter banks for cyclic-prefixing the nonuniform DMT system," (invited paper) *Proc. 36th Asilomar Conference on Signals, Systems and Computers*, Pacific Grove, CA, Nov. 2002.
- (C14) B. Vrcelj and P. P. Vaidyanathan, "Improvements in equalization of multiuser CDMA systems: oversampling and nonuniqueness," *Proc. 37th Asilomar Conference on Signals, Systems and Computers*, Pacific Grove, CA, Nov. 2003.
- (C15) P. P. Vaidyanathan and B. Vrcelj, "A frequency domain approach for blind identification with filter bank precoders," *Proceedings ISCAS*, Vancouver, Canada, May 2004.

- (C16) P. P. Vaidyanathan and B. Vrcelj, “Transmultiplexers as precoders in modern digital communication: a tutorial review,” (invited paper) *Proceedings ISCAS*, Vancouver, Canada, May 2004.