

## MICHAEL TSIROULNIKOV

e-mail: [info@miketdpsolutions.com](mailto:info@miketdpsolutions.com) Phone & Fax: (604) 274-0110

#449 – 5880 Dover Crescent, Richmond, BC, V7C 5P5

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### **Professional skills:**

- Experience in software / hardware architecture and building embedded systems (especially hard real time, performance oriented systems), system design & analysis, distributed systems, multitasking and multiprocessing, RTOS, device drivers.
- Digital signal processing theory & applications,
  - Adaptive systems and their practical implementations,
  - Applicable areas of mathematics and numerical recipes,
  - Fixed-point arithmetic 'know-how's, limitations and implications,
  - DSP algorithm development methodology as a step-by-step feedback controlled process, to minimize time spent on troubleshooting, testing and maintenance.
- Telecommunication domain:
  - Voice over packet technology (starting from DCME / VoFR / VoATM/ VoEthernet / VoIP), years of hands-on experience;
  - TDM (T1/E1, SDH/SONET, DCE, local loops, PBX, gain plan, echo control, etc);
  - Customer-side (DTE/CPE) telephony & room acoustics.
- Experience in programming stretching from DSP / microprocessor assembly languages to Win32/COM C/C++, code optimization.
- Ability to go through entire path of R&D from advanced research papers to fully functional commercial applications. Proven record of designing clean flexible well-polished products requiring little or no maintenance, while standing agreed deadlines.

### **Programming languages:**

C/C++, Assembler of TMS320C55x / 54x / C5x / etc, MatLab, FORTRAN, etc.

### **Operation Systems:**

MS ..., UNIX, VxWorks, VRTX, RMX-III, etc...

### **Education:**

<b>1978-84</b>	M.Sc. in technical cybernetics, Physics-Mechanics Department of Leningrad Politechnical Institute.
<b>1992</b>	Course of RMX-III, software engineering standard (DoD-STD-2167A).
<b>1993</b>	Course of C++, OOD.

### **Publications:**

12 papers (system identification, adaptive filters & control, SAW device design and simulation, etc).

The most recent paper: [http://dspvillage.ti.com/pdfs/edge/march2002\\_multirate.pdf](http://dspvillage.ti.com/pdfs/edge/march2002_multirate.pdf)

Visit [www.miketdpsolutions.com](http://www.miketdpsolutions.com) for examples of algorithmic designs and documentation skills

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## Employment History:

**2000 - present**

*MIKET DSP Solutions, sole proprietor [www.miketdpsolutions.com](http://www.miketdpsolutions.com). Developing high-performance DSP algorithms and providing DSP consulting services to Tri-Link Technologies, Sierra Wireless, Photon Control, Wireless2k, Polycom Canada, etc.*

1. Design & implementation of low-MIPS CDPD GMSK modem for Sierra Wireless, Inc. on ADI 218x.
2. Design, development, integration & testing of embedded signal processing subsystem for Tri-Link Technologies VoIP / Ethernet soft PBX, including interfacing to call control plane, control envelope, adaptive jitter buffer, packet loss concealment (PLC as G.711 annex I), conferencing unit, drivers, test environment and tools, tone generators, etc.
3. Development of signal detectors for C55x/C54x, based on proprietary high precision short-term 'parametric' MLE-alike spectral analysis
  - DTMF detector, run time configurable (0.25MIPS)
  - Multi-frequency (MF R.1, R.2) detectors (0.3 MIPS each).
  - Call progress (EIA 464+400Hz)
  - Caller Id and Caller Alerting Signal (Types I, II).
4. Research & development of high precision RLS-based line echo canceller for VoIP applications, providing up to 35 / 60 dB of ERLE on  $\mu$ -law / linear codecs, wide DT range (up to 40 dB perceptual on  $\mu$ -law codecs), fast convergence, dynamic range from -60 dBm, robust step-size control, Wiener NLP, for C55x & C54x.
5. Research & development of sub-band echo cancellers (both long-tail network and acoustic) for VoIP/ DTE / video-conferencing applications, based on the complex domain bi-orthogonal perfect reconstruction filter banks, dual Calman filtering, psycho-acoustic Wiener post-processing (NLP), and Ephraim-Malah noise reduction. AEC: Echo tail up to 400ms, convergence speed up to 100 dB/s; TCLwst up to 50 dB, dynamic range -60...+6 dBm, noise reduction up to 15 dB.
6. Co-operation with BC Cancer Research Dep. on algorithm research for limited data limited angle 3D image reconstruction techniques for microscope CT. New high-precision error-feedback based algorithms are discovered and analyzed. Articles and a patent application are in progress.

**2000**

*Spectrum Signal Processing Inc., senior DSP engineer / responsible for technology in the Network Solutions department.*

1. Development of 'C5420 based DSP resource card for VoIP / VoATM (AAL2) / etc. Trying to achieve design flexibility so that the same hardware could be used for different applications with software updates; allowing customization for applications different from 'universal port' model.
2. Performing various duties as system architect, team & project leader, providing technical support of marketing activities, interacting with vendors and potential customers, hiring embedded and DSP engineers.

**1999-2000**

*Tri-Link Technologies Inc. (former Xinex Networks), senior DSP engineer / team leader*

1. "Next Generation" VoIP / VoLAN Architecture System Design.
  2. Design and Development of fast preemptive RTOS for C54x for interrupt-driven applications.
  3. Improved hybrid echo canceller with block affine projection method, extending dynamic range, enhancing DT detector, incorporating adaptive voice activity detectors {TI C54x, assembler, C}.
- Optimizations of Caller Id receiver for low-level signals (-65dBm) and twist up to 10dB {TI C54x, assembler, C}. Design & development of low-MIPS CP & DTMF detectors.

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- 1998-1999** *Abatis Systems Corporation, Burnaby, team leader / senior firmware engineer.*  
Design of VoIP card, including: board functional design, vendor choosing, software porting & development, Call Control, H.323 stack interfacing, CAS processing, etc.), etc.
- 1996-1998** *Xinex Networks Inc., New Westminster, DSP team leader/ senior engineer.*
1. Design, Development & Testing of DSP subsystem of ATM-based integrated voice/video/data over LAN system.
  2. Speakerphone development & testing, including acoustical measurements and perceptual tuning.
  3. Design, Development & Testing of echo cancellers (both acoustic and hybrid); speakerphone algorithm (good for given hardware); Voice Activity Detector. {TI C5x, assembler, C}
  4. Design of CP, DTMF detectors & Caller Id receiver.
  5. Research & Design of Sub-band Acoustic Echo Canceller.
- 1992-96** *DSI Inc., Petach-Tikwa, (on contract with ECI Telecom Ltd – now Veraz Networks.), System Design Group, DSP / system engineer.*
1. Embedded systems programming for SDH/SONET multiplexers {68302, C, VRTX}. Management of peripheral cards, where every peripheral card contains its own processor and some controlled ASICs, including control of card presence; software download and configuration; fault and exception handling; non-traffic-affecting update of software; etc.
  2. Development of software for a card providing communication between DS3 tributary (45M) and SDH ring.
  3. Leading of Object Oriented Design seminar.
  4. Co-architect of VoX platform (network of up to 512 DSPs). Development of system layer software for distributed processing of voice/fax/voice-band-data. {TI C54x, assembler, C}, which serves as a platform for VoIP / VoATM (AAL2) and DTX-480 DCME terminals. Used by all major carriers like Sprint, MCI, AT&T.
    - Functional design & simulation of ASIC for inter-processor communication;
    - Design of performance-optimized preemptive priority-based scheduler, Inter-task communication, Memory management, Interrupt handling;
    - Design of fast reloading of applications on 40 Mbit/s to any DSP on the network; Bootstraps;
    - Software support of inter-DSP and DSP-controller communication, special debug channels for network testing / field debugging, (NetOS) etc.
    - Defining of generic application interface;
  5. Development & Testing of fax / voice-band-data remodulator for the DCME /VoX with memory minimization. Development of fax simulator with insertion of various impairments for testing of faxes, DCME, VoX, etc. {TI C54x, assembler, C/C++}.
- 1991** *Sensor Ltd., St.Petersburg, founder / senior software engineer.*
1. Design and development of the CAD to accelerate SAW device design, including adequate simulation of second order effects.
  2. Development of commercial databases {PC, Clipper}.
- 1984-91** *Radiotechnical Institute, Leningrad, engineer / senior engineer / project leader*
1. Design of algorithms and software for GPS receiver of GLONASS/LORAN navigation system signals. System integration, debugging and testing.
  2. Design & Testing of SAW filters and delay lines for communication, radiolocation and navigational systems, concentrating on low-loss precise devices, Development of supporting software.
  3. Working as a project leader and coordinator including negotiations with customers.