

# Jem Berkes

416-477-1527 (Toronto) • [jem.berkes@berkes.ca](mailto:jem.berkes@berkes.ca) • [www.berkes.ca](http://www.berkes.ca)

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## EDUCATION:

**Master of Applied Science in Electrical Engineering**      University of Waterloo, ON      2005 – 2008  
Cumulative average: 89.2%  
NSERC Julie Payette Scholarship winner, offered to 24 top ranked Masters candidates (6 in Engineering)  
NSERC André Hamer Prize winner, offered to the most outstanding Masters candidate in Canada

Research area: computer hardware, security, RF communications, embedded systems

**Bachelor of Science in Computer Engineering**      University of Manitoba, MB      2000 – 2005  
Cumulative average: 97.3%  
Awarded University Gold Medal (highest standing in Engineering) and Medal in Computer Engineering

NSERC-funded laboratory researcher; Undergraduate minors in Management and Arts (Psychology)

## WORK EXPERIENCE:

### Digital Systems Designer, Engineering Research

Arctic Renewables Corporation      Winnipeg, MB      June 2009 – *Present*  
Performed product research & development for cost-effective electrical engineering solutions in: digital electronics, power management, computer hardware, communications, microprocessors.

### NSERC Researcher (Masters student and Research Assistant)

University of Waterloo      Waterloo, ON      Sept 2005 – Feb 2008  
Conducted experiments on computer hardware and low-power microprocessors. Practical lab work involved measuring electrical signals and RF from wireless commercial devices using oscilloscopes and other tools. Designed real-time control systems with automated scripting and computer control.

### Entrepreneur / small business owner

SysDesign (sole proprietorship)      Canada / Australia      1997 – *Present*  
Designed software and other technology solutions for industry and government customers world-wide. Consulting work involved market research, remote team coordination, technical writing, sales.

2008	Licensed assembler-based design to the Canadian Space Agency (Government of Canada). The Intel x86 code has a small memory footprint and drives a standard VGA video interface.
2006 - 2007	An ongoing project required a notification system for monitoring physical sensors. I built custom hardware to interface sensors to a Linux PC, which then signals mobile phones. The design used a finite state machine and required integration of peripherals, hardware, software, and networks.
2003 - 2004	Haansoft (Korea), a major software company, requested code suitable for integration into an existing product. The work was coordinated with the remote team and written in C language.
2000 - 2001	The Florida State Government, Division of Emergency Management requested a control solution that could send emergency signals through a satellite communication network.
1997	Designed a real-time video camera controller for FOX 7, KTBC-TV (Texas). Controlling the equipment required a solution based on serial I/O over RS-232 using the 16550 UART IC.
1997	Produced assembly language to control printer systems for Albert Smith Signs Group, Australia. Required a new design that interfaced with proprietary DOS-based hardware.

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### GENERAL SKILLS:

- Strong communication and team skills; enjoy interdisciplinary environments; experienced world traveller
- Very strong technical writing skills; experience developing documentation, manuals, technical reports
- Expertise in network communication hardware and security, including TCP, IP, Ethernet, wireless, routers
- Experience debugging communications signals including wireless: radio frequency modulation, packets
- Experience in control systems theory and design; have implemented finite state machines and feedback

### HARDWARE SKILLS:

- Experience with: electronics circuits, simple PCB design, reading/creating schematics, digital control circuits, filtering, optical isolation, sensors, analogue/digital conversion, CMOS/TTL-LS, computer interfacing
- Experience reviewing electronics parts specifications and selecting components for designs
- 8 years experience with electronics lab equipment (oscilloscopes, interfacing/data acquisition, RF antennas)
- 10+ years experience programming microprocessors, 3 years with low-power embedded systems (smart cards)
- 2 years experience VHDL design, Xilinx FPGA and Altera CPLD, other microcontrollers (eg. Microchip PIC)
- Programmable logic design for Altera CPLD (MAX 7000 family) using Altera MAX+PLUS II
- FPGA development using Xilinx ISE environment and Coregen IP; prototyping with Xilinx Spartan-II FPGA
- Experience using Mentor Graphics ModelSim for FPGA simulation and verification, timing analysis
- 3 years experience in hardware design for security, including crypto implementation, side-channel attacks
- Extensive knowledge of PC architecture: power supply, BIOS, memory, internal buses, IDE and SATA, USB

### SOFTWARE SKILLS:

- 10+ years experience with Intel x86 assembly language, IA-32. Expertise designing and writing asm code.
- Experience using engineering software: MATLAB, Maple, AutoCAD, Cadence OrCAD (Pspice)
- Expertise in many platforms and programming language, especially Linux, DOS, C and Intel x86 assembler
- Experience in Motorola 6800/68000 assembly, C++, Java, Unix shell script, BASIC, and embedded coding
- Expertise with scripting and automation tools: batch files, Unix shell script, Perl
- Experience with parallel programming algorithms and implementation, Open MPI
- Advanced knowledge of software and network tools: SSH, VMWare, Wireshark (Ethereal), other Unix tools
- Knowledge of computer video hardware, frame buffers, graphics technologies and display standards
- Knowledge of audio systems: power amplifiers, channel mixing, filtering, digitization (sound cards)
- Knowledge of audio and video compression (e.g. MPEG) and digital formats, storage and playback

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### **RESEARCH / DESIGN PROJECTS:**

#### **Masters Project, Electrical and Computer Engineering, University of Waterloo (2005 – 2008)**

The research and practical experiments were carried out in an RF electronics laboratory. Power and electromagnetic signals from security hardware (smart cards, RFID, wireless embedded systems) were captured and analysed. I automated testing procedures using PC-controlled signal acquisition and custom firmware code. After investigating design issues for low-power hardware, I designed a novel practical signal analysis technique that can be used for low-power microprocessors communicating by radio.

#### **Bachelors Design Project, Electrical and Computer Engineering, University of Manitoba (2003 – 2004)**

Our team of students designed and built a fully functioning Voice over IP (VoIP telephone) system, consisting of independently designed components. I designed and built the hardware component, which used analog audio circuits and digital controls interfaced to POTS (telephone system) through optical isolation, for lightning protection. I also designed a custom PCB and built a properly functioning final prototype.

### **AWARDS AND RESEARCH GRANTS:**

- NSERC Julie Payette scholarship winner, one of 6 “best PGS M candidates” in Engineering, all of Canada
- NSERC André Hamer prize winner, awarded to “most outstanding students” in NSERC graduate competition
- University Gold Medal in Engineering and Medal in Computer Engineering, University of Manitoba (2005)
- Canada Millennium Scholarship, Provincial Excellence Award (2000 through 2004)
- NSERC University Undergraduate Research Award (2003)
- Finalist in 2001, 2002 UM/Management’s Student Entrepreneur of the Year Competition

### **PROFESSIONAL ACTIVITIES, VOLUNTEER WORK:**

- Member of IEEE professional association for 8 years (*ongoing*)
- Volunteer at Canada Millennium Scholarship Foundation, reviewing scholarship applications, 2006-2007
- Volunteer at Manitoba Cycling Association and civic Recreation & Transport committee, 2003-2005
- Member of University of Manitoba Engineering Society (student council) and IEEE representative, 2001-2004
- Volunteer at Winnipeg Fringe Theatre Festival, 2003-2004