

Andreas B. Wagner

US, EU, and Swiss citizenships

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<http://hub.darcs.net/pointfree/>

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Education

Wentworth Institute of Technology

Bachelor of Science in Computer Science

Boston, MA

Graduated 2014

Skills

Languages C, C++, Forth, Bourne Shell (bash), Z-Shell (zsh), fish (shell), R, x86 GAS assembly, x86 NASM, x86 FASM assembly, ARM assembly, AVR assembly, \LaTeX , Sed, Awk, Javascript, Erlang, Haskell, Common Lisp, Scheme Lisp, HTML, Go, CSS, PHP.

Operating Systems Arch Linux, Plan 9, Debian Linux, FreeBSD, OpenBSD, Mac OS X, Microsoft Windows.

Software UrJTAG, GTK, Qt, GDB, Valgrind, bloom/bud, Vim and Unix-like/Plan 9 tools, radare2, darcs, git, mercurial.

Tools Xilinx FPGA's, Logic Analyzers, Bus Pirate and the various serial protocols it supports.

Embedded Software Writes device drivers and software for embedded systems, typically with the aim of doing as much as possible with as little as possible.

Operating System Development Research operating system design, capability systems in particular.

Network Coding Digital and Analog Network Coding combines multiple messages for transmitting and receiving over the same channel without time-division. Digital network coding may XOR the packets together while analog network coding would allow the messages to interfere in the channel. With analog network coding the user would subtract one's own message from the combined interfered message to extract the other node's message.

Named Data Networking Data-centric networking uses content, rather than location as the shared piece for locating and routing content.

darcs/camp patch theory darcs patch theory is focused on changes rather than chronology and makes it possible for users of distributed version control to commute patches for a more spontaneous workflow. Adapting ctre, an alternative to the Operational Transformation Theory of Google Docs, to a Distributed Version Control System (DVCS), named skyr, such that darcs-like flexibility can be achieved with regular language alone and thus low computational complexity.

Threaded Interpretive Languages Implementation techniques for threaded interpretive languages such as Forth, making it possible to fit an interactive system in very small spaces. Some other work is on bootstrap metacompiling threaded code to an FPGA without the closed-source Xilinx toolchain. Threaded Interpretive Languages mix compilation and interpretation state. Compiling words on an FPGA Forth can compile by reconfiguring the FPGA through dynamic partial reconfiguration: compile to LUTs, that is, truth tables. Forth word headers could also be extended to be a capability for security and memory protection over a single address space.

Work Experience

Analog Devices Inc.

IS Intern

Norwood, MA

Spring 2013, Fall 2013

Created a searchable Javascript map of the Analog Devices facilities and improved Javascript library dependencies for upstream. Created graphs and visuals for monitoring of computing resources.

Wentworth Institute of Technology

Teaching Assistant

Boston, MA

Fall 2011, Fall 2012

Tutored students of programming and computer science at the Computer Science Facilitated Study Group (FSG).

Harvard Medical School

Software Development Internship

Boston, MA

Summer 2011

Designed and created a Graphical User Interface for the Poisson gap sampling schedule generator for Nuclear Magnetic Resonance (NMR) spectrometers. This involved usability, flexibility and forwards-compatibility considerations. GTK3 with C was utilized to write this software.

S.G. Hyberts, A.G. Milbradt, A.B. Wagner, H. Arthanari, G. Wagner: Application of iterative soft thresholding for fast reconstruction of NMR data non-uniformly sampled with multidimensional Poisson Gap scheduling. *J. Biomol. NMR*, 52, 315-27 (2012).

Projects

OceanForth Developing a Real-Time Operating System (RTOS) for the Cypress PSoC 5LP mixed signal ARM SoC for which I will adapt my existing Software Defined Radio (SDR) code to make use of the reconfigurable analog features.

FlyingSquirrelOS Designing and currently developing a novel operating system, FlyingSquirrelOS, written in C. FlyingSquirrelOS is a distributed operating system with a transparently persistent store and capability-based addressing. The OS currently includes VGA graphics and a mouse driver which will be turned into GUI utilizing Voronoi partitioning for non-rectangular layout. Voronoi partitioning has the property of being stable in the presence of change. <http://www.flyingsquirrel.org/>

stringology A collection of string algorithms in C.

mecrisp-stellaris mk20dx256 Mark Schweizer and Matthias Koch passed maintainership of the Teensy 3.1 (mk20dx256) port of the mecrisp-stellaris system to me. Since then I have developed Digital-to-Analog (DAC), Analog-to-Digital (ADC) drivers and code for Software Defined Radio (SDR). A full USB driver is nearing release.

teensy-anc Analog Network-Coding (ANC) for the ARM Cortex-M4 based Teensy 3.1 microcontroller. Implemented Minimum Shift Keying (MSK) for modulation/demodulation using simple numbers only (no complex I/Q) in order for it to work on devices with only one DAC (Teensy 3.1) or if I would like to use the full width of the DAC or combine several smaller DACs (on the PSoC). MSK was chosen because it has properties useful for ANC such as constant amplitude.

cranberrynet Designed, built, and wrote software for a wireless remote sensing network for collecting water level and atmospheric temperature readings simultaneously across hundreds of wild cranberry bogs on Cape Cod. The mesh network uses NRF24L01+ radios to relay sensor readings through other nodes to a GPRS hub for access over the cell phone network. The system can be interactively updated and queried remotely or, for low power, it can sleep and wake-up only when taking readings, then transmit only when the MicroSD card cache is full to reduce overhead from the packet structure. The total cost of the system adds up to about \$2000, considerably less than remote sensing networks built with XBee radios.

amforth-cc11x Wrote the amforth driver for the CC1101 radio transceiver from Texas Instruments.

amforth-ad9851 Wrote the amforth driver for the AD9851 Direct Digital Synthesis signal generator.

NDN-Implicit A network protocol for taking advantage of substrings that are identical between different files or superstrings but are different from the target file for the purpose of improving data availability. I use a tree data structure built using Named-Data Networking (CCNx) names for paths. The unique substrings of the files are at the leaves, a string shared by some unique substrings would be the parent (least common subsumer). The downloader traverses from a leaf to the root unambiguously while removing previously matched leaves for the next match. Hence the file is implied by the unique substring while taking advantage of shared substrings in files different from the target to improve availability.

Assorted widgets Wrote a battery monitor, RSS feed notifier, Arch Linux package update notifier, volume meter, reddit notifiers and code to change the cursor color based on the current vi mode of the zsh shell.

latex-boustrophedon Wrote and continues to maintain a package for typesetting text with a boustrophedonic writing direction – text that flows “like an ox turns in a field” (seen in Safaic, Sabean and some ancient Greek writing) as well as reverse-boustrophedonic text in which every other line is rotated 180° as seen in the Rongorongo texts of Rapanui/Easter Island. This is used by people for improving their reading speed and reducing interruptions as well as those who are simply interested in formatting ancient writing such as Linear B.

latex-hiveplot Wrote a LaTeX package for generating the radial network visualizations known as ‘hiveplots.’ For clarity these visualizations show only the topology of a network, not their geometry.

Arch Linux packages Maintains about two hundred packages for the Arch Linux distribution.