Tony Bruguier

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Education

California Institute of Technology (Caltech)

PhD, Electrical Engineering (Sept 2004 - Oct 2007)
Thesis: *Encoding of Financial Signals in the Human Brain*
Advisor: Peter Bossaerts
Web: http://www.bruguier.com/thesis.html

Master of Science in electrical engineering (Sept. 2003 - Jun 2004)
Graduated with 4.0 GPA

Ecole Supérieure d'Ingénieurs en Electronique et Electrotechnique

Diplome d'Ingenieur, major in signal processing (Sept. 1999 – Jun 2003)
Graduated valedictorian

Professional Experience

Brion Technologies (computational lithography) (Nov 2007 – present)

- Created a Lua-scriptable EDA tool (Electronic design automation) for $100k mask creation
  - Designed the software architecture from the ground up and implemented it in C++.
  - Lowered design turn-around time from several months to 2 days
- Maintenance, improvements, and bug fixes of the multi-threaded C++ code running on a cluster
- Creating of symmetry-aware bilinear form tuning algorithm
  - A lithography scanner can be modeled with Fourier Optics. The model can be diagonalized into a bilinear operator called a TCC (Transmission cross coefficient)
  - US Patent under review
- Creation of a gauge selection algorithm
  - The calibration of a model requires the measurement of some input gauges, but the metrology burden imposes a limit on the numbers of gauges our customers can measure.
  - Two US patents under review
- Created and implemented new model for resist process
  - Estimation of fitting and prediction power, overfitting mitigation, and stability enhancement
  - I designed and wrote the entire C++ code for the model fitting, and the code for the use of the model on a full-sized chip using C++, and FFTW on a distributed system, and communication with an FPGA system
  - US Patent application number 20100128969
- Languages used: C++ and Lua (main), Perl (occasional)

Philips Medical Systems (automatic medical diagnostic) (summers 2002, 2003, and 2004)

- Improved on automated EKG interpretation algorithms for cardiographs
- Created proprietary algorithm for measurement of QRS-T loops using vectorcardiography
- Measured effect of in-house lead transformation algorithms on diagnostic performance
- Wrote denoising and onset/offset detection algorithms using wavelets
- Wrote optical waveform recognition algorithms
- Wrote EKG marking program for the rest of the team
- Languages used: C++, C#, Basic, MATLAB, Unix scripts

OSC Solutions (Employee 1 at startup) (summer 2001)

- Setup startup company's IT infrastructure (Setup LAN, Source Control Server)
- Used Java/WebObjects to create prototype for Enterprise Resource Planning program
- Finalized customer management and production logistic sections
- Languages used: Java, SQL, Unix scripts

LSV Communication (Internet startup) (summer 1999)

- Programmed a shopping cart for a real-estate advertisement website
- Developed a mailing-list database allowing customers to receive weekly and personalized updates
- Languages used: 4D (proprietary), JavaScript

More: http://www.bruguier.com/professional.html

Other skills

Scientific skills

- Extensive knowledge of modern signal processing
  - Fourier transform
  - Information theory
  - wavelets
- Scientific Programming
  - Dynamic programming
  - graph theory
  - probability models
- Mathematical modeling
  - Optimization, numerical analysis
  - Descriptive & inferential statistics
  - Numerical optimization
  - Data analysis, regression
  - Linear algebra
  - Random processes

Foreign Languages

- French (fluent)
- Spanish (basic)
- Mandarin (beginner)

More: http://www.bruguier.com/other.html

Other interests

Self-taught programming languages:

- C (Middle school)
- C++ (High school)
- Basics of TCP/IP and HTTP (High school)
- PPC assembly (College)
- PHP and MySQL, LAMP stack (College)
- Java and Objective C (College)

Also self-taught basics of number theory and cryptography (College)

Currently:

- taking or auditing online classes in applied mathematics (Stanford and MIT)
- learning Mandarin Chinese (various city colleges)

More: http://www.bruguier.com/interests.html

Research and publications

Several peer-reviewed articles, patent applications, and other publications

See: http://www.bruguier.com/research.html

References

See: http://www.bruguier.com/references.html