

# CLEMENT FARABET

RESEARCH SCIENTIST — NEW YORK UNIVERSITY  $\cap$  YALE UNIVERSITY

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## Education

*Presently*      **Université Paris Est**      *PhD Student*  
**ESIEE Paris, France**

Advised by Profs Yann LeCun, Michel Couprie and Laurent Najman, this thesis work aims at extending/formalizing my current work at NYU/Yale.

*2002 - 2008*      **Institut National des Sciences Appliquées**      *M.Eng., Electrical Engineering*  
**INSA, Lyon, France**      *(With Honors)*

Final year's major in Image and Signal Processing.

Relevant courses: Computer Science, Control Theory, Electronics, Telecommunication, Mathematics (probability theory, optimization) and Physics.

## Experience

*Presently*      **New York University :: Courant Institute**      *Research Scientist*  
**Yale University :: Eng. School, NY, USA**

Development of a custom Stream/Dataflow Processor for complex/generic vision tasks. Joint project with Yale's *e<sup>-</sup>Lab* (Prof. Eugenio Culurciello) and New York University (Prof. Yann LeCun).

Our Stream/Dataflow Processor's—ambitious—purpose is to implement any kind of generic biologically inspired recognition/detection/classification task with a minimum power consumption. The streaming nature of the architecture makes it well suited to process large video streams in real-time, and totally autonomously... all that in a single chip!

*2008-2009*      **New York University**      *Junior Research Scientist*  
**Courant Institute, NY, USA**

My Final Year's Thesis: a project that focused on hard-wired neural networks for autonomous robots. Advised by Prof. Yann LeCun (from the Computational and Biological Learning Lab, NYU).

Design and implementation of an FPGA-based vector processor. The instruction set of this processor is the set of layers of a typical convolutional neural network.

Design of a Lisp compiler to parse very high-level code (Lisp-like) and generate sequences of instructions adapted to the convolutional network processor.

*2006 - 2007*      **University of New South Wales at the**      *Junior Research Scientist*  
**Australian Defence Force Academy, Australia**      *One year*

Development of a miniaturized FPGA based system to analyze video streams from a camera. This system was designed to be embedded in an unmanned helicopter (UAV) to provide the main computer with visual guidance.

Design of the whole system: analog and digital circuits, lens adjustment; design of the logic inside the FPGA: communication, human interface, tools to analyze the image and auto-adapt gain and exposure settings, tool to auto-calibrate the lens for mapping pixels to angles,...

*2005 - 2008*      **Academia, France**      *Teacher*

Giving private lessons to students in mathematics and physics.

## Articles

- Conference Proc.* **C. Farabet, B. Martini, P. Akselrod, S. Talay, Y. LeCun and E. Culurciello**, “Hardware Accelerated Convolutional Neural Networks for Synthetic Vision Systems”, in *International Symposium on Circuits and Systems (ISCAS’10)*, IEEE, Paris, 2010.
- Y. LeCun, K. Kavukcuoglu and C. Farabet**, “Convolutional Networks and Applications in Vision”, in *International Symposium on Circuits and Systems (ISCAS’10)*, IEEE, Paris, 2010.
- C. Farabet, C. Poulet and Y. LeCun**, “An FPGA-Based Stream Processor for Embedded Real-Time Vision with Convolutional Networks”, in *Proc. of the Fifth IEEE Workshop on Embedded Computer Vision (ECV’09 @ ICCV’09)*, IEEE, Kyoto, 2009.
- C. Farabet, C. Poulet, J. Y. Han and Y. LeCun**, “CNP: An FPGA-based Processor for Convolutional Networks”, in *International Conference on Field Programmable Logic and Applications (FPL’09)*, IEEE, Prague, 2009.
- M. Garratt, H. Pota, A. Lambert, S. E.-Maslin and C. Farabet**, “Visual Tracking and LIDAR Relative Positioning for Automated Launch and Recovery of an Unmanned Rotorcraft from Ships at Sea”, in *ASNE Conference on Launch and Recovery of Manned and Unmanned Vehicles From Surface Platforms*, American Society of Engineers, Annapolis, 2008.
- Journal Papers* **M. Garratt, H. Pota, A. Lambert, S. E.-Maslin and C. Farabet**, “Visual Tracking and LIDAR Relative Positioning for Automated Launch and Recovery of an Unmanned Rotorcraft from Ships at Sea”, in *Naval Engineers Journal*, vol 121, no. 2, pp. 99-110, June 2009.
- Workshops/Talks* **C. Farabet, P. Akselrod, B. Martini, K. Kavukcuoglu, B. Corda, S. Talay, E. Culurciello and Y. LeCun**, “A Dataflow Processor for General Purpose Vision”, presented at *Neural Information Processing Systems (NIPS10)*, Vancouver, 2010.
- B. Corda, C. Farabet, M. Scoffier and Y. LeCun**, “Building Heterogeneous Platforms for End-to-end Online Learning Based on Dataflow Computing Design”, in *Workshop on Learning on Cores, Clusters and Clouds (LCCC @ NIPS10)*, Whistler CA, 2010.
- B. Corda, C. Farabet and Y. LeCun**, “A Study of Parallel Computing for Machine Learning: Which Platform for Which Application”, presented at the *4th Annual Machine Learning Symposium at the New York Academy of Sciences*, New York, 2010.
- C. Farabet**, “NeuFlow: a Vision Processor for Real-Time Object Categorization in Megapixel Videos”, presented at *AIPR Workshop*, Washington DC, 2010.
- C. Farabet**, “NeuFlow: a Dataflow Computer for General Purpose Vision”, presented at *e-labs Seminar Series*, Yale University, 2010.
- C. Farabet, B. Martini, P. Akselrod, S. Talay, Y. LeCun and E. Culurciello**, “Bio-Inspired Processing for Ultra-Fast Object Categorization”, in *High Performance Embedded Computing (HPEC10)*, MIT Lincoln Laboratory, Lexington, 2010.
- C. Farabet, C. Poulet, J. Y. Han, and Y. LeCun**, “An FPGA-based Processor for Convolutional Networks”, in *Snowbird Learning Workshop*, Clearwater FL, 2009.
- C. Farabet**, “Hardware Implementation of a Convolutional Neural Network – Design of a Neural Processor”, Masters thesis, *INSA Lyon – New York University*, 2008.
- C. Farabet, I. Ghizdavescu, S. Autin and C Revesz**, “Cartography of a Wall in a Coke Oven by Reconstruction of a Panoramic Picture”, *INSA Lyon*, 2008.
- C. Farabet**, “Implementation of a Tracking System within a FPGA”, *University of New South Wales at ADFA*, 2007.

## **Skills**

*Languages* French (native), English (fluent), Chinese (basics).

*CS Knowledge* **Languages** (*in order of preference ;-)*: Lua, Lisp, C, Verilog, Python, Java, C++, VHDL, UNIX Bash/Shell, Assembly, PHP/Javascript/HTML.

## **References**

*From NYU* Pr Yann LeCun, contact: [yann@cs.nyu.edu](mailto:yann@cs.nyu.edu)

*From YALE* Pr Eugenio Culurciello, contact: [eugenio.culurciello@yale.edu](mailto:eugenio.culurciello@yale.edu)

*From UNSW* Dr Matthew Garratt, contact: [m.garratt@adfa.edu.au](mailto:m.garratt@adfa.edu.au)  
Dr Andrew Lambert, contact: [a.lambert@adfa.edu.au](mailto:a.lambert@adfa.edu.au)

*From INSA* Pr Tanneguy Redarce, contact: [tanneguy.redarce@insa-lyon.fr](mailto:tanneguy.redarce@insa-lyon.fr)