Nicolas Bigaouette, Ph.D.

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Curriculum Vitae

Profile

I am a Computational Physicist, passionate about putting *advanced scientific ideas in production*. While the *what* and *why* drives my scientific curiosity, it's the *how* that makes me stand out. Polyglot and versatile, I have explored fascinating fields from physics simulations to embedded medical devices and artificial intelligence in cybersecurity. My career goal is to continue to sharpen my skills by surrounding myself with creative people of diverse backgrounds.

Professional Experiences

2020 – Today **Senior Rust Software Developer - ML SwE (Data Science)**, *CrowdStrike*, Montreal.

Part of super-star dev team writing *feature extraction* (FX) engines **in Rust** for "on sensor"

- *New* Linux executable (ELF) structural parser and FX engine
  - **5,000x** faster, **10,000x** less memory FX
  - **Improved** model: better detection/generalization
- *New* PDF structural parser and FX engine
  - New visibility over **previously undetected** threats
  - Javascript threats extraction, boosting security research

2017 – Today **Applied Research Scientist - Cyber-Security AI group**, *Element AI*, Montreal.

- Proud member of ElementAI's first released product team:
  - Access Governor (AG): Identity and Access Management (IAM) AI solution
  - Researched new AI method for AG, **100x faster** than state-of-the-art
- Fast time-to-market AI product:
  - *Leading research's development* efforts (**Python**)
  - *Leading dev.* of secure, critical, on-prem agent (**Rust**)
  - *Backend dev.* team (**Python**, **FastAPI**, **Docker**)

2015 – 2017 **Biomedical Embedded Software Developer, R&D**, *Rogue Research, Inc.*, Montreal.

- Design and implement full software stack for a new medical device named *cTMS*:
  - **QML**/C++ for *fast* & *fluid* UI using **Material Design**;
  - Brisk **5 seconds** boot time (**Yocto** for *max. flexibility*)
- Integration of **git** workflow in existing subversion (svn) infrastructure:
  - Deep knowledge of git allowed *solid integration*;
  - Increased whole *team productivity* and *confidence*.
- Took ownership of the **Testing Framework** in **Python**:
  - Exposed C++ code to Python for *reuse* and *validation*;
  - Increased *quality* and *number* of validation tests.

2014 – 2015 **Research Scientist – Software Developer**, *Chemical Computing Group*, Montreal.

- Architected a **Unit Test framework** for main product's language (SVL);
- Est. **version control** best practices (**git**):
  - Accelerated *tenfold* previous documentation workflow;
- High order spline interpolator implementation in **C** (C89, C99) generalized to N-dimensional grids:
  - Increased smoothness by *one order* over previous version;
  - *Speed and accuracy* increase in many submodules due to *reduction in required grid points*;

2012 – 2014 **Physicist, Research and Development**, *Rheolution, Inc.*, Montreal.

- Development of physical and numerical models for viscoelastic analysis;
- **C++11 library** for instrument control:
  - Allowed *automatic* calibration, data acquisition, analysis;

2007 – 2013 **Ph.D. research**, *University of Ottawa*, Ottawa.

- Full development of C++98 **parallel algorithms** (**OpenCL**, **GPU**, **MPI** & **OpenMP**):
  - Molecular Dynamics (MD)
  - BH Tree: $O\left(N^2\right)$ to $O\left(N \log N\right)$
  - Finite-Difference Time-Domain (FDTD)
  - Particle-in-Cell (PIC)
- 75 and 16 nodes GPU Beowulf cluster Administrator (1680 cores, 3.2 TB RAM, 20 Nvidia Tesla M2075)

Education

2008 – 2013 **Ph.D. in Physics**, *University of Ottawa*, Ottawa, ON, (Prof. Lora Ramunno).

Computational investigation of intense short-wavelength laser interaction with rare gas clusters
http://hdl.handle.net/10393/30511