Jason M Larkin, MS, PhD, Consultant

jasonlarkin84@gmail.com ● http://jasonlarkin.org

CAREER OVERVIEW

I learn quickly and seek complex problems. I have extensive experience in **research and development** in diverse fields, collaborating in multi-disciplinary teams globally, delivering my research in **publications and presentations**.

EXPERIENCE

SpiralGen, Inc. (2013 - Present) *Senior Research Engineer*

- **PROJECTS**

  Supported work of major commercial and research projects featuring the code-generation engine **Spiral**.

  - **High-Assurance Cyber Military Systems (HACMS, DARPA)**

    * Automatically-optimized / formally-verified kernels for **Cyber-Physical Systems** using Spiral.
    * Spiral plug-in for OSATE and the **Architecture Analysis & Design Language (AADL)**.
    * **DARPA Demo Days** ground/air vehicles, virtual/physical environments.
    * **Large**/**diverse** collaboration team interacting with O(1000K) Lines of Code (LOC).

  - **SpiralFFT for National Center for Supercomputing (NCSA) Blue Waters**

    * Improve petascale performance of **Hybrid MPI** / **OpenMP** FFT and Stencils using Spiral.
    * **Pseudo Spectral Methods** for modeling turbulence and the **NEURON** simulation environment.

  - **SpiralGen DevOps and Cloud Infrastructure**

    * **"Full-stack"** software development for high-performance, embedded, and cloud computing).
    * **Agile** solutions in a **Continuous Integration** using **Software Configuration Management** (SCM).
    * **WebIDE** interface using **Virtual Machines** (VMs) containers on **Amazon Web Services** (AWS).
    * Integration: Matlab/Simulink/Mex, Python/Cython, ROS, Webots, KeyMaeraX, Mathematica.

  - **Power Efficiency Revolution for Embedded Computing Technologies (PERFECT, DARPA)**

    * Eclipse RCP **first commerical release** of SpiralFFT.

  - **Building Resource Adaptive Sotware Systems (BRASS, DARPA)**

    * Test harness for Spiral-generated resource adaptive FFT for Synthetic Apeture Radar.

- **FUNDING AND RESOURCE PROPOSALS**

  - **DTRA 172-003 Small Business Innovation Research (SBIR)** (PI Phase 1, in progress).
  - **DOD 172-008 SBIR** (co-wrote Phase 1, in progress).
  - **DOE SG-13808 SBIR** (co-wrote, Phase 1 awarded, Phase 2 submitted).
  - **DOD A15-102 SBIR** (PI, Phase 1 submitted).
  - **NSF NCSA Blue Waters PAID IME Submission** (Co-PI, in progress).
  - **Spiral on Pittsburgh Supercomputing Bridges** (PI, submitted).
  - **Optimization of 3-D FFTs for Intel Xeon Phi and NVIDIA Kepler K20 GPUs using Spiral** (PI, awarded).

General Intelligence (2013 - present) *Founder, Senior Consultant*

- **PROJECTS**

  - Research and Collaboration

    * **Advised on 6 projects (4 leading to publication)**: K.D. Parrish, S.C. Huberman, A. Jain, S. Stefanus, N. Samaraweera, S. Swanson
    * **disorder:** comprehensive repository of open-source code and data from PhD thesis.
    * **Research Analytics**: Natural Language Processing, IBM Watson Discovery.

  - Optimizing Environment, Physical Fitness and Nutrition for Software Development

    * Human Computer Interface, Optimized Nutrition/Cost, Physical Fitness and Ergonomics.

  - Agricultural Engineering

    * Industrial Scale, Energy Optimization, Genetics.

  - Music Production and Studio

    * Virtual and Digital Audio Workstation, Theory, Performance.

  - Data Acquistion and Signals Processing Engine

    * Biological Signals processing, Event-based Pub/Sub model, Automated code generation and documentation.

Carnegie Mellon University (2010-2012) ***TA-Heat Transfer: lectured on conduction, convection, radiation.***
University of Pittsburgh (2008) ***TA-Fluid Mechanics: viscous, boundary, scale similarity, dimensional analysis.***
University of Pittsburgh (2007-2009) ***Lecturer-Physics: mathematics, turbulence, statistics and nonlinearity.***
Precision Therapeutics (2006-2007) ***Intern-Technology Development: optical microscope automation design.***

EDUCATION

– **Carnegie Mellon University** Pittsburgh, PA PhD Mechanical Engineering, 2013 GPA: 3.9/4.0

 * **Thesis**: Vibrational Mode Properties of Disordered Solids from High-Performance Atomistic Simulations.
 * **Nanostructure Thermal Conductivity:** investigator for AFOSR on the DOD's HPCMP.
 * **GULP: international** collaboration with Julian Gale at the Nanochemistry Research Institute at Curtin University.

– **University of Pittsburgh** Pittsburgh, PA MS Mechanical Engineering, 2009 GPA: 3.7/4.0

 * **Thesis**: Statistics of Particle Concentrations in Free-Surface Turbulence.
 * **Statistics of Free-Surface Turbulence: international** collaboration with Alain Pumir and Mahesh M. Bandi.

– **University of Pittsburgh** Pittsburgh, PA BS Mechanical Engineering, 2007 GPA: 3.2/4.0

 * **Research**: FEM design of model arterial bifurcation.

– **Steel Center AVTS** Jefferson Hills, PA CADD Certification, 2002 GPA: 3.80/4.00

SKILLS (DESCENDING ORDER, MINIMUM 40 HOURS)

– **Publication and Public Speaking**: Journal Publication (11), Book Chapter (2), Conference Presentation (18).
– **Condensed Matter Physics**: quantum physics (chemistry, statistical, field), solid-state physics (molecular dynamics , nanoscale transport, statistical mechanics). **Complex Systems**: chaos and nonlinear systems (turbulence, many-body systems), complexity and information, genetics (sequencing, Markov models). **Engineering**: fluids (turbulence, biological), continuum mechanics (solid mechanics, kinematics, elasticity), biological fluid dynamics (arterial flow, viscoelasticty), CAD AutoCAD Inventor. **Robotics** (motion planning, navigation control). **Machine Learning**: classification, natural language processing, neural networks. **Signals Processing**: (PID controller, Kalman filter, Numerical integration, sensor fusion, anomaly detection). **Coursework (50)**: statistics · optimization · numerical methods · molecular/electron structure · nanoscale transport.
– **Full-Stack Software Engineering**:

 * **Languages (Lines of Code):** Matlab (20000), Python (10000), Perl (1000), JavaScript (4500), Java (1000), C++/C (4500), Fortran (1000). **Misc**: LaTeX, Markdown, HTML, XML, JSON, CSS
 * **Software Configuration Management**: svn, git, GitHub, Jenkins, JIRA.
 Compilers/Compilation: GNU, Intel, Visual Studio, MinGW, Cray, Cython, Mex, Ant, make, cmake, catkin_make, MSBuild, Maven.
 Integrated Environments: Visual Studio, Eclipse/Che, Matlab/Simulink, ROS, OSATE/AADL.
 Cloud Computing: Amazon Web Service (AWS), Docker, VirtualBox/VMWare, nodejs, nginx, mongodb, Operating Systems: Ubuntu, Red Hat, CentOS, CoreOS, OSX, Windows (XP, 7, 8, Server).
 Documentation: Doxygen, JSDoc, lex/flex.
 * **High-Performance Computing:** Linux cluster administration/computing, MPI / OpenMP, Vector Intrinsics (SSE/AVX/etc), CoArray Fortran,

– **Hardware:** optics/lasers, DI/DO AI/AO interfaces, automation, machining, circuitry, robotics control.

PUBLICATIONS (SELECTED, 11 TOTAL)

- "Origin of the Exceptionally Low Thermal Conductivity of Fullerene Derivative PCBM Films", (in progress).
- "Decorrelating a Compressible Turbulent Flow: an Experiment", Physical Review E 82, 016301 (2010).

PRESENTATIONS (SELECTED, 18 TOTAL)

- "SpiralFFT for Blue Waters", **J.M. Larkin (speaker)**, NCSA Symposium for Petascale 2015.
- "Virtual Crystal Approximation", **J.M. Larkin (speaker)**, 2013 MRS Spring Meeting San Francisco, CA.
- "Generalized Fractal Dimensions...Turbulence", **J.M. Larkin (speaker)**, 2008 American Physical Society March Meeting.