

Chris Coughlin



Experience

Software Engineer

DATA SCIENCE, C.H. ROBINSON

EDEN PRAIRIE, MN

APRIL 2017-PRESENT

Provide data science solutions and support for the Financials department including research and development of new models and techniques to address business needs and consultative evaluation of outside vendor capabilities. Provide Python and streaming data development services for the North American Surface Transportation data science team.

- *Technologies:* Python, Docker, Elasticsearch, Java, Kafka Streams
- *Sample Projects:*
 - **Image Classification** – deep learning solution capable of identifying shipping documents from scanned images. In production, the model typically examines more than 30,000 images a day and is more than 80% accurate.
 - **Signature Detection** – deep learning solution capable of differentiating signatures from other forms of handwriting and printed text, used to determine whether a consignee has signed for delivery of a shipment. Deployed but not yet in production.
 - **Automatic Document Indexing** – a graph-based algorithm for automatically extracting fields such as invoice amount and payee from OCR data without training a model. Currently in development.
 - **Freight Forecasting** – implemented the streaming data solution based on Spark Streaming and Kafka. Proof of concept.
 - **Streaming Data Pipeline** – Kafka Streams solution for marrying loads and offers Kafka topics into a single topic for real-time identification of business opportunities. Proof of concept.

Founder

EMPHYSIC

PLYMOUTH, MN

AUGUST 2015-PRESENT

Provide data engineering, data science, applied physics services.

- *Technologies:* Java, Akka, Mahout, Jenkins, Maven
- *Sample Project:*
 - **Myriad Data Reduction Framework** – NASA-funded effort to develop a machine learning model and corresponding Big Data streaming framework for automatically detecting structural damage in aircraft. Spring 2017 AI Grant finalist; application video available at https://youtu.be/eNno2Qa_kd8.

Presentation available from <https://www.slideshare.net/ChrisCoughlin9/application-of-the-actor-model-to-large-scale-nde-data-analysis> .

Data Analytics Engineer

CONTATA SOLUTIONS

MINNEAPOLIS MN

APRIL 2015-FEBRUARY 2016

Design and implement analytics, data pipeline and NoSQL data warehousing solutions for commercial applications.

- *Technologies:* Java, Python, Elasticsearch, Cassandra, Spark, Akka
- *Sample Projects:*
 - **Streaming Data Architecture** – design for a streaming data system based on Akka and AWS SQS. Replaced a multi-node Apache Storm system with a single node.
 - **Anomaly Detection in Customer Loyalty Data** – proof of concept for finding anomalies in customer rewards card program data with clustering and outlier detection.
 - **NoSQL Data Lake** – design for a data lake for aggregating customer data from multiple sources and schema into a single data store.

Computational Physics Programmer

COMPUTATIONAL PHYSICS, CANADIAN NUCLEAR LABORATORIES

DEEP RIVER ON

SEPTEMBER 2013-APRIL 2015

Technical and high-performance computing support.

- *Technologies:* Java, Python, C++
- *Sample Projects:*
 - **WIMS Post Processor** – extensible application for automatic analysis of nuclear reactor simulation data. Extracts information from structured and unstructured data to perform calculations used to determine long-term economic viability of reactor designs.
 - **Pipeline Processing Library** – developed a library to concurrently process “point cloud” data in computer vision. Used to construct three-dimensional surroundings for autonomous vehicles.

NDE Engineer / Scientist

NONDESTRUCTIVE EVALUATION (NDE), TEXAS RESEARCH INSTITUTE

AUSTIN TX

OCTOBER 1999-SEPTEMBER 2013

Applied physics research and development, software development, project and team management.

- *Technologies:* Python, C, C++
- *Sample Projects:*
 - **Large Area Health Monitoring Processor (LAHMP™)** – a statistical approach to assessing the structural integrity of air vehicles in real time during flight, used to predict future health and

recommend a course of action to mitigate. First successful test flight in 2006 on an F-15/E and the basis of more than \$1 million in revenue for the company.

- **Damage Location** – created an algorithm to determine the source of acoustic events in composite structures based on time series analysis and material properties. Used to calculate the location of damage in air vehicles in real time.

Magnetics Engineer

PIPETRONIX LTD.

TORONTO ON

AUGUST 1998-OCTOBER 1999

Applied magnetics and physics research and development.

- *Technologies:* MATLAB, C
- *Sample Project:*
 - **Modeling of Ambient Magnetic Field** – developed a model of the behavior of the magnetic field around an in-line inspection tool as it moved through the pipeline, used to determine the bias in sensor readings as a function of velocity.

Education

Master of Science (Physics)

QUEEN'S UNIVERSITY

KINGSTON ON

1996-1998

Focus of research: effects of mechanical stress on the magnetic behavior of cracks and pitting in steel pipelines. Completed final months of program concurrently with Magnetics Engineer position at Pipetronix Ltd.

Honours Bachelor of Science (Physics)

LAKEHEAD UNIVERSITY

THUNDER BAY ON

1992-1996

Four-year Honours program in Physics, with additional specialization in Energy and Fuel Science.

Professional Development

Machine Learning Crash Course

Google

<https://developers.google.com/machine-learning/crash-course/>

2018

- Fifteen hour introduction to deep learning and TensorFlow.

Advanced Java Programming Certificate

University of Illinois Office of Continuing Education

Urbana Illinois

2015

- Two 60-hour courses in algorithms and development of distributed network applications.

Client-Side Programming Certificate

University of Illinois Office of Continuing Education

Urbana Illinois

2013

- Three 60-hour courses in client-side development with HTML5, CSS, JavaScript, JSON, and Ajax.

Java Programming Certificate

University of Illinois Office of Continuing Education

Urbana Illinois

2012

- Five 40-hour courses in Java development. Topics covered included Swing, JDBC, and multithreading.

Python Programming Certificate

University of Illinois Office of Continuing Education

Urbana Illinois

2011

- Four 40-hour courses in test-driven Python development. Topics covered included MySQL, multiprocessing/multithreading, and unit testing.

Patents

Distributed Mode System For Real Time Acoustic Emission Monitoring

- U.S. Patent 7,080,555
- Canadian Patent 2,569,143
- Japanese Patent 4,607,960

Recent Publications / Presentations

Application of the Actor Model to Large Scale NDE Data Analysis

- 2018 SPIE Smart Structures and Industry 4.0 Conference, March 5, 2018.

A complete list of publications and presentations is available from <https://chriscoughlin.com/about-chris/publications-and-presentations/>.