Colin K. Curtis - Software and Data Engineer

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Major Achievements

- **Python Engineer** - Translator Green Team @ RENCI (June 2018 - Present) https://ncats.nih.gov/translator
- **Project Manager and Author** - 'Friction: Friend and Foe', book chapter in Surface and Interface Science Vol. 8
- **Author** - Multiple academic publications in the Physics sub-fields of Tribology, Optics, and Polymer Science
- **Developer** - Adaptive Learning Analysis for Images (ALAI)
- **National Meritorious Winner (Team of 3)** - COMAPS MCM, 2011 - Radio Repeater Network Optimization

Work Experience

Software and Data Engineer - Python, Renassaince Computing Institute (RENCI); June 2018 - Present

- Focus on clean, modular code
- NIH National Center for Advancing Translational Sciences (NCATS) Translator project
- Daily collaboration with teams spanning disciplines to answer bio-medical research questions
- Setup, improve, and maintain several web APIs for biomedical data access (BioNames, CTD, Bicluster)
- Scaling of these web APIs through use of concurrent I/O and distribution of tasks across clusters
- Accessing and analyzing large (graph) data sets efficiently is the hallmark at RENCI
- Collaboration with local and remote collaborators to stand-up novel bioinformatic analytical tools
- Utilization of graph database technology to accelerate the pace of discovery in large, biological/medical data sets

Research Assistant, Krim Group; January 2015 - December 2018

- Research focus: data analysis, predictive modeling, functionalized carbon nano-structures, friction, surface effects
- Paid Research Assistant for two major National Science Foundation funded projects: DMREF and QCM
- Utilized software packages and programming environments including LabVIEW, MATLAB, and Python 3
- Central responsibility was collection, analysis, interpretation, and presentation of data
- Optimization and organization of the lab group's time and equipment
- See Research Publications
- Experiments involving gaseous diffusion through functionalized graphene and graphene oxide layers, in vacuum, to study the permeability of, and friction experienced by, nanoscale carbon membranes in the presence of common gases

Research Assistant, Clarke Group; Jan 2013 - July 2014

- Research focus: Polymers, LASER for spectroscopy and photothermal, nanoparticle characterization and synthesis
- Designed and built a melt electro-spinning device for polymers, producing ultra-fine fibers without solvent
- Utilized ANSYS Maxwell mesh-calculation to simulate 3-D electro-magnetic fields
- Used and maintained LabVIEW software systems for instrument control and data collection
- Second Author, *Unconfined, melt edge electrospinning... polymer jets*

Teaching Assistant, Department of Physics, NC State University; August 2012 - May 2014, August 2014 - Dec 2014

- Instructor for introductory physics laboratory sections (PY 205 and PY 208)
- Provided theoretical introduction to the relevant course materials
- Organized and maintained teaching laboratory equipment
- Provided real-time feedback and assistance to students via the Socratic method

Other Coding Projects

code repository at www.github.com/colinkcurtis

Adaptive Learning Analysis for Images (ALAI), A Machine Learning Application

- Reduced costs of image analysis by reducing the user's time-per-image by a factor of 100
- Data fitted using iterative categorization and regression
- Weighting and bias-of-fit automatically calculated according to uncertainties from measurements
- Classification of continuous fitting zones (linear v. exponential) by $Adjusted - R^2$ goodness of fit comparison

- The goal was to determine fractal dimension, saturation roughness, and correlation analysis from Atomic Force Microscope images
- Written in MATLAB, chosen for statistical processing large matrices and linear algebra efficiency

HackerRank Challenges

- Project Euler 220: Heighwey Dragon
- Project Euler 206: Concealed Square
- Project Euler 1: Multiples of 3 and 5

gibber

- Retrieve, filter, and record data for: market listings, account balances, and transaction records
- Retrieve data from remote financial databases via RESTful style API (Bittrex and Gemini exchanges)
- Filter data using Regular Expression methods used to filter and sort to ensure data integrity and usability
- Record data in a format of the user's choosing, including SQL, CSV, or JSON formats

Professional Skills & Interests

Software Engineering Toolkit

- mezos, marathon, docker
- pytest, networkx, obonet
- Graph databases (Neo4J)
- Algorithm design

Languages & Environments

- Python*
- MATLAB, Rust, LaTeX
- Linux, macOS, & Windows
- VMs & Virtual Envs

Coding Interests & Abilities

- Data engineering
- Predictive modeling
- Concurrent I/O
- Parallel Programming

Other Skills & Interests

- Technical writing
- Statistical Mechanics
- Conversational Spanish
- Coding Challenges

Education Milestones

- **M.S. Physics**, North Carolina State University (2014)
- **B.S. Physics, Mathematics Minor**, Appalachian State University (2012)

Research Publications

- First Author, *A Comparative Study of the Nanoscale and Macroscale Attributes... of Nanodiamonds*, Beilstein Journal of Nanotechnology, Sep 2017 (PDF available here: https://www.beilstein-journals.org/bjnano/content/pdf/2190-4286-8-205.pdf)
- Second Author, *Unconfined, melt edge electrospinning from multiple, spontaneous, self-organized polymer jets*, Materials Research Express, 28 Nov 2014 (Vol. 1, Num. 4)
- Third Author, *A Tribological Study of γ-Fe_2O_3 Nanoparticles in Aqueous Suspension*, Tribology Letters, Dec 2018 (66:130)

Personal Interests

- Sci-Fi, History, and Biographies
- Running and Mixed Martial Arts
- Gardening and Cooking