Karl Griffin

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Summary

IRC-funded Chemistry PhD Student researching the development and optimisation of organic memristive devices for neuromorphic / non von Neumann computing. During my PhD I developed a passion for programming. I am self-taught and believe I will flourish when given the opportunity to immerse myself in the world of software. I am particularly interested in Python and SQL for data analysis, machine learning and back-end development. I also have experience in HTML, CSS and Flask for front-end development, as well as using Heroku and AWS for deployment and hosting.

Education

2019 - Present	PhD (Chemistry) at **University College Dublin**	
2013 - 2019	BSc (Chemistry) at **University College Dublin**	(1.1, GPA: 3.95/4.2)
2013	Leaving Certificate at **Abbey Vocational School**	(Points: 565/600)

Research Experience

PhD Research, Supervisor: Prof. Gareth Redmond, UCD Sept 2019 - Present

- Interdisciplinary research spanning the materials chemistry, device physics and engineering fields, involving the preparation of organic nanowires via novel synthetic routes for the development and optimisation of memristive devices for neuromorphic / non von Neumann computing
- During this research I discovered the mechanism of I-V hysteresis in defective organic small-molecule semiconductors

Lab Demonstrator, Tutor and Student Project Supervisor Sept 2019 - Present

- Teaching undergraduate chemistry and engineering laboratories and giving tutorials
- Supervising final year BSc and MSc student research projects (3 BSc, 3 MSc projects)
- Valuable experience collaborating on as well as leading research projects of varying scale and complexity to completion

BSc Research, Supervisor: Prof. Gareth Redmond, UCD Sept 2018 - April 2019

- Thesis: "Organic Nanowires for Memristive Computing: Understanding the Relationship Between Molecular Packing, Electronic Properties and Device Performance"
- During this research I uncovered a relationship between the molecular packing in nanowires of two closely-related derivatives of an organic semiconductor and related this to differences in their conductivities

Academic Conferences

Nanotech Paris May 2022

- Oral presentation titled: "Exploring Memristive Squaraine Microtubes: Programmable Multi-Level Memory Behaviour for Neuromorphic Computing Applications"

MC15 - 15th International Conference on Materials Chemistry July 2021

- Poster presentation titled: "Memristive Squaraine Nanowire Devices for On-The-Fly Machine Learning Applications"

Laboratory and Technical Skills

Single crystal / nanowire preparation	Reprecipitation and self-assembly techniques
Electrochemical / optical characterisation	Cyclic voltammetry, UV-vis / PL spectroscopy
Structural characterisation	Optical microscopy, SEM, AFM, FTIR, p-XRD, XPS
Electrical characterisation	I-V analysis, EIS and equivalent circuit modelling
Data analysis / visualisation	Excel, Kaleidagraph (MacOS), Origin (Windows), Python (via Matplotlib, Seaborn, NumPy, Pandas)

Contribution

Postgraduate Representative – UCD College of Science EDI Committee Jan 2021 - Sept 2022

I served as postgraduate student rep on the UCD College of Science Equality, Diversity and Inclusion committee representing the interests and concerns of the postgraduate population. I implemented and launched several initiatives including a mentor / mentee system between senior and junior PhD students.

Coding

As a self-taught, self-directed programmer balancing coding with PhD commitments, my knowledge of the following technologies is at an entry level with an eager desire and massive potential for advancement:

Programming Languages
Python, SQL, HTML, CSS

Frameworks, Libraries and Packages
Python: Flask, Selenium, BeautifulSoup, Scikit-learn, Matplotlib, Seaborn, NumPy, Pandas
CSS: TailwindCSS, Bootstrap
Version Control: Git / GitHub

Software Projects

Automated Gym Booker (Browser Automation) Demo

During COVID-19, UCD gym implemented a booking system to limit access to students. I created a bot to automate the booking process using Python (specifically Selenium) for browser automation.

Task Master (CRUD Application) App

This is a basic 'Reminders App' built with Flask. It is a CRUD (create-read-update-delete) app and the reminders are stored in a SQLite database using SQLAlchemy. I deployed the app using Heroku.

Premier League Stats (Web Scraping, Data Analysis and Visualisation) More

I scraped a football stats website (FotMob) using BeautifulSoup. I structured the data into a Python dictionary and subsequently a .JSON format. I accrued 26 different stat categories for the 2016/17 - 2021/2022 seasons, for every team that has played in the PL during that period. I used Pandas and Matplotlib for data analysis and visualisation purposes, saving the data to an AWS PostgreSQL database.

Luhn's Algorithm (Object-Oriented Programming) Code

I solved the Luhn algorithm (credit card no. validity check). I instantiated credit cards from a .csv file using a class method, and I then checked the validity of the card numbers using a static method.

Web Development More

I have built and deployed websites using HTML, CSS and Flask. For a list of / link to all, click More.

Achievements and Awards

Terminal Live Europe Regional	1 of 70 students selected from across Europe's top universities to compete in this AI coding competition run by **Citadel** (2022)
Udemy: Python	**Udemy** Certification - "2021 Complete Python Bootcamp: From Zero to Hero in Python" (2021)
Udemy: SQL	**Udemy** Certification "The Complete SQL Bootcamp 2021: Go from Zero to Hero" (2021)
IRC PhD Scholarship	'Government of Ireland Postgraduate Scholarship' from the **Irish Research Council** (2019)
UCD Entrance Scholarship	Awarded by **UCD** as recognition for high achievement in the Leaving Certificate (2013)
Ad Astra Athletics Scholarship	Awarded by **UCD** as recognition for high achievement in the field of athletics (2013)

Additional Information

Professional Athlete	From 2014 - 2017, I was a sponsored athlete representing New Balance on the European and World stage, specialising over 800 metres (best: 1:47.39)
Athletics Coach / Masseuse	I am qualified / certified as both an athletics coach and sports masseuse