# Stephen Charles

## Overview

```
print("Hello World!")
```

I'm a proficient *pythonista* with a background in mathematics, astrophysics and computer science. Particular expertise in managing machine learning pipelines with large data sets involving time series analysis, computer vision and NLP, in addition to interpersonal skills from a range of hospitality roles. Take a look at my Portfolio and GitHub for examples of recent projects.

## Employment

**Feb 2022 – Now** — **Innovative Technologies** – *Manchester - Remote*

Position: ***Machine Learning Engineer***

Stack: `Python, Pytorch, Keras, Tensorflow, Numpy, Pandas, Sklearn, Matplotlib, Seaborn, Git, Bash`

Duties:
- ICU performs accurate age verification to automate associated policy and allow access to age restricted purchases and premises, through an ensemble of various ML algorithms.
- Implemented bespoke methods from cutting edge research in SVM's, CNN's, and Bayesian Linear Regression which allow for statistically robust age verification.
- Designed a system by which spoof detection was achievable through the use of belief propagation and anomaly detection.
- Deployed trained models in resource-constrained environments.
- Worked remotely in an agile, communicative, and self-directed manner as part of a collaborative, interdisciplinary, diverse, and geographically-dispersed team.

**June – Sept 2020** — **Facebook (Meta)** – *London - Remote*

Position: ***Data Scientist, Analytics Intern***

Stack: `Tableau, SQL, Python, Amazon Web Services, Google Cloud Platform`

Duties:
- Performed large-scale data analysis to extract useful business insights.
- Identified the ones which were actionable, suggesting recommendations, and influenced the direction of the business by communicating the results to cross-functional groups.
- Classified leads so that the team could work on the most valuable cases, and suggested improvements in the tools and techniques to help scale the team.
- Created dashboards with Tableau on data obtained via SQL queries.

## Education

**Oct 2021 – 2022** — **Data Science** – *University of Bath*

MSc: *Distinction*, Master of Computer Science

Modules:

***Statistics for Data Science*** - Probability and statistics, with a focus on translating real-world problems into a mathematical framework in data science contexts.

***Machine Learning*** - Covered both supervised and unsupervised machine learning algorithms from Bishop, including how to develop, evaluate and deploy trained models. The second semester involved advanced techniques focused on neural networks with both regression and classification.

***Reinforcement Learning*** - Implemented various agents to solve environments from Sutton & Barto, including Dynamic Programming and Temporal Difference methods.

***Bayesian Machine Learning*** - Implementing approaches such as bayesian inference, importance sampling monte carlo, and confidence interval predictions using `bambi`.

**Oct 2020 – 2021** — **Astronomy and Astrophysics** – *University of Manchester*

MSc: *Distinction*, Master of Physics

Research: Published a program to facilitate the data acquisition and analysis pipeline for TESS automatically, dubbed `firefly` (the best Sci-fi show!), which applies nested sampling (`dynesty`) to find best fit variables (`TransitFit`) between the host star and exoplanet.

**Sept 2016 – 2020** — **Mathematics with Computer Science** – *University of Nottingham*

MMath: *Upper Second-Class Honours*, Master of Mathematics

Research: Dissertation involved working with python to numerically solve spherical cavitation bubble collapse.

**Sept 2014 – 2016** — **Space Engineering** – *Loughborough College*

A-Levels: *Mathematics* A* · *Further Mathematics* A · *Physics* A · *Engineering* A

A specialised course focused on Engineering with guest lectures at the Space Centre in Leicester.

**Sept 2009 – 2014** — **Secondary School** – *Loughborough College*

GCSE's: *Mathematics* A* · *Further Mathematics* A · *Physics* A · *Biology* B · *Chemistry* B · *English* A · *English Literature* A · *Astronomy* A

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## General Tech Stack

| | |
|---|---|
| Languages | Python, C++, SQL, LaTeX |
| Packages | Numpy, Pandas, SciPy, AstroPy |
| ML Packages | Sklearn, Tensorflow, PyTorch |
| Data Viz | Tableau, Seaborn |
| Scientific | Matlab, R, Fortran, Mathematica |
| Cloud | GCP, AWS |

## Awards and Qualifications

| | |
|---|---|
| 2022 | DataCamp: Data Science Track |
| 2022 | AWS DeepRacer Student |
| 2021 | Kaggle Competitions |
| 2020 | Tableau Desktop Specialist |
| 2016 | Full UK Driving Licence |
| 2015 | Grade 8 Violin |

## Publications

| | |
|---|---|
| Author | - |
| Co-Author | Hayes, J J C, E Kerins, J S Morgan et al. (2021) "`TransitFit`: an exoplanet transit fitting package for multi-telescope datasets and its application to WASP-127 b, WASP-91 b, and WASP-126 b", 1–14. |

## Academic Work Experience

**Autumn 2018** — **Scholarship** – *National University of Singapore*
Scholarship: Obtained a scholarship to study a crash course in Korean language for 5 weeks and to learn about the culture and history of the changing landscapes of Singapore. Upon completion, applied to spend the Autumn semester here successfully.

**Sept 2017 - 2019** — **Physics Outreach** – *The University of Nottingham*
Outreach: I began, on a voluntary basis, promoting physics via social media which eventually evolved into a paid role in which I mediated with events staff in the department to ensure successful participation. Part of the role was ensuring inclusivity, and how best to target minority groups.

**Summer 2018** — **Magical Maths** – *St Mary's Catholic Primary School, Nottingham*
Outreach: Organisation of weekly sessions to promote mathematics to primary school children, in line with the national curriculum.

**Summer 2014** — **Research Intern** – *Space Research Centre, The University of Leicester*
Intern: During my first college year I gained work experience at the University of Leicester Space Research Centre, assisting in the development of an astrobiology rock-sampling tool called SPLIT for use on Mars.

## Voluntary Positions and Responsibilities

**2020 - Now** — **SPAR** – *University of Manchester*
Researcher: Actively contributing to exoplanet detection in the spearnet collaboration.

**2021 - Now** — **ART-AI** – *University of Bath*
Researcher: Collaborating with a large research group with an aim to educate interdisciplinary professional experts to make the best, and safest, use of artificial intelligence.

## Interests

**Photography**: Avid adventurer and keen astronomer. This hobby pushes the boundaries of my interest in both.

**Hiking**: Exploring the peaks, lakes and anywhere with hills. Love to spend weeks away camping.

**Music**: Self taught Guitar, Piano, Violin.

**Art**: Into optical illusions like the works of Escher, Bridget Riley etc.

**Literature**: Love the classics, Jules Verne, H.P. Lovecraft, H.G. Wells etc.

**General**: Into Sci fi and anything spacey!

## References

| Name | Title | Email | |
|---|---|---|---|
| Dr. Eamonn Kerins | *Senior Lecturer* | eamonn.kerins@manchester.ac.uk | University of Manchester<br>Department of Physics<br>PhD |
| Prof. CJ Harris | *Research Professor* | chrisharris57@msn.com | University of Southampton<br>Department of Engineering<br>PhD, DSc, FREng, Fellow |
| Dr. John Holt | *Research Engineer* | jmch1@le.ac.uk | University of Leicester<br>Department of Physics<br>PhD, FREng |

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# Statement of Interest

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Reference: **Applied Machine Learning Engineer**
Date: Saturday 30th April, 2022

Dear Genomics,

Before I started academic study I used to run a server for Ultima Online, primarily written in C++. As such, the server was highly customisable, and with the source code from another server I painfully merged two incompatible SVN's together to create one. Just by comparison alone I was able to get used to the logic and constructs that formed the language. Browsing through the many lines of code and merging was a very slow process, but it allowed me understand slightly different methods of doing things. It was almost like learning through reverse engineering. I like to follow the concept of learning by doing. Of note, I took interest in the AI constructs and pathing algorithms adopted, to try and create realistic npcs to fill the world.

My undergraduate studies primarily focused on Mathematics in its purest form, to which I supplemented this by taking extra modules from physics to practice its application. In my final year I took a formal C++ course to take what I had learned from my game server days and apply it to my reading during undergraduate study. Suddenly very nasty equations were efficiently solved! I think data analysis in this aspect fascinates me. My dissertation project involved the inter-facial perturbations of a spherical bubble, to which an approximate formula was derived. As with most fluid dynamics problems, the solution required numerical analysis. I was able to apply my previous knowledge and reverse engineering, adapting to new problems, using the many libraries and pseudo code available in literature.

Astrophysics became my next programming achievement. Extreme care, and background knowledge was required in the handling and use of very large data sets. The precise information needed extracting and filtering, by which a human doing such by hand would be very laborious! Specifically, I worked in exoplanet research, fitting light curves to improve on the planets already proven to exist. The hope is that with a greater sensitivity, more interesting and varied data will provide confirmation of exomoons and through transit timing variations, more planets! In this field I have written a self-contained python EDA pipeline (`firefly`) for a transit fitting program (`TransitFit`) to automate the data collection it requires to run. This was written in python, which has quickly become my favourite language. It can currently fit TESS lightcurves with a nested sampling routine, using a Bayesian machine learning approach. In the future I hope to expand the functionality by allowing simultaneous fitting of multiple space based and ground based telescopes.

I'm keen to apply to the position of Applied Machine Learning Engineer at Genomics because I feel that my past experience would be an asset to your team. My technical background paired with your current expertise would be of great benefit to us both, and I feel that at Genomics I would meet like minded individuals who share the same passions for Data Science.

I am hopeful these considerations will be of benefit in the application process. Should you require more depth than supplied here, please visit my `GitHub` and `Portfolio`.

Kind Regards,

*Stephen Charles*

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