Operations Data Scientist

Dr Rob Barnsley CPhys

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Last Updated: 19/05/2025

BACKGROUND

I am a chartered Ph.D. physicist currently working as an operations data scientist for the SKA Observatory at Jodrell Bank, Manchester, UK. Previously I worked in industry as a scientist and optical designer developing imaging instruments for radiometric temperature measurement, and as a research associate at Oxford University prototyping cutting edge software and instrumentation for the world's largest optical telescope.

SELECTED SKILLS & EXPERTISE

- ➢ Broad cross-disciplinary expertise in software and hardware, with experience in both academic and commercial environments.
- ➢ Over 20 years of software development experience, primarily in **Python**, **C**, **C++,** and **SQL**. Skilled in backend development using **FastAPI**, **SQLAlchemy** and **Pydantic**, with database expertise in **PostgreSQL**.
- ➢ Familiar with distributed systems and task orchestration tools such as **Celery**, as well as frontend development with **Vue.js**.
- ➢ Comfortable working across the full stack, prototyping & integrating diverse technologies into a cohesive, production-ready system.
- ➢ Over 10 years of experience with DevOps and cloud native technologies, including **Kubernetes**, **Helm**, **ArgoCD**, **OpenStack**, **Docker**, **Ansible**, **Azure**, and CI/CD pipelines using **GitHub Actions** and **GitLab CI**.
- ➢ Experienced in project coordination and technical leadership, with a strong scientific background and peer-reviewed publications. Skilled at communicating complex concepts across diverse audiences.

CERTIFICATIONS, AWARDS AND CONTINUING PROFESSIONAL DEVELOPMENT

(2025) SKAO collaboration award

(2021) Certified Kubernetes Application Developer (CKAD)

(2020) Certified SAFe 5 Practitioner (Agile)

(2020) Machine Learning with Python (MITx Data Science)

(2020) Data Analysis in Social Science (MITx Data Science)

(2020) Awarded Chartered Physicist status

(2019) The Science of Uncertainty and Data (MITx Data Science)

(2018) Advanced Optical Engineering (Zemax)

(2017) Introduction to Systems Engineering (UCL)

(2015) Tackling the Challenges of Big Data (MITx)

(2014) Circuits and Electronics 6.002x (EdX)

WORK EXPERIENCE

Operations Data Scientist – SKAO, **March 2020 – Present** **(DO NOT CONTACT)**

- Designed and deployed a globally distributed data centre network to support petabyte-scale data storage and transfer across SKA Regional Centres (**SRCs**).
- Developed and maintained prototype APIs for data discovery, access, and transfer using **Python (FastAPI)**, **PostgreSQL**, and **MongoDB**.
- Containerised APIs with **Docker** and packaged them for deployment using **Helm**; integrated **OpenID Connect** for authentication and **OpenAPI** for documentation.
- Built and maintained CI/CD pipelines with **GitLab CI** for automated unit, component and integration testing & deployment.
- Deployed services to Kubernetes clusters (managed via **Cluster API**) using **ArgoCD** and **Helm**.
- Provisioned and configured infrastructure using **Ansible** to ensure consistent **OpenStack** and **Cluster API** environments (e.g., DNS, proxies, user environments).
- Contributed to system architecture for SKA's data management platform, with a focus on scalable, maintainable global operations.
- Supported data centres in deploying and operating services; built **Grafana** dashboards for real-time system health and performance monitoring.
- Participated in SAFe Agile ceremonies, including planning and demos; regularly presented updates to the wider Agile Release Train (**ART**) community.
- Led the metadata component of CERN's Rucio project: prioritised features, developed new functionality, and upheld high code quality standards using **Python**.

Design Physicist – AMETEK Land (Land Instruments International), **June 2018 – March 2020**

- Technical lead for new instrument development projects. Responsible for the design, implementation and analysis of experiments

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to evaluate the physical properties of instruments proceeding through an NPI process.
- Managed projects through the stage-gated NPI process by liaising with product managers to gather & distil stakeholder requirements, and coordinated software, mechanical and electrical teams to deliver these requirements.
- Developed a software suite for ISO image quality characterisation of 2D imaging instruments (**Python, Qt, Azure DevOps**).
- Developed software algorithms and interfaces to aid/autonomise instrument calibration (**Python**, **OpenCV**, **Qt, Azure DevOps**).
- Optical design and tolerancing of new NIR/MIR/LWIR instruments, working to ISO standards e.g. ISO 10110 (**Zemax**, **Inventor**).

Scientific Computing Consultant – Self Employed, **October 2006 – Present**

- Provided scientific consultancy services to SME in the fields of software, engineering and optics.
- Last project was to replace an aging computer vision system used for QC of electrolysis needles with an up-to-date hardware and software solution whilst maintaining the legacy PLC interface between the QC vision system and fabrication machines (**OpenCV**, **Python**, **Zemax**, **Inventor, Linux**).
- Previous projects include optical design and tolerancing of scientific instrumentation for cancer detection (**Zemax**) and development of websites and a bespoke browser-based company management software solution (**PHP**, **MySQL**, **MSSQL**, **CSS**, **HTML** and **JavaScript**).

Postdoctoral Research Scientist – Oxford University, **May 2016 – May 2018**

- Drove forward the assembly of an instrument prototype for a multinational project (the Extremely Large Telescope, or ELT).
- Developed software to model the optical system using Fourier analysis (**Python**, **Git, Linux**).
- Developed software to process data from the prototype on the GPU (**C++/CUDA**, **Git, Linux**).
- Taught laboratory sessions in optics for first year undergraduate students.

Liverpool Telescope Instrument Scientist – Liverpool John Moores, **September 2012 – April 2016**

- Led the design through integration phases for a near infrared imaging instrument and developed a suite of autonomous programs (**Python**, **Git, Linux**) to process and visualise data taken with it.
- Supervisor for Master's degree student project.
- Developed a system to programmatically interface a USB stepper stage with a confocal chromatic sensor, allowing the noncontact measurement of surface window sag and irregularity at the micron level (**Python, Linux, RaspberryPi**).

Design Consultant – Calvino Noir Ltd., **May 2014 – April 2015**

- Contractor for SEIS 150k£ project to produce a video game for iOS and PC platforms.
- Oversaw game and level design through iterative playtesting, feedback and in-game analytics (**PHP**)
- Helped market the game through several channels incl. investor conferences (SLUSH, Helsinki 2014) & game shows (EGX, London 2014).

Student – Google, **May 2011 – August 2011**

- Begun development of codebase (**C**, **C++**, **OpenCV, SVN**) for an automated content based image retrieval system to allow a user to submit a picture of an unknown species and receive possible identifications using data supplied by the Encyclopedia of Life (EoL) database.

EDUCATION

Ph.D. Astrophysical Instrumentation – Liverpool John Moores University, UK **2008-2012**

- Worked on the optical assembly, integration and testing of a spectrographic instrument for the robotic Liverpool Telescope (LT).
- Developed a suite of programs (**C**, **Python**: https://github.com/LivTel/frodo-l2-pipeline, **Linux**, **CSH, bash**) to autonomously process and visualise data from this instrument, the products of which have been directly used in peer-reviewed journals.
- Published work in peer-reviewed journals and conference proceedings.
- Presented work to a technical audience at conferences both nationally and internationally

1st Class MPhys with Honours – University of Liverpool, UK **2004-2008**

- Chadwick Entrance Scholarship