DIGIN DOMINIC

Research Software Engineer | Computational Scientist

digindominic@outlook.com
+44 7340 341174
Edinburgh, UK
digindominic.me
github.com/digin1
linkedin.com/in/digin

PROFESSIONAL SUMMARY

Research software engineer with 8+ years of experience building production-grade scientific platforms at the University of Edinburgh. Equal contribution author on a Nature Scientific Reports publication. Specialises in large-scale microscopy data pipelines processing 24M+ synapses, GPU-accelerated analysis, interactive 3D brain visualisations, and distributed infrastructure serving 500+ researchers worldwide. Manages multi-node compute clusters and full-stack web platforms bridging neuroscience research and modern software engineering.

EXPERIENCE

Research Software Developer | University of Edinburgh, Grant Lab – CCBS — 2020 – Present

- Developed SynaptopathyDB (Nature Scientific Reports), a comprehensive database integrating 64 proteomic studies with 3,437 synapse proteins mapped to 1,266 diseases, serving 500+ researchers
- Built GPU-accelerated synapse detection pipeline (TrackMate + PyTorch CUDA) processing 24M+ synaptic puncta with ray-casting ROI projection across 243+ tiled montages
- Created MontageROI Segmenter — web-based annotation tool with Three.js canvas, multi-channel TIFF support, and ImageJ-compatible export for production research workflows
- Designed custom image stitching pipeline achieving 6.4x speedup over baseline (45 min → 7 min) with correlation-weighted cross-channel optimisation
- Built NeuroSphere interactive 3D brain atlas (Three.js/WebGL) covering 43 human and 25 mouse brain regions with real-time neural circuit simulation
- Developed multiple Next.js/TypeScript synaptome atlas platforms (SV2A, Nanoarchitecture) with interactive SVG visualisations and multi-age/sex comparison
- Architected AI-powered workflow automation platform (FastAPI + Next.js) integrating Claude, OpenAI, and Gemini APIs with Celery task queues
- Managed 7-node compute cluster via Ansible, Docker Swarm orchestration, and CI/CD pipelines (GitLab CI)

Full Stack Developer | Freelance & Commercial — 2017 – 2020

- Delivered e-commerce platforms, CMS systems, IoT asset management, and inventory management applications for multiple clients
- Managed Linux server infrastructure, virtualisation (KVM, Xen, OpenVZ), and monitoring (Nagios, Prometheus, Grafana)

KEY PROJECTS

SynaptopathyDB
Nature publication, 770MB+ DB
React · Flask · PostgreSQL

NeuroSphere
Interactive 3D Brain Atlas
Three.js · WebGL · React

MontageROI Segmenter
Web annotation tool
Flask · Three.js · Canvas

TrackMate Mapping
GPU synapse detection
PyTorch · CUDA · Python

SV2A Synaptome Atlas
Multi-age/sex comparison
Next.js 14 · TypeScript · SVG

Code-Pad.me
Best Project Award (NTU)
Django · Docker · WebSocket

TECHNICAL SKILLS

Languages
Python, JavaScript/TypeScript, Shell, R, SQL, C#

Frontend
React, Next.js, Three.js/WebGL, Tailwind CSS

Backend
Flask, FastAPI, Django, Celery, Dask

DevOps
Docker/Swarm, Ansible, AWS, GitLab CI, K8s

Data / ML
PyTorch (CUDA), OpenCV, NumPy, TensorFlow

Databases
PostgreSQL, SQLite, MongoDB, MySQL, Redis

EDUCATION

MSc Cyber Security | Nottingham Trent University 2021 – 2022

- Best Project Award — Code-Pad.me (online code execution platform with real-time collaboration)
- Focus: Secure systems, infrastructure hardening, risk-aware architecture

PUBLICATIONS

PUBLISHED **"SynaptopathyDB integrates synaptic proteomes with disease data to reveal shared and unique pathogenic mechanisms"**
Sorokina O*, Dominic D*, Bayés À, Armstrong JD, Grant SGN. Scientific Reports 15(1), 42986 (2025)
DOI: 10.1038/s41598-025-26969-z ** Equal contribution*

PREPRINT **"PRMix: Primary Region Mix Augmentation for Instance Segmentation in Volumetric Brain Electron Microscopy"**
Yuan K, Woods H, Günar Ü, Dominic D, Wu Y, Qiu Z, Grant SGN. bioRxiv (2025)
DOI: 10.1101/2025.08.13.670045

ADDITIONAL COMPETENCIES

Scientific Computing

- Microscopy pipelines (ND2/CZI/TIFF/IMS)
- Image stitching & 3D segmentation (nnUNet)
- Brain atlas mapping & colocalization analysis

Infrastructure

- Docker Swarm & 7-node cluster management
- NAS (Synology), GPU pinning, NUMA scheduling
- Network tuning & performance optimisation

Soft Skills

- Bridges scientists and software engineering
- Translates research needs into robust systems
- Autonomous end-to-end ownership & training

Nature Publication — Scientific Reports
500+ — Researchers Served
24M+ — Synapses Processed
Best Project Award — NTU MSc
8+ Years — Experience