George Crowley, FHEA

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Education

2022–2027 **PhD Candidate in Electrical & Electronic Engineering**, University of Sheffield.

- **Thesis Title:** *Machine Learning Methods for Monitoring of Complex Water and Sewer Network Infrastructure*.
- **Advisors:** Dr. Iñaki Esnaola, Prof. Simon Tait, Prof. George Panoutsos, Prof. Vanessa Speight.
- **Funding:** Sponsored by *Thames Water & EPSRC CDT in Water Infrastructure and Resilience (WIRe)*.

2019–2022 **BSc (Hons) in Mathematics** (First Class Honours), University of Sussex.

- **Thesis Title:** *Methods for the Observational Model*.
- **Advisors:** Dr. James Van Yperen, Dr. Eduard Campillo-Funollet, Prof. Anotida Madzvamuse.

Research Publications

Journal Articles

1. **G. Crowley**, S. Tait, G. Panoutsos, V. Speight, and I. Esnaola, "Information-theoretic sensor placement for large sewer networks," *Water Research*, vol. 268, p. 122 718, Jan. 2025. DOI: 10.1016/j.watres.2024.122718.

Pre Prints

1. **G. Crowley** and I. Esnaola, *Symmetry of concentration and scaling for self-bounding functions*, *arXiv preprint*, arXiv:2509.22375, 2025. URL: https://arxiv.org/abs/2509.22375.
2. **G. Crowley** and I. Esnaola, *Submodularity of mutual information for multivariate Gaussian sources with additive noise*, *arXiv preprint*, arXiv:2409.03541, 2024. URL: https://arxiv.org/abs/2409.03541.

Conferences & Presentations

Oral Presentations

2026 **Thames Water Innovation conference**, Reading, UK.
"Sensor placement methods for the Smart Waste program."

WIRe Annual Conference, Sheffield, UK.
"Monitoring our sewer networks: the good, the bad, and what's left to improve."

Poster Presentations

2025 **26th IWA Young Water Professionals (YWP) Conference**, Brighton, UK.
"Effects of sensor placement in large sewer networks."

8th London Symposium on Information Theory (LSIT), Cambridge, UK.
"Applying concentration inequalities to information-theoretic sensor placement problems."

Academic & Professional Experience

Research Appointments & Consultancy

2026 **Visiting Student Research Collaborator**, *Princeton University*, USA.
Department of Electrical and Computer Engineering. Hosted by Prof. H. Vincent Poor.

Academic & Professional Experience (continued)

2026 – Present — **Data & Research Consultant**, *Southern Water* & University of Sheffield, UK.
Developed uncertainty quantification frameworks for combined sewer overflow (CSO) intervention analysis using operational data to enable Environment Agency compliance.

Teaching & Pedagogy

2025 — **Fellow of the Higher Education Academy (FHEA)**, *Advance HE*.

2023 – 2025 — **Graduate Teaching Assistant**, *Dept. of Automatic Control & Systems Engineering*, University of Sheffield.
Delivered labs and tutorial support for AER124, ACS232, and ACS6106. Marked exams for AER203 and ACS131.

Employment History

Jan 2026 – Oct 2026 — **Consultant (Southern Water)** – *The University of Sheffield.*
Developing uncertainty quantification methods for measuring the impact of combined sewer overflow interventions for **Southern Water**.

2019 – 2022 — **Fitness Advisor** - *Southdowns Leisure*, Worthing, West Sussex.

2017 – 2018 & 2014-2016 — **Sales Advisor** – *Vodafone UK*, Worthing, West Sussex.

Academic Service

Peer Reviewer

2025 — **IEEE International Symposium on Information Theory (ISIT 2025)**.

IEEE International Conference on Communications (IEEE ICC 2025).

Skills & Technical Expertise

Computational & Technical

Languages — Python, MATLAB, HTML, Linux (HPC), LaTeX.

HPC & Tools — High-Performance Computing (HPC) environments (*Stanage* Linux cluster), Git, GitHub.

Methods & Modelling — Data-Driven & Probabilistic Modelling, Uncertainty Quantification (UQ), Information Theory, Machine Learning (Anomaly Detection), Optimal Sensor Placement, Numerical Methods (ODEs/PDEs).

Domain Expertise

Water Infrastructure — Urban Drainage Modelling, Combined Sewer Overflow intervention analysis, Environmental regulatory compliance evidence (Environment Agency).

References

1. **Dr. Iñaki Esnaola** (PhD Primary Supervisor) - Senior Lecturer (Associate Professor).
School of Electrical and Electronic Engineering, University of Sheffield.
Email: esnaola@sheffield.ac.uk
2. **Prof. Simon Tait** (PhD Secondary Supervisor) - Professor of Water Engineering.
School of Mechanical, Aerospace and Civil Engineering, University of Sheffield.
Email: s.tait@sheffield.ac.uk