University of Nottingham
UK | CHINA | MALAYSIA

ROLE PROFILE

Job Title	Research Associate/Fellow (Fixed-term)
School/Department	School of Mathematical Sciences
Job Family and Level	Research & Teaching Level 4
Contract Status	This fixed-term post is available from 1st November 2019 or as soon as possible thereafter for a period of 36 months.
Hours of Work	Full-time
Location	School of Mathematical Sciences, University of Nottingham, University Park, Nottingham, NG7 2RD
Reporting to	Prof Gary Mirams (Grant holder)

Purpose of the New Role

This postdoctoral position will have specific responsibility for undertaking and developing a research programme in inference for mechanistic models together with Prof Gary Mirams on his Wellcome Senior Research Fellowship "Developing cardiac electrophysiology models for drug safety studies". Biophysically-based mechanistic Ordinary Differential Equation (ODE)-based models of cardiac electrophysiology have reached the maturity where they are being used to make safety-critical decisions in hospitals and pharmaceutical regulation, these new applications require uncertainty quantification with appropriate statistical methods to assess and improve the trustworthiness of our models and their predictions [1].

Aims: we have been developing novel experimental designs to perform nonlinear regression based on ODEs and retrieve more information on parameter values from shorter experiments [2,3,4]. We would like to develop and improve techniques to **perform model selection** and **assess model discrepancy/mis-specification** in addition to applying more established techniques for inferring parameter values within the models. Some of the primary challenges are outlined in this video: http://www.birs.ca/events/2018/5-day-workshops/18w5144/videos/watch/201811121403-Mirams.html. We will be developing efficient and practical ways to create models by utilising **experimental design/adaptive learning** to create new high-throughput experiments in partnership with academic and pharmaceutical industry collaborators as well as international pharmaceutical regulators.

Approach: this project will involve the application of statistical techniques to quantify our uncertainty in model parameters and model equations/structure; design of more information-rich experiments to reduce our uncertainties in the models we develop [2,3,4], and close work with experimental labs to test out experiments we design and improve them.

This Wellcome funded project has a dedicated Research Software Engineer to assist with developing codes and data handling, and the role-holder will work closely with them, other Postdoctoral Researchers, PhD students and Prof Mirams in a strongly collaborative team with shared code development and a joint research programme. The role holder will have the opportunity for travel to partnering experimental laboratories in Sydney, Australia and Utrecht in the Netherlands. They will be responsible for writing up their work for publication and have the opportunity to use their initiative and creativity to identify areas for research, work collaboratively in interdisciplinary teams, develop research methods and extend their research portfolio.

Relevant Publications

1. Mirams, G.R., Pathmanathan, P., Gray, R.A., Challenor, P. & Clayton, R.H. Uncertainty and variability in computational and mathematical models of cardiac physiology. *J. Physiol.* **594,** (2016).

2. Fink, M. & Noble, D. Markov models for ion channels : versatility versus identifiability and speed. *Philos. Trans. A. Math. Phys. Eng. Sci.* **367,** 2161–79 (2009).

3. Beattie, K.A., Hill, A.P., Bardenet, R., Cui, Y., Vandenberg, J.I., Gavaghan, D.J., de Boer, T.P. & Mirams, G.R. Sinusoidal voltage protocols for rapid characterisation of ion channel kinetics. *J. Physiol.* **596,** 1813–1828 (2018).

4. CL Lei, M Clerx, D.J. Gavaghan, L. Polonchuk, GR Mirams, K Wang (2019). Rapid characterisation of hERG channel kinetics I: using an automated high-throughput system. Biophysical Journal (online, ahead of print). doi:10.1016/j.bpj.2019.07.029

	Main Duties and Responsibilities
1	To plan and conduct original research as part of a collaborative team using recognised approaches methodologies and techniques.
2	Analyse and illuminate data, interpret reports, evaluate and criticise texts and bring new insights.
3	Collaborate with academic colleagues on joint interdisciplinary research projects.
4	To establish your reputation by writing up research work for publication and contributing to the dissemination of findings at national/international conferences
5	Plan and manage own research activity and resolve problems, if required, in meeting research objectives and deadlines in collaboration with others.

Knowledge, Skills, Qualifications and Experience

	Essential	**Desirable**
Qualifications/ Education	PhD or equivalent, in a relevant branch of mathematics, statistics, control engineering, physics or a closely related discipline. OR Near to completion of a PhD in one of these subjects	
Skills/Training	Ability to fit computational models to real-world data (optimisation or inference in a frequentist or Bayesian framework) using various approaches and interpret the results. Very good programming skills, including use or development of statistical inference software in a widely used programming language (for example R, Python, Stan, etc.) Excellent communication skills and the ability to convey complex information clearly and accurately.	Ability to create new research approaches, techniques and methods Experience with some of the following techniques: • model selection, • experimental design, • uncertainty quantification.
Experience	Proven ability to produce research of high quality in applied statistics or a closely related discipline.	Published papers in relevant academic journals.

Additional Information

The School of Mathematical Sciences is in the top ten mathematics departments nationally, and was recognised for the quality of its research in the most recent national Research Excellence Framework (REF). The REF assesses UK higher education institutions in all subject areas and is based on submissions provided by each university detailing their research and the wider societal impact that it has had. In the School, 32% of our research was recognised as world-leading and a further 56% as internationally excellent. Its research environment was classified as 75% world-leading in vitality and sustainability, with the remaining 25% internationally excellent - reflecting the outstanding setting the School provides for its 80 academic staff as well as its postdoctoral and postgraduate researchers.

The School has a substantial student population which includes 850 undergraduate students, 80 postgraduate MSc students and 120 postgraduate PhD students.

The School is committed to promoting Equality and Diversity. This has been recognised in the awarding of an Athena SWAN Bronze Award, and the School is working hard towards further progress. Athena SWAN http://www.athenaswan.org.uk/ recognises and celebrates good employment practice for women working in STEM subjects.

Applicants will be considered on an equal basis, subject to the relevant permission to work in the UK as defined by the requirements set out by UK Visas and Immigration. Please visit https://www.gov.uk/government/organisations/uk-visas-and-immigration for more information.

Informal enquiries may be addressed to Gary Mirams, email: gary.mirams@nottingham.ac.uk. Please note that applications sent directly to this email address will not be accepted.

Job Title	Senior Research Fellow (Fixed-term)
School/Department	School of Mathematical Sciences
Job Family and Level	Research & Teaching Level 5
Contract Status	This fixed-term post is available from 1st November 2019 or as soon as possible thereafter for a period of 36 months.
Hours of Work	Full-time
Location	School of Mathematical Sciences, University of Nottingham, University Park, Nottingham, NG7 2RD
Reporting to	Prof Gary Mirams (Grant holder)

Purpose of the New Role

This senior postdoctoral position will have specific responsibility for research, co-supervision and developing a research programme in inference for mechanistic models together with Prof Gary Mirams on his Wellcome Senior Research Fellowship "Developing cardiac electrophysiology models for drug safety studies". Biophysically-based mechanistic Ordinary Differential Equation (ODE)-based models of cardiac electrophysiology have reached the maturity where they are being used to make safety-critical decisions in hospitals and pharmaceutical regulation, these new applications require uncertainty quantification with appropriate statistical methods to assess and improve the trustworthiness of our models and their predictions [1].

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	Main Duties and Responsibilities
1	Undertake original research of international excellence. To acquire, analyse, interpret and evaluate research findings using approaches, techniques, models and methods selected or developed for the purpose.
2	To deliver research as part of a collaborative team and contribute to the achievement of specific research objectives
3	To assist in the co-ordination of the research and related administrative tasks, including liaising with external project collaborators in academia and industry
4	To establish your reputation nationally, by writing up research work for publication and contributing to the dissemination of findings at national/international conferences
5	To provide support, guidance and supervision to other staff within the research team, where appropriate in own area of expertise.
6	To supervise undergraduate and/or postgraduate students projects and placements, as appropriate. To participate in co-supervision of projects at the Masters and PhD level.
7	Be responsible for resolving problems to meet research objectives and deadlines.
8	Perform any other duties appropriate to the grade and role

Knowledge, Skills, Qualifications and Experience		
	Essential	**Desirable**
Qualifications/ Education	PhD or equivalent, in a relevant branch of mathematics, statistics, control engineering, physics or a closely related discipline.	A PhD or previous research post working on statistical inference for mechanistic models.
Skills/Training	Ability to devise, advise on and manage a research programme. Ability to create and apply relevant research approaches, models, techniques and methods. Excellent programming skills, including use or development of statistical inference software in a widely used programming language (for example R, Python, Stan, etc.) Ability to fit computational models to real-world data (optimisation/inference in a frequentist or Bayesian framework) using various approaches and critically evaluate the results. Experience of one or more of the following: • model selection,	Experience of working with interdisciplinary teams – including experimental laboratory-based collaborators.

	• experimental design, • uncertainty quantification.	
Experience	Proven ability to produce research of high quality in applied statistics or a closely related discipline: a consistent track record of high-quality peer reviewed publications.	Previous success in gaining support for externally funded research projects. Experience of supervision of junior colleagues.

Additional Information

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