



King's College London
Chair in Algorithm Engineering
Department of Informatics

Candidate Pack
Autumn 2023

Role Purpose

The highest level of academic leadership in research in the area of Algorithm Engineering, and in teaching and administration, as directed by the Head of Department of Informatics.

The Department of Informatics at King's College London is seeking to appoint a Chair in Computer Science in the area of Algorithm Engineering. The successful candidate will have an excellent track record in Algorithm Engineering and will provide research leadership in this area within the department and across the university.

Algorithm Engineering combines the theory of algorithm design with implementation and experimentation, aiming to develop algorithms, algorithmic methods and implementation methodologies and techniques with high practical impact. While the traditional study of algorithms has been dominated by worst-case analysis in theoretical models of computation, Algorithm Engineering puts the focus on considering various technological aspects of modern computing platforms, evaluating the actual performance of algorithms by systematic computational experimentation processes, and working with real-world scenarios and data, contributing to computational advances across various domains.

Topics of interest within the context of Algorithm Engineering include: considering, and exploiting for performance, the hardware architecture of the target computing platforms, including supercomputers, GPU-based systems and other High-Performance Computing platforms; parallelisation of computation; memory hierarchies, algorithms and data structures for massive datasets and high frequency data streams; network computing, including cloud computing and distributed computing.

This Chair role is within the departmental Algorithms and Data Analysis research group, but with expectation of establishing and leading wider collaborations within the department, linking with relevant research units throughout the university. The university offers the Chair a range of domains for impactful multidisciplinary collaborations, including engineering, biological sciences, medical sciences, financial studies, and digital humanities, and a range of computing platforms. These include a large new university HPC platform based on clusters of GPUs and CPUs, and further GPU-based systems within the Faculty of Natural, Mathematical and Engineering Sciences (where the Department of Informatics is placed). King's College London is a key research partner in the [NVIDIA's C-1 supercomputer](#) (the UK's most powerful supercomputer), giving the Chair the opportunity of not only using this infrastructure for their own research but also of developing into a role of a leading expert and advisor for the university on effective utilisation of access to C-1.

King's College London

Please see the link below for supporting information for prospective applicants. This also includes some background information about the university including rankings, research outputs, King's Health Partner Trusts and our current fundraising initiative. www.kcl.ac.uk/aboutkings

Beyond the description of the College, Faculty, Department and Group included after the person specification below, particular links of interest include:

Research groups and Hubs at Informatics - <https://www.kcl.ac.uk/informatics/research/groups>

Undergraduate teaching - <https://www.kcl.ac.uk/informatics/undergraduate>

Postgraduate teaching - <https://www.kcl.ac.uk/informatics/postgraduate>

The role and key responsibilities

The appointee will be expected to:

- Provide academic leadership in the area of Algorithm Engineering within the Department of Informatics, and to play a leading role in this area within the Faculty, and across the College.
- Contribute to the teaching, project supervision, and administration of the undergraduate and postgraduate degrees in the Department of Informatics.
- Provide other teaching and administrative support within the Department as and when required.
- Enhance the research profile of the Department, through maintaining a consistent high-level output of publications and presentations of world-class quality.
- Sustain high-quality research activity through a portfolio of individual, joint and/or network research projects.
- Engage actively and regularly in the pursuit of research funding through grant applications to Research Councils, etc., and to assist other academic staff in the development of research proposals.
- Develop links and collaboration with academics elsewhere at King's College London.
- Engage, when appropriate, in the dissemination of advanced research through knowledge transfer, outreach, continuing professional development, etc.

- Contribute to national and international Research Council activities and similar panels as appropriate.
- Seek continued involvement in international research activities, such as conference programme committees and editorial work for academic journals.
- Supervise and train postgraduate students and postdoctoral research staff to ensure their effective development.
- Contribute fully and conscientiously to administrative tasks in the Department of Informatics, as directed by the Head of Department.
- Be involved in the mentoring of junior staff and act as line manager for non-professional members of academic staff. At an appropriate time, the appointed candidate may be expected to take on a term of office as Head of Department.
- Lead/contribute to service activities within the Department, Faculty and College.
- Contribute to performance and development review processes as appropriate in accordance with the College's strategy.

Person profile

Knowledge, qualifications and experience:

The successful candidate will represent a good match against the following essential and desirable criteria for each category listed below:

Education, qualification, and training

Essential

- PhD in Computer Science, Algorithmic or related field.
- Strong research record in Algorithm Engineering through high quality publications.

Knowledge and skills

Essential

- Leadership skills
- Ability to attract and develop talented researchers into the field
- Ability to motivate students and junior colleagues
- Ability to carry out relevant research
- Ability to teach undergraduate and postgraduate modules in Algorithms and High Performance Computing

Desirable

- Ability to further academic planning and strategic development

Experience

Essential

- Outstanding research record of international stature in Algorithm Engineering
- Established record of acquiring research grants/funding
- Teaching and assessment experience at undergraduate and/or postgraduate level
- Experience of supervision of research students

Desirable

- Experience of university governance and of academic administration

Personal Characteristics and other requirements

Essential

- Ability to organise work to meet demands of research, teaching, and administration
- Ability to manage and interact with staff and students at all levels
- Ability to communicate effectively (written and orally)
- Commitment to providing effective teaching at undergraduate and MSc level

About the Faculty

The Faculty of Natural, Mathematical and Engineering Sciences (NMES) comprises the Departments of Chemistry, Engineering, Informatics, Mathematics, and Physics.

The university is making significant investment in the Faculty and both student and staff numbers are growing. We currently have around 3,700 undergraduate and postgraduate taught and research students and around 300 academic and research staff, supported by 100 Professional Services staff. We are international in our outlook. Our staff come from over 45 countries, with around two-thirds coming from outside the UK, and around 56% of our students are from the EU and the rest of the world.

All our academic departments have highly-rated research activities and the Faculty offers a wide-ranging portfolio of undergraduate, postgraduate taught and PhD programmes. Our work crosses traditional subject boundaries, creating cutting-edge research that provides opportunities to engage in multidisciplinary activities across the university, and to develop partnerships with external groups and industry. Each department has a vibrant research environment, where students work with, and learn from, world-leading academics while benefitting from an open-door policy and a wealth of support.

Our vision is to establish King's as an outstanding institution in science and technology, competitive with the world's best. We aim to be distinctive and bold, by strengthening our individual departments in their disciplinary identities and their participation in broader cross-King's interactions. This applies to our core areas of mathematics, physics, chemistry, computer science, telecommunications, robotics, bioinformatics and biomedical engineering, as well as expansion into broader engineering and other areas that complement our current portfolio.

The growth of our engineering activity at King's is a major strategic initiative for the university, with a new undergraduate General Engineering course scheduled to launch in September 2020, to complement our existing Biomedical Engineering and Electronic Engineering programmes. We are also establishing new engineering research themes, building on the strength and complementarity across King's more generally, including the obvious opportunities in science and health, but also in relation to management and business, security and digital humanities. Externally, our ambition is to develop synergistic research opportunities with key external partners including King's Health Partners, the Francis Crick Institute, London Centre for Nanotechnology, and others both nationally and internationally, including exploring the opportunities for joint activities with our [PLuS Alliance](#) partners, the University of New South Wales and Arizona State University.

Our unrivalled central London location offers easy access to major research libraries and leading scientific societies such as the Royal Society, Royal Society of Chemistry, BCS, Institute of Physics, IET, IMechE and the London Mathematical Society. We are committing significant investment to the development of our estate, with major capital projects on many of our campuses. In 2019 Her Majesty the Queen opened the Bush House complex on the Strand campus (which provides new teaching

facilities, social areas, office space and student space for the Department of Informatics). We are investing £50 million in new education and research laboratories including building new engineering laboratories under the Quad Building at the historic centre of the Strand campus, to provide our students and staff with facilities fit for a world-leading university.

We are very proud of the tradition of excellence within the Faculty, which includes a history of high levels of research funding and a number of Nobel Laureates from among our distinguished former staff and students, and we are working hard to promote the careers of women working in science, engineering and technology. The Department of Informatics was awarded a Bronze Athena SWAN award in April 2018 and the Department of Physics was awarded Juno Champion status by the Institute of Physics in January 2019. Other departments are working on their own applications. Our work in this area is helping us to identify best practice for the working environment of *all* staff working in our Faculty. You can find out more at <https://www.kcl.ac.uk/nmes/women-in-science>.

Supporting our staff is important to us. We offer a [Parenting and Carers Fund](#) of up to £10k for academic and research staff working in all disciplines as well as a locally managed fund which provides additional support for those with caring responsibilities. The [Carer's Career Development Fund](#) also supports academic, research and professional services staff with the additional care costs associated with attending conferences and events outside normal working hours. Staff are able to apply for flexible working to help them to balance the demands of their professional and personal commitments and we offer comprehensive leave policies for maternity, paternity, adoption, surrogacy, dependant and shared leave. We have a variety of [diversity and inclusion networks](#) at King's including an active [LGBT+ Staff Network](#) and another for [Parent's and Carers](#) who run events throughout the year. We host a series of social events for all staff and PhD students in the Faculty to provide an informal setting for colleagues to socialise and connect with one another, including themed coffee mornings, occasional evening events and an annual summer picnic for staff and their families. We also organise lunches for new staff, to help them to meet new colleagues from across NMES.

We are also keen to help our staff to develop their careers. We offer a clear and transparent academic promotion process, including briefing sessions for staff and feedback from our Faculty Academic Staffing Committee on draft applications, as well as support for academic supervision and research grant applications. For professional services staff, we offer a variety of training opportunities including an Information and Skills programme, which offers bite-sized sessions on a range of topical issues and provides the opportunity for staff across NMES and the wider university to share their expertise. Staff can also join one of professional services networks that bring together colleagues in similar roles to share good practice, provide peer support and contribute to King's overarching ambitions.

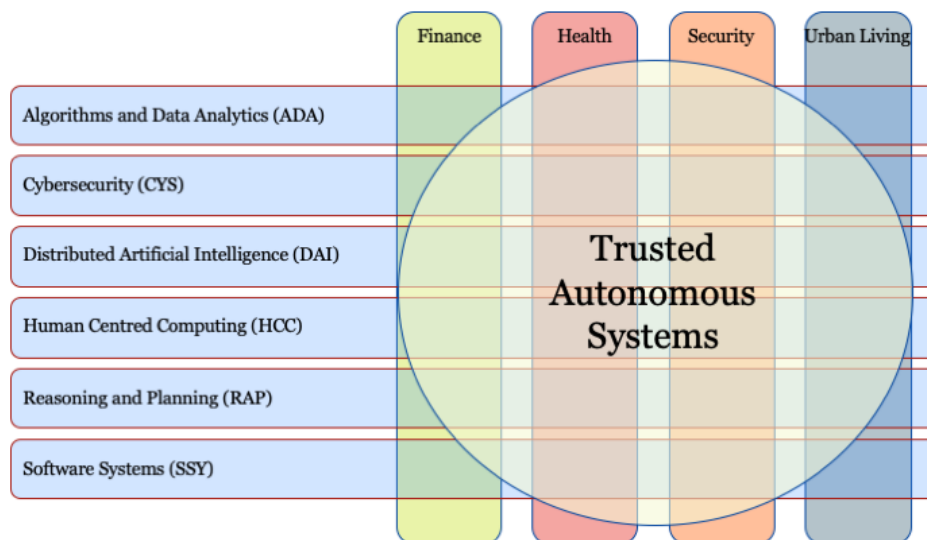
King's is committed to serving its local community in London. Examples include the [King's Maths School](#), which provides high quality mathematics education for gifted mathematicians aged 16-19 in the heart of London, and the London Centre for Urban Science and Progress (CUSP London), a joint initiative with the University of Warwick, that brings together researchers, businesses, local authorities and government agencies, to apply urban science to improving public health and wellbeing.

Details of all our departments and programmes are on the Faculty of Natural & Mathematical and Engineering Sciences website at <http://www.kcl.ac.uk/nmes>.

About the Department of Informatics

On the banks of the Thames, located in the iconic Bush House building, Informatics at King's College London is a thriving department in the heart of London. To better tackle real-world challenges, the Department of Informatics has strategically organised its activities according to six research groups and five cross-cutting hubs. The groups are as follows (<https://www.kcl.ac.uk/informatics/research/groups>).

Algorithms and Data Analysis (ADA) is concerned with theoretical and practical considerations of machine learning techniques and algorithm design applied to very large data sets. **Cybersecurity (CYS)** investigates design, modelling, analysis, verification and testing of networks and systems in order to tackle cybersecurity and privacy problems that are important to industry, society and individuals in this technologically dependent world. **Distributed Artificial Intelligence (DAI)** explores the use of AI in social and economic contexts where an intelligent entity may be interacting with other entities. **Human Centred Computing (HCC)** is concerned with the design, development and evaluation of systems with which humans interact and engage in complex and varied ways. **Reasoning and Planning (RAP)** focusses on the fundamental Artificial Intelligence challenge of creating, representing and reasoning with expressive models of the world, with particular strengths in dealing with complex systems, reasoning with information that is uncertain, incomplete or subjective, and planning. **Software Systems (SSY)** investigates design, modelling and engineering of software systems, reasoning about systems, and algorithms and tools for verification of software.



Hubs provide a virtual clustering of researchers from all parts of the Department around a specific theme. Five hubs have been identified: four focus on sectors of economic activity (health, security, urban living and finance), whereas the fifth hub (trusted autonomous systems) provides a technology focus for the whole Department.

Financial markets are increasingly being underpinned by information technology to the extent that financial markets can be seen as instances of distributed systems technology, and in turn economic and financial incentives are increasingly understood to play an important role in conventional distributed systems technology such as internet protocols. The **Finance Hub** conducts fundamental and applied research at the intersection of finance and computation, a sector which is colloquially known as FinTech. We apply techniques such as network analysis, scientific and high-performance computing, time-series analysis, bigdata analytics and agent-based modelling to problems in market micro-structure, risk management, portfolio construction, and the design of crypto-finance and distributed-ledger protocols. The Hub has established collaborations with other departments at King's, such as the Department of Mathematics and the King's Business School, as well as key financial institutions, including the Financial Conduct Authority. These collaborations are key to enabling access to data conducive to original research.

The **Health Hub** centres on computational characterisation of medically relevant study cases and data. Comprising bioinformatics, systems biology, medical and health informatics, well-being, sensors and remotely controlled robotic devices, this multidisciplinary activity not only connects academic groups within the Department of Informatics, but also links Informatics to multiple other disciplines and organisational units across King's and to the Francis Crick Institute. The overall objective is advancement in understanding fundamental mechanisms in health and disease, enabling remote diagnosis and operations, monitoring the delivery of medical practice and designing effective interventions for therapy or treatment. Through these collaborations, there are opportunities to access unique data sets, which enable the development and evaluation of original computer science research, with the potential to have strong impact in the broad area of health.

The **Security Hub** consolidates the research conducted in Informatics related to security, covering the whole socio-technical and cyber-physical spectrum of modern systems with a strong focus on information security and cybersecurity. This includes topics such as formal and intelligent methods for security and privacy; security design, verification and testing; secure and privacy-preserving telecommunications; human factors and usable security and privacy; data privacy, data anonymization, and personal data protection; data and system transparency; digital forensics and cybercrime; and blockchain and distributed ledger technologies. The Hub also collaborates with other organisational units at King's, in particular the School of Security Studies (including the Department of War Studies and the Department of Defence Studies) and the Department of Digital Humanities, which provide additional security scenarios and access to unique data sets.

The **Urban Living Hub** acts as an umbrella activity for all research in the Department of Informatics addressing urban-related issues. Topics of interest include buildings, energy, culture, entertainment, logistics, town planning, pollution, population, transport and smart cities. The hub is directly aligned with King's 2029 strategic vision of a civic university at the heart of London, with a view to develop research collaborations that address London's challenges. The Hub operates in close cooperation with the Centre for Urban Science and Progress (CUSP) London, a national and international collaborative network of researchers, companies and local governments. Through CUSP London's ambitious program, the Hub offers opportunities to access unique data sets and challenges.

The **Trusted Autonomous Systems** Hub pulls researchers from computer science and engineering together to develop the trustable autonomous systems of tomorrow. Our vision for such autonomous systems is that they are capable of reasoning and planning, they are safe and secure, they efficiently

integrate in human-autonomous systems teams, they rely on wireless communications and they might have physical embodiment as robots or intelligent sensors, they interact with humans, they are accountable for their behaviour, thereby allowing users to place their trust in them.

The UKRI **Centre for Doctoral Training (CDT) in Safe and Trusted Artificial Intelligence (STAI)** brings together world leading experts from King's College London and Imperial College London to train a new generation of researchers in safe and trusted artificial intelligence (AI). The STAI CDT offers a unique four-year programme, focused on the use of model-based AI techniques for ensuring the safety and trustworthiness of AI systems. Students will engage in various training activities, alongside their individual PhD project, ensuring that not only are they trained in state-of-the-art AI techniques, but also that they acquire a deep understanding of ethical, societal, and legal implications of AI in a research and industrial setting. Through engagement with the CDT's diverse range of industrial partners, students will be exposed to the different experiences, challenges, and technical problems involved in both start-ups and large corporations. Staff in the department of Informatics are invited to offer topics and potentially supervise PhD students in the STAI CDT.

Research undertaken in the department of Informatics as well as in the department of War Studies has contributed to King's College London being recognised as an **Academic Centre of Excellence in Cyber Security Research** (ACE-CSR) by the National Cyber Security Centre (NCSC) and the Engineering and Physical Sciences Research Council (EPSRC). The ACE-CSR is a crucial mechanism to facilitate engagement with external stakeholders including government organisations, research funding agencies, and the broader industrial sector (<https://www.kcl.ac.uk/research/cybersecurity-centre>).

As well as developing research collaborations between the six research groups, our aim is to further develop interdisciplinary research and teaching initiatives with other departments in the Faculty of Natural & Mathematical Sciences, and across the university. In the 2014 Research Excellence Framework (REF), Informatics at King's was rated as having 92% of its research outputs as world leading or internationally excellent. The 2014 REF results placed the Department in the top 10 of Computer Science and Informatics departments in the UK, when measured by the Power Ranking. There are currently 56 full-time academic staff, supported by teams of professional services and technical staff.

We offer several undergraduate programmes, including the BSc Computer Science, BSc Computer Science with Management, BSc Computer Science with Artificial Intelligence, BSc Computer Science with Robotics, and associated MSci degrees. There are currently approximately 850 full-time undergraduate students.

We also run a portfolio of successful MSc programmes in Advanced Computing, Advanced Software Engineering, Artificial Intelligence, Computational Finance, Cybersecurity, and Data Science. There are currently approximately 220 MSc students. We are keen to continue to expand our postgraduate research programme, in which there are currently approximately 100 PhD students.

For several years, Informatics has hosted research groups in robotics and telecommunications, and associated educational programmes, in effect, incubating a new department of Engineering. Engineering was relaunched as a distinct department in August 2019, with plans centred on the launch of new additional undergraduate engineering programmes with a 21st Century perspective. The approach to teaching engineering aims to be distinctive, combining traditional teaching methods with

modern, project-based learning, catering for the needs of our students and the industries in which they will work. Engineering research at King's currently focusses on robotics, telecommunications and biomedical engineering, and our aim is to strengthen our existing research activities but also to establish new research themes, building on the strength and complementarity in the Department of Informatics and across King's more generally. Strong links have been forged between the Department of Informatics and Engineering, and we anticipate the departments to retain strong links in the future.

The Department is located on the Strand Campus, in the heart of central London, close to the cultural activities of the West End and the South Bank, to the major departments of state at Whitehall, to the BCS and IET and to the leading financial institutions of the City, and within easy reach of major transport links. The Department moved to the historic Bush House in the summer of 2017, featuring state-of-the-art teaching and research spaces.

In collaboration with the Faculty of Natural & Mathematical Sciences, the Department of Informatics has been engaged with [Athena SWAN](#) since 2013. In April 2018, the Department was awarded a department level Athena SWAN Bronze Award in recognition of the work we are doing towards gender equality. This is part of a broader programme of activities the Department is engaged in around diversity and inclusion, and ensuring an inclusive and supportive working and learning environment is a key part of the Department of Informatics' strategy. For details about the Department's work in this area, please see the [Diversity and Inclusion](https://www.kcl.ac.uk/informatics/about/diversity-inclusion) (<https://www.kcl.ac.uk/informatics/about/diversity-inclusion>) and the [Women in Science](https://www.kcl.ac.uk/informatics/about/women-in-science) webpages (<https://www.kcl.ac.uk/informatics/about/women-in-science>), where you can also find our Athena SWAN application and action plan. Although the Department is fairly large in size, there is a friendly and inclusive culture, with regular social and celebratory events to bring staff and students together. Our staff and students come from all over the world, which provides a rich environment for teaching and research. Diversity is positively encouraged with a number of family-friendly policies, including the operation of a core hours policy, the right to apply for flexible working and support for staff returning from periods of extended absence, for example maternity leave. The Department of Informatics is committed to ensuring an inclusive interview process and will reimburse up to £250 towards any additional care costs (for a dependent child or adult) incurred as a result of attending an interview for this position. All new members of staff are allocated a mentor to support them in their career development and staff are encouraged to participate in the wide range of training opportunities available at King's.

To find out more about the department please follow this link:

Departmental overview <https://nms.kcl.ac.uk/luc.moreau/informatics/overview.pdf>

Terms and Conditions of Employment

This appointment is made under the King's College London Terms and Conditions of Service for Academic staff a copy of which is available upon request.

Probation

Not applicable

Annual leave

27 working days per annum pro rata (please note the annual leave year runs from January-December); bank holidays and customary closure days in are in addition to the annual leave entitlement. Staff receive four additional customary closure days in December. Notification as to how these days are taken is circulated at the start of the academic year.

Superannuation

This appointment is superannuable under the USS www.uss.co.uk pension scheme. In accordance with recent legislation, we automatically enrol our staff in a pension scheme if they meet certain age and earning criteria. This is known as auto-enrolment. The university collects pension contributions via a salary sacrifice method called *PensionsPlus*. These deductions are made before the calculation of tax and national insurance is calculated; therefore reducing the amount you pay.

Staff already superannuated under the NHS Superannuation Scheme may opt to remain in that scheme provided an application to do so is received by the NHS scheme trustees within three months of appointment to King's College London. Please note that NHS Superannuation Scheme: Medical Schools are classed as "Direction Employers" and some benefits of the NHS Scheme are not available to Direction members.

Alternatively, staff may opt to take out a personal pension. Please note that the university does not provide an employer's contribution towards a private pension plan.

Staff benefits

King's College London offers a wide range of staff benefits. For the full comprehensive list of staff benefits please refer to our website: www.kcl.ac.uk/hr/staffbenefits

Equal opportunities

King's College London recognises that equality of opportunity and the recognition and promotion of diversity are integral to its academic and economic strengths. The following principles apply in respect of the university's commitment to equality and diversity:

- To provide and promote equality of opportunity in all areas of its work and activity;
- To recognise and develop the diversity of skills and talent within its current and potential community;
- To ensure that all university members and prospective members are treated solely on the basis of their merits, abilities and potential without receiving any unjustified discrimination or unfavourable treatment on grounds such as age, disability, marital status, pregnancy or maternity, race, religion or belief, sex, sexual orientation, trans status, socio-economic status or any other irrelevant distinction;

- To provide and promote a positive working, learning, and social environment which is free from prejudice, discrimination and any forms of harassment, bullying or victimisation;
- To foster good relations between individuals from different groups and tackle prejudice and promote understanding.

King's has been a member of the Athena SWAN Charter since 2007 and gained its Bronze institutional award in 2008. Our award was successfully renewed in September 2013 for a further three years. The Athena SWAN agenda forms part of a wider suite of diversity and inclusion work streams. Working with the Charter is helping King's to identify best practice for the working environment of all staff working in science disciplines.

Occupational Health Clearance

As part of our pre-employment checks the successful applicant will be sent a 'Health and Capability Declaration Form' and if they declare that they do have a health condition or disability that may require accommodation measures so that they are able to carry out their work comfortably and efficiently, they will be sent an Occupational Health Questionnaire to determine whether any reasonable accommodation measures are required for the candidate to take up the post.

If you have special needs in relation to your application, please let us know.

Process

Candidates who would like to discuss this role further are welcome to contact Kerry Shepherd at kclalgeng@minervasearch.com

A CV and personal statement outlining how the candidate will fulfil the role and what they will bring to it, should be emailed to kclalgeng@minervasearch.com

Formal panel interviews will be held on Wednesday 7th February 2024 at King's College London.

Appointment will be made subject to satisfactory references, and in line with the usual terms and conditions of employment of the College.