Appointment of
Chair in Computational Intelligence for Software Engineering
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Executive summary

Ranked in the top 100 world universities by QS World University Rankings, the University of Birmingham is one of the most ambitious and forward looking universities in the sector and was named University of the Year 2013-14 by The Times and The Sunday Times.

The University of Birmingham’s research reflects its civic roots, offering one of the broadest ranges of any UK university. It is one of the UK’s most successful institutions in terms of attracting research funding, exceeding £150 million each year, with this figure continuing to grow year-on-year. Applications from both undergraduate and postgraduate students are at record levels and the University’s commitment to students is reflected in the current investment of £175 million in a range of new and enhanced buildings across the campus.

The College of Engineering and Physical Sciences is the second largest of five Colleges making up the University of Birmingham and is also one of the largest such groupings in Europe, bringing together physical sciences and engineering into one coherent College.

The College comprises 514 academics, 252 professional, support and technical staff, 3,500 undergraduate students and over 1,500 postgraduate and research students working across nine Schools: Chemistry; Chemical Engineering; Civil Engineering; Computer Science; Electronic, Electrical and Computer Engineering (EECE); Mechanical Engineering; Materials and Metallurgy; Mathematics and Physics and Astronomy.

The School of Computer Science has consistently been ranked in the Top 10 in UK league tables, and in The Guardian University Guide 2014, ranked first place out of 128 in the UK league table for Computer Sciences and IT. The School has around 135 active researchers (40 permanent academic staff, 25 research staff and about 70 research students) delivering outstanding teaching and world-class research in fundamental and applied computer science, artificial intelligence, optimisation, computer security, medical imaging and robotics.

As part of a new global search in key academic disciplines, the University of Birmingham now seeks to appoint a Chair in Computational Intelligence for Software Engineering to join the world-leading Natural Computation Group in the School of Computer Science. The vision is to ensure leading concepts and discoveries in this area are translated to industrial and professional sectors resulting in the highest possible external impact, working in partnership with them.

The Natural Computation Group, led by Professor Xin Yao, has been at forefront of research and applications of nature-inspired computation, especially evolutionary and neural computation. The Group members publish in top journals and conferences in evolutionary and neural computation, computational intelligence, theoretical computer science, software engineering, and other applied areas.
The research in the Group has been well-funded by external grants from UK, EU and other international agencies and industry. The Group has extensive collaboration links with leading researchers in the world. It is the founder of the USTC-Birmingham Joint Research Institute in Intelligent Computation and Its Applications (UBRI, http://ubri.ustc.edu.cn/), which has 60 researchers, including staff and students, on the USTC (University of Science and Technology of China, http://en.ustc.edu.cn/) west campus, in Hefei, China.

Two main research themes of the Group are Meta-heuristic Optimisation and Data Analytics, covering fundamental theories, algorithm development, and real-world applications. Our strategy has always been to deepen our fundamental research while growing our research activities by collaborating with partners from different industrial sectors. We are seeking a Chair who shares the same research interests as ours and can substantially deepen our research and scale-up our research activities by working closely with the Group as a team. A main emphasis of the chair-holder will be to lead development of industrial connections and new external partnerships.

We are particularly interested in candidates in computational intelligence for software engineering, which is one of our current research foci in applying advanced Meta-heuristics and Data Analytics to hard software engineering problems. However, research excellence and good fit to our research interests are our primary concerns. A strong desire and track record in connecting outstanding research to users is essential.

Meta-heuristic Optimisation and Data Analytics have tremendous potentials in solving numerous real-world problems in various industrial sectors. The Chair will play a leadership role in growing our research activities at the intersection between our expertise areas and other areas, such as software engineering, supply chain management, engineering design optimisation, etc. He/she will lead and contribute to the further development of the USTC-Birmingham Joint Research Institute in Intelligent Computation and Its Applications (UBRI) in Hefei, China, and its closer integration with the Natural Computation Group at Birmingham, to build an international centre of excellence in Meta-heuristic Optimisation and Data Analytics with physical presence in both UK and China.
The University of Birmingham is the largest civic university in the United Kingdom, and with over 6,500 staff and 30,000 students, we have a budget in excess of £500 million per annum.

The College structure encourages and enhances close working relationships particularly between diverse academic disciplines allowing it to deliver on its research excellence. It also ensures decision making is swift, allowing us to take full advantage of the fast changing higher education environment, technology advancements and financial opportunities in an increasingly competitive environment.

**Research strength**

The University of Birmingham’s research reflects its civic roots, offering one of the broadest ranges of any UK university. It is one of the UK’s most successful institutions in terms of attracting research funding, exceeding £150 million each year. This figure continues to grow year-on-year.

In 2011/12 new research grant awards went up by more than 50 per cent and this track record has been sustained.

The University has long been at the vanguard of medical research and continues to lead the way in research into the treatment of cancer, heart and liver disease, as well as infections with a global significance such as TB. The Institute of Translational Medicine, a partnership between the University and Birmingham Health Partners, is a £24 million investment building on our excellent track record in clinical trials ensuring world-class medical research translates directly into enhanced treatments for patients.

Physical Sciences boast outstanding academic and research credentials. Chemical Engineering was recognised with a Queen’s Anniversary Prize in the Golden Jubilee year of 2012 and the University has a £60 million investment from Rolls-Royce and HEFCE in the world-leading High Temperature Research Centre.

Our astrophysics and particle physics research is world renowned. Professor David Charlton is the lead spokesperson for the Atlas Experiment at CERN, which recently announced the discovery of the Higgs boson.

Our Public Service Academy set up by the College of Social Sciences uses our expertise and research activity to shape public policy. In addition we undertake Policy Commissions on topics ranging from healthy ageing to wealth distribution.

These are just a small number of research initiatives within our impressive and growing portfolio.
International presence

The University is a major player on the global stage, ranked 62nd in the world in the latest QS World University Rankings. The University has a major international research footprint, with the third largest number of Anglo-Chinese co-authored papers over the last decade. The Birmingham Guangzhou Centre is a significant extension of our co-operation with universities and government in South China. This expands our presence in China, supported by our China office, in addition to offices in Delhi, Lagos, Joinville in Brazil and Brussels.

Working with the University of Nottingham we are developing a unique collaboration to form a network of strategic partnerships with leading Brazilian universities and industry with a focus on oil and gas industries. These initiatives complement the UK Governments’ outreach work in Brazil and this year we will welcome 20 doctoral researchers to Birmingham as part of a scholarship programme.

Most recently we formally announced a strategic partnership with the University of Illinois in the US. The Birmingham Illinois partnership for Discovery, enGagement and Education (BRIDGE) confirms a commitment to engagement and cooperation between the two universities.

We have 4,000 international students from 150 countries studying on campus and 30 per cent of our academics are international. Applications from both undergraduate and postgraduate international students are at record levels.

New developments on Campus

Founded in 1901, the University of Birmingham has an outstanding campus in Britain’s second city. We continue to invest and develop our campus for the benefit of students, staff, visitors and the local community. We are committed to ensuring our facilities match our growing global reputation.

As part of our current £250 million capital programme, a new library will provide a state-of-the-art service to students and academics, whilst a new sports centre, including a 50 metre swimming pool, will open in January 2016. This facility will reflect our preeminent position, ranked 2nd in the UK for the quality of student sport.

2015 will see the UK’s first University Training School outside London open its doors, offering outstanding education for the city’s young people, with the emphasis on preparing pupils for leading universities. Central to its ethos will be its role as a centre for teacher education in the region.

Culture

The University has a strong cultural standing which enhances the academic, student and visitor experience. These include the Shakespeare Institute in the Bard’s birthplace of Stratford-upon-Avon, the Ironbridge Institute in Shropshire that celebrates the Industrial Revolution, and the Barber Institute of Fine Arts that is home to works from Canaletto to Monet, and the world’s second largest collection of Byzantine coins. Our campus also includes Winterbourne House and Gardens, an Edwardian heritage attraction housing more than 6,000 plant species from around the world.

At the heart of the campus is our newest cultural asset, the Bramall Music Building, opened in 2012. The Bramall houses our globally renowned Department of Music, ranked 2nd in the UK, and the 450 seat Elgar Concert Hall, named after the composer Sir Edward Elgar, who was the University’s first Professor of Music.
The student experience

This year we received record numbers of applications for both undergraduate and postgraduate study, and from over 75,000 applicants we will welcome approximately 8,000 new students this year to our student population of 30,000.

We continually develop and invest in the facilities, services and accommodation we offer our students. Work has begun on a state-of-the-art student service hub allowing students to access all the student support available from one location at the centre of campus.

We are proud of our record on graduate employability and students tell us every year that it is a key reason for selecting a university. We have invested £5 million in employability services to ensure students have the skills employers’ value. Our graduate employability six months after graduation is now at a record high of 93 per cent. In addition we are 10th place overall, and 1st place for self-made millionaires in the 2013 Wealth – X Survey, which measures the financial success of alumni.

Our commitment to our students has led to satisfaction ratings in the National Students Survey rising faster than the national average and now exceeds that national average at 88 per cent satisfaction, with a good proportion of our degree programmes receiving a 100 per cent satisfaction score.

Financial strength

The University's long standing foundation of financial probity allows us to invest in the facilities and services necessary for producing high-quality, cutting-edge research as well as giving students the best learning and life experiences. Our financial position allows us to plan confidently for the long-term future of the University. Our annual turnover of £500 million contributes £1 billion to the economy of the region each year.
College of Engineering and Physical Sciences

The College of Engineering and Physical Sciences is the second largest of five Colleges making up the University of Birmingham and was recently the recipient of the Queen’s Award for Research in the area of Chemical Engineering.

The College is also one of the largest such groupings in Europe, bringing together physical sciences and engineering into one coherent College which consists of nine Schools: Chemistry; Chemical Engineering; Civil Engineering; Computer Science; Electronic, Electrical and Computer Engineering (EECE); Mechanical Engineering; Materials and Metallurgy; Mathematics; and Physics and Astronomy.

The College comprises 514 academics, 252 professional, support and technical staff, 3,500 undergraduate students and over 1,500 postgraduate and research students.

The College spans an enormous breadth of disciplines affording students, staff and alumni access to learning and career development opportunities which few educational institutions can match.

Partnerships

The College has many partnership relationships with external bodies with contacts running to over 1,500 organisations each year. Some of these strategic partnerships include:

- Manufacturing Technology Centre – a translational centre for taking new methodologies and modelling methods related to manufacturing into large scale trial in alliance with over forty industrial partners.
- Caterpillar – partnership in education and research that covers vehicle technology and rail transportation focused on development of new talent.
- BP – a major programme in student development and support to ensure development of talent to meet industrial needs.
- DSTL – a research partnership relating to space communications and space-related technologies and new materials.

For more details about the College of Engineering and Physical Sciences visit:
www.birmingham.ac.uk/university/colleges/eps/index.aspx
The School has consistently been ranked in the Top 10 in UK league tables, and in The Guardian University Guide 2014, ranked first place out of 128 in the UK league table for Computer Sciences and IT.

The School has around 135 active researchers (40 permanent academic staff, 25 research staff and about 70 research students) delivering outstanding teaching and world-class research in fundamental and applied computer science, artificial intelligence, optimisation, computer security, medical imaging and robotics.

Research programmes are supported by a wide range of bodies, including UK and EU Research Councils, overseas governments and universities and UK and multi-national companies. Research is also undertaken collaboratively with universities and research laboratories throughout the world. Research is focused on the following themes:

- Artificial Intelligence and Intelligent Robotics
- Natural Computation
- Medical Image Interpretation
- Human Computer Interaction
- Security and Privacy
- Software Engineering
- Theory of Computation

Artificial Intelligence and Intelligent Robotics

Research in the group covers a wide range of interests within artificial intelligence and cognitive science. One main focus is robotics, encompassing both purely technological development and human cognitive ramifications. Other foci are on pure and applied branches of machine learning, automated reasoning (including mathematical reasoning), and natural language processing (where the work again has ramifications outwards into cognitive science). A distinctive applied research focus for the group is scientific document analysis, with a strong concentration on the automated reading and interpretation of mathematical formulas.
Natural computation

Natural computation is the study of computational systems that use ideas and get inspiration from natural systems, including biological, ecological, economic, chemical and physical systems. It is an emerging interdisciplinary area in which a range of techniques and methods are studied for dealing with large, complex, and dynamic problems. The primary application areas of natural computation include adaptive optimisation, machine learning and advanced data mining.

Medical Image Interpretation

The Medical Imaging and Image Interpretation Group is focused on finding novel, non-invasive methods of acquiring image data and extracting information from these data. Some of the recent work has been focused on developing novel techniques that allow the use of features and properties of an optical image to infer quantitative information about the structure and composition of the tissue being imaged.

Human Computer Interaction

The Centre brings together academic staff and researchers from across the University of Birmingham who are working in the field of Human-Computer Interaction. Human-Computer Interaction is a broad field and includes research spanning a range of disciplines. Core members of the centre include researchers from the School of Computer Science and from the Department of Electronic, Electrical, and Computer Engineering. Staff members from Mathematics, Psychology, Education, and Social Sciences are also involved in on-going research projects.

Security and Privacy

The Security and Privacy group researches all aspects of computing security and privacy. The research ethos of the group is to tackle problems that are important to society, including government and industry. The group is recognised as an EPSRC/GCHQ Academic Centre of Excellence in Cybersecurity Research. Much of the work and research conducted is funded by a wide range of sources including EPSRC, Microsoft, IBM, Vodafone, HP and Google.

Software Engineering

Research is focused on the systematic engineering of scalable solutions, which are targeted towards real and industrial problems and emerging large scale distributed computing paradigms (e.g. Services, Cloud). The group researches tightly intertwined issues in fundamental areas of software engineering with a focus on requirements engineering; software architecture; software modelling; software analysis, testing and verification; software economics and management; security, dependability and green aspects. The group is a world-leading contributor to synergistic areas including Search-based and Computational Intelligence for Software Engineering; Economics-driven Software Engineering; and Software Engineering in/for the Cloud.

Theory of Computation

Research focuses on the development and study of precise mathematical formalisms that can be employed for the design, specification, and verification of computer programs.

For more details about the School of Computer Science visit:

www.cs.bham.ac.uk
Appointment of Chair in Computational Intelligence for Software Engineering

As part of a new global search in key academic disciplines, the University of Birmingham now seeks to appoint a Chair in Computational Intelligence for Software Engineering.

Reporting to the Head of School of Computer Science, the post-holder will engage in and publish world-leading research and generate significant research income; undertake teaching responsibilities relevant to programmes of the School; and contribute more widely to the School through service, administration and informal leadership.

The Chair will join the Natural Computation Group in its endeavour to substantially grow our high-impact research in both depth and breadth. S/he will work closely with Group members through shared research expertise in Meta-heuristic Optimisation and Data Analytics, but can grow the research activities by bringing in new collaborations with other areas, such as software engineering, supply chain management, engineering design optimisation, etc.

Research quality and international impact will always be the highest priority for all our research activities. The Chair is expected to play a significant role in synergising the development of the Natural Computation Group at the University of Birmingham and the USTC-Birmingham Joint Research Institute in Intelligent Computation and Its Applications (UBRI) at the University of Science and Technology of China (USTC), in Hefei, China. In particular the chair-holder will develop effective relations with external and industrial users and lead development of such partnerships.

Person specification

The post-holder will be expected to evidence:

• an international reputation for excellence in research through an outstanding publications record in Meta-heuristic Optimisation and Data Analytics and peer recognition;
• an established record of attracting external funding and engagement in knowledge-transfer activities;
• demonstrated success in managing projects and working collaboratively with fellow scholars;
• demonstrated success in fostering collaboration across disciplinary boundaries and with businesses, both locally and internationally;
Appointment of Chair in Computational Intelligence for Software Engineering

continued

- demonstrated success in mentoring research activity of junior staff and PhD students;
- ability in strategic planning, showing effective implementation and evaluation for developing an internationally leading research group;
- ability to implement the mission of the School, College and University;
- commitment to the promotion of equal opportunities.

Duties and responsibilities

The substantive appointment will be as a Professor in Computational Intelligence for Software Engineering. The post-holder will be expected to:

- undertake and publish highest-quality research cognizant of relevant metrics for international impact and scholarly merit;
- generate research income through applications to major funding bodies, including UK research councils, EU, international agencies and businesses world-wide;
- play a leading role in developing the Natural Computation Group at the University of Birmingham and the USTC-Birmingham Joint Research Institute in Intelligent Computation and Its Applications (UBRI) at the University of Science and Technology of China (USTC), in Hefei, China, as a world-leader in Meta-heuristic Optimisation and Data Analytics;
- attract UK and international research talents to the Natural Computation Group through prestigious fellowships from UK, EU and overseas;
- develop long-term strategic partnerships with major international companies in collaborative research activities driving significant new partnership income;
- develop partnership with other disciplines to enhance successful inter-disciplinary grant applications and research impact;
- attract talented PhD applicants to the University of Birmingham and develop them into future research leaders;
- play a leading role in curriculum review and development;
- contribute to the planning, teaching, examining and marking of undergraduate and postgraduate modules;
- contribute to the administration, management and leadership of the Group, School, College and University as required for an appointment at this level.
Appointment process and how to apply

An executive search exercise is being undertaken by Perrett Laver. Perrett Laver will support the University in helping to identify the widest possible field of qualified candidates and assisting in the assessment of candidates against the requirements for the role.

Applications should consist of a full CV detailing academic and professional qualifications, full employment history, latest remuneration and relevant achievements and should be accompanied by a covering letter describing briefly how candidates meet the criteria in the ‘person specification’, why the appointment is of interest and what they believe they can bring to the role.

These can be uploaded at www.perrettlaver.com/candidates quoting the reference number 1645.

The closing date for applications is 12 noon (GMT) Monday 6th October 2014.

Applications will be considered by the selection committee in the week commencing Monday 20th October and shortlisted candidates will subsequently be invited for informal visits to the University, which will be followed by more formal interviews during week commencing Monday 1st December.
The City of Birmingham

Sites

Birmingham is a major European centre and the second city of the United Kingdom. It is a city of business and ballet, canals and world-class concerts, jewellery and jazz, historical interest and contemporary vision. Birmingham has a diverse community that creates a vibrant, multicultural and exciting place to live and work.

The heart of Birmingham is symbolised by Symphony Hall, considered one of the greatest concert venues in the world and a fitting home for the globally respected City of Birmingham Symphony Orchestra. Symphony Hall forms part of the impressive International Convention Centre, which overlooks attractive canals at the hub of the UK's canal network.

At the magnificent Hippodrome Theatre is the internationally renowned Birmingham Royal Ballet, adding further cultural depth to the city. Apart from London's West End, Birmingham boasts the highest concentration of live theatre in the UK, including regular tours by major opera companies.

The brand new £189 million Library of Birmingham has recently opened, housing a collection of one million books, the library also has more than 200 public access computers, theatres, an exhibition gallery and music rooms making this the largest library in Europe.

The City Museum and Art Gallery houses the world's finest collection of Pre-Raphaelite paintings, alongside a major collection of Old Masters, Modern and Contemporary pictures.

The restored Gas Hall Gallery has international touring exhibitions, while the Halcyon and Ikon galleries feature innovative contemporary works.

National landmark sites abound, including the National Indoor Arena, the National Exhibition Centre, National Motorcycle Museum, National Car Heritage Museum, Cadbury World, and the National Sealife Centre.

The iconic Bullring is one of the largest dedicated shopping facilities in Europe. Sports and recreation are also well served; the city offers international Test cricket, Premiership football, International Championship golf and top-class rugby.

The International Convention Centre and National Indoor Arena have spawned a whole new development at the centre of the city. The National Exhibition Centre, on the outskirts of the city, remains one of the largest exhibition facilities in Europe. Birmingham is also home to over 200 restaurants serving up 27 different kinds of cuisine and has more Michelin starred restaurants than any other English city outside London.
Transport and accommodation

Birmingham is at the crossroads of the UK’s motorways. From Birmingham International Airport, more than 50 different airlines operate scheduled services to 100 destinations worldwide. The University has its own railway station (250 yards from the School of Biosciences), while 50 million passengers a year use Birmingham New Street Station, which will be at the centre of the proposed high speed rail network. London is 90 minutes away by shuttle service, with trains every 20 minutes.

There is a high standard of all types of private accommodation, with high-quality affordable family housing in several attractive residential suburbs and excellent transport connections to smaller local towns. Public parks and large domestic gardens are an integral part of this green city. Birmingham is also the ideal base for exploring one of Britain’s most fascinating regions for tourism, being within an hour’s drive of Stratford-upon-Avon, Warwick, Wales, the Potteries, and the Cotswolds. Quality public and private schools are widely available, with several consistently rated in the top 10 on examination performance in annual league tables for England and Wales.