

# BP Professorship of Information Engineering

in association with Keble College



## Outline of the post

Following the retirement of Professor Sir Mike Brady, FEng, FRS the University intends to appoint to the BP Professorship of Information Engineering with effect from 1 October 2011 or as soon as possible thereafter.

This appointment is a key part of the strategic plan of the Department and University to maintain and enhance its research capabilities and its capacity to exploit synergies in Information Engineering, including computer vision, sensor systems, control and robotics. However, while applications in these areas are welcomed, the search is not limited to candidates working in them. The post holder will be expected to work with other group members to identify key areas of research potential and possible commercial exploitation. The successful candidate will be expected to provide the drive and leadership required to facilitate new research initiatives within Information Engineering.

The successful candidate will have an outstanding research record and will be of internationally recognised stature in Information Engineering. He or she will be expected to pursue a research programme at the forefront of the subject, providing research leadership to colleagues working in this field. He or she will have the opportunity to shape the direction of research in the University in the information engineering field.

The Professorship is associated with Keble College.

Further information may be obtained from Prof. G.T. Houlsby, FEng (Head of Department), Department of Engineering Science, Parks Road, Oxford, OX1 3PJ (tel. +44 (0)1865 273003, e-mail [guy.houlsy@eng.ox.ac.uk](mailto:guy.houlsy@eng.ox.ac.uk)), and all enquiries will be treated in strict confidence; they will not form part of the selection decision.

## The Department of Engineering Science

Engineering teaching and research takes place at Oxford in a unified Department of Engineering Science whose academic staff are committed to a common engineering foundation as well as to advanced work in their own specialities which include most branches of the subject. We have especially strong links with computing, materials science, medicine and also with economics and management studies. The Department employs 72 academic staff (this number includes nine statutory Professors appointed in the main branches of the discipline, and 24 other professors in the Department); in addition there are ten Visiting Professors. There is an experienced team of teaching support staff, clerical staff and technicians. The Department has well-equipped laboratories and workshops, which together with offices, lecture theatres, library and other facilities have a net floor area of about 16,000 square metres. Further information about the Department is available at [www.eng.ox.ac.uk](http://www.eng.ox.ac.uk).

The Department is part of the Mathematical, Physical and Life Sciences Division of the University. More information about the MPLS Division may be found at [www.mpls.ox.ac.uk](http://www.mpls.ox.ac.uk).

## Research

Research in the Department is particularly strong. We have approximately 280 research students and about 80 Research Fellows and Postdoctoral researchers. Direct funding of

research grants and contracts, from a variety of sources, amounts to an annual turnover of approximately £10M in addition to general turnover of about £12M. The Department achieved the highest grade (5\*A) in the 1996 and 2001 Research Assessment Exercises. In the Research Assessment Exercise of 2008, 85% of the Department's research was rated as 4\* or 3\* (world-leading or internationally excellent). The research activities of the department fall into seven broad headings, though there is much overlapping in practice: **Turbomachinery; Materials Engineering; Civil and Offshore; Information, Control and Vision; Electrical and Optoelectronic; Chemical and Process; Biomedical Engineering.**

### *Information Engineering*

Although there are no formal subdivisions within the department, Information Engineering is part of the "Information, Control and Vision" area, in the whole of which the department is particularly strong. This area has an outstanding record of intellectual contribution, with significant grant support and many international collaborations. It is also renowned for the commercial application of its work, with much patenting and spin-out activity. The main fields of research currently are computer vision, machine learning, robot navigation, medical imaging, and control. This latter area was recently afforded by the appointment of Prof. David Limebeer, FREng to the Professorship of Control Engineering.

Our research portfolio in the linked fields of Information and Vision Engineering has grown greatly since the appointment of Professor Brady in 1985, as we have developed useful new technology at the intersection of mathematics, computation and engineering science. The group has a 25 year-long record of success in attracting substantial sums of Research Council, European and industrial funding, including an EPSRC IRC, Platform Grant and Programme Grant. The work of the group have regularly been recognised by prestigious best paper awards and other accolades.

A particular long-standing strength is the department's work on **image processing** and **computer vision** (Prof. Sir Mike Brady, FRS, FREng, Prof. RW Daniel, Prof. DW Murray, Dr ID Reid, Prof. AP Zisserman, FRS). There are close links with Microsoft Research and former faculty member Prof. Andrew Blake, FREng, FRS, cemented by Prof. Zisserman's Microsoft Research/RAEng Professorship in Computer Vision Engineering. Prof. Zisserman's research on **multiple view geometry** generated the spin-out company 2d3 whose software is used for fixing objects in moving images (e.g. Harry Potter films), while Prof. Daniel's work on high quality binocular reconstruction has led to the wound-care specialist spin-out Eykona. Research on **active vision**, led by Prof. Murray and Dr Reid, looks at the link between real-time visual processing and control of cameras, and has led to important developments in visual tracking and visual surveillance. Over the last seven years Prof. Reid and Prof. Murray's groups have been at the epicentre of worldwide interest in **visual SLAM** (Simultaneous Localisation and Mapping). This latter area has much cross-over into **robotics**, especially **robot navigation**, and there is strong research into mobile robotics led by Dr Paul Newman with a particular emphasis on sensor exploitation (laser, vision and radar) and long-term, large-scale navigation via machine learning and inference techniques. This work has recently begun to focus on transport as a compelling and relevant application domain, with significant industrial funding and support from BAe Systems and Nissan.

Work on **machine learning** (Prof. SJ Roberts, Prof. AP Zisserman) uses statistical signal-processing and classification to seek patterns in data generated, for example, by gene micro-arrays (with Plant Sciences), ECGs and EEGs, speech (with Mathematics), as well as in images and videos. Prof. Roberts participates in several consortia developing techniques to fuse data from disparate sources to present a coherent picture of the external environment. His methods are exploited by financial market traders, and Prof. Roberts has a part-time appointment in Oxford's Man Institute of Quantitative Finance.

The group's historical (and world-leading) work on **medical imaging** (Prof. Sir Mike Brady FRS FREng, Prof. JA Noble, FREng) was developed as part of the Information Engineering group, and led to the successful spin-out Mirada Medical in 2001. Research in this area remains strong, though its focus is now more closely aligned with the interdisciplinary Institute of Biomedical Engineering. However there remain significant areas of overlap and crossover with work on **non-medical vision**. Likewise work on **medical signal processing** (Prof. L Tarrasenko, FREng) has much in common with Roberts' work.

Control engineering is a long-standing area of active research within the Department. The current areas of activity include predictive, adaptive and robust control, linear and nonlinear systems theory, fault diagnosis, network theory and the design and implementation of feedback control systems for regulating novel distributed parameter processes. More recently, the scope of the group's research has been expanded to include systems biology and large scale networked systems, and the control of multi-body and distributed mechanical systems such as road and air vehicles.

Further details of all the Department's research, research sponsors, and our undergraduate programme can be found on the Departmental web site: [www.eng.ox.ac.uk](http://www.eng.ox.ac.uk).

The Department has well-equipped laboratories with Information Engineering being centred on our purpose-built Information Engineering Building, opened in 2004. In particular there is access to first class computation and network facilities. It also has access to facilities across the University and at the Begbroke Science Park.

### *Teaching*

We aim to admit 160-180 undergraduates per year, all of whom take 4-year courses leading to the MEng degree. Around 80% of the undergraduates read the broadly-based Engineering Science course. The remainder study for a joint degree in Engineering, Economics and Management. The courses are accredited at MEng level by the major engineering Institutions. The syllabus has a common core extending through the first two years. Specialist options are introduced in the third year, and the fourth year includes further specialist material and a major project.

### **The Oxford Collegiate system**

As well as working in the Department of Engineering Science, the appointee will also be a fellow of Keble College. There are 38 self-governing and independent colleges at Oxford, giving both academic staff and students the benefits of belonging to a small, interdisciplinary community as well as to a large, internationally-renowned institution. The collegiate system fosters a strong sense of community, bringing together leading academics and students across subjects, and from different cultures and countries.

### **KEBLE COLLEGE**

The appointee will be a non-stipendiary professorial fellow of Keble College. He or she will have full entitlement to common table, with free lunch and dinner whenever the College is open. He or she will also be entitled to an academic allowance of £927 and a student allowance of £217 (current rates). He or she will have access to college rooms for teaching/organizing academic meetings, and for social events. He or she will be a member of the Governing Body and will be expected to attend its meetings (three per term) and play a full part in the governance of the College, including sitting on its sub-committees. Professorial fellows may be called upon to hold certain college offices and, if willing to undertake these additional duties, receive an extra stipend. Professorial fellows may also be asked to act as college advisers for graduate students in their field, and it is hoped that they will play a role in encouraging and developing the research culture within the College.

Keble College was founded by public subscription in 1870. It is one of the largest colleges in Oxford and has well over 600 students, of whom over 200 are graduate students. It is located in Parks Road opposite the University Museum, and is the closest college to the Engineering Science department.

There are eight statutory chairs currently allocated to the College, including the BP Professorship of Information Engineering, plus three further professorial fellows (Professor Tim Jenkinson, Professor of Finance at the Saïd Business School, Professor Paul Jeffreys, Director of Information Technology for Oxford University and Co-Director of the e-Horizons Institute, and Mrs Alena Ptak-Danchak, Keeper of Scientific Books). There are at present 40 members of the College Governing Body. In addition, Keble has 13 research fellows.

Keble is one of the leading colleges in the fields related to this chair, being strong not only in Engineering but also in Computer Science, Medicine including Neuroscience, Mathematics, and Physics. Indeed, our very close proximity to the science departments and our long history of strength in these subjects has led to Keble being seen by many as a 'science' college, though we do not share that view ourselves. However, we seek to build upon these strengths through this appointment, which represents an important part of our efforts to develop depth in as many subjects as possible.

In Engineering, we are the largest college in the University: we have one Professorial Fellowship (vice Brady), one Reader (Prof. Richard Darton), two Tutorial Fellows (Prof. Paul Taylor and Dr Stephen Payne) and one Research Fellow (Dr Piotr Orłowski), with 36 undergraduate and 16 MSc/DPhil students in residence. In Mathematics, as well as a range of other research strengths, we have recently associated with a new chair in partial differential equations, which has a particular connection to our Engineering research areas, both for the Information Engineering post and for Prof. Taylor (water wave dynamics in offshore engineering) and Dr Payne (fluid mechanics of blood flow). Keble Fellows have participated in setting up the "Imaging" interdisciplinary research cluster, established in the last year. This brings together Biomedical Fellows with Engineers and Chemists within Keble and is enhanced by pump-priming modest-scale funding from College resources. Two pairs of Fellows within this cluster have won substantial external grant funding for their laboratories based on their collaborative work in this group. A further key intention of the Imaging Cluster is to invite visiting academics interested in any aspect of Imaging to College to present on their own expertise and stimulate interest in broader areas than they customarily experience in their own research labs, among our community of graduates and post-docs.

Keble has recently announced a bold plan to develop an Advanced Studies Centre within its £45 million redevelopment of the Acland Hospital site in Banbury Road, five minutes' walk from the main College site, and opposite the Department of Engineering Science. The Advanced Studies Centre will provide a focus for research activities across the College. Its aims are defined as being "to encourage and support the pursuit of knowledge and understanding both within and across disciplines and to facilitate interactions both within the College and with communities of scholars beyond it."

Potential applicants can find out more about Keble College at: [www.keble.ox.ac.uk](http://www.keble.ox.ac.uk)

### **Duties of the post**

The professor will be a member of both the University and the college community. He or she will be part of a lively and intellectually stimulating research community which performs to the highest international levels in research and publications and will have access to the excellent research facilities which Oxford offers.

The professor's duties will include the following.

- Research and the general supervision and leadership of research in Information Engineering and more generally in the Department of Engineering Science.
- Teaching, including lectures, classes, laboratory demonstration, supervision of undergraduate and masters' projects, and supervision of doctoral students.
- University examining, as and when requested to do so by a committee for the nomination of examiners
- Administration, including participation in and chairing of relevant committees in the Department and in the wider University, and undertaking relevant administrative roles.
- Head of Department: every professor or reader who is employed by the University may be invited by Council to act as Head of Department and, unless individually exempted, has the formal obligation to accept the headship. Recent practice, however, has been that the Head is chosen by an election within the Department every five years, and the Department's choice is ratified by Council. The present Head of Department is Prof. Guy Houlsby, FREng, whose period in office extends to 30<sup>th</sup> June 2014.

### Selection criteria

Applications will be judged only against the criteria which are set out below. Applicants should make sure that their application shows very clearly how they believe that their skills and experience meet these criteria.

Oxford is committed to fairness, consistency and transparency in selection decisions, and unsuccessful applicants may request feedback against the published selection criteria for the specific post. (We are, however, unable to provide general advice about the suitability of applicants' qualifications and experience for future vacancies in Oxford or elsewhere.) Chairs of selection committees (known as electoral boards) will be aware of the principles of equality of opportunity and fair selection and there will be a member of each gender on the selection committee.

The selection criteria for this post are as follows:

<b>REQUIREMENTS</b>	<b>ESSENTIAL or DESIRABLE</b>	<b>ASSESSED BY:</b>
<i>The postholder must be able to demonstrate:</i>		
<i>Substantial international reputation in scholarship and research and excellent publication record in international journals in Information Engineering.</i>	<i>Essential</i>	<i>application, interview</i>
<i>The vision, leadership and ability to manage a substantial research team, to train, guide and motivate research students and junior colleagues, and to establish a leading research presence in the University.</i>	<i>Essential</i>	<i>application, interview</i>
<i>The ability to develop and present proposals for funding, and an established record in attracting research grant support.</i>	<i>Essential</i>	<i>application, presentation, interview</i>
<i>The ability and readiness to contribute to the development and management of the Department of Engineering Science and the wider University.</i>	<i>Essential</i>	<i>application, interview</i>
<i>A past record of and commitment to providing</i>	<i>Essential</i>	<i>application,</i>

<i>effective teaching at undergraduate and postgraduate level, including successful supervision of graduate students.</i>		<i>presentation, interview</i>
<i>The ability to communicate effectively (in writing and orally).</i>	<i>Essential</i>	<i>application, presentation, interview</i>
<i>Evidence of engagement with the wider engineering profession at a senior level</i>	<i>Desirable</i>	<i>application</i>

### **Sabbatical leave and outside commitments**

All professors may apply for sabbatical leave to allow them to focus on their research. In general, one term of leave is available for each six terms worked. This leave may either be taken as one term of leave after 6 terms of service, or accumulated and taken as one year of leave after 6 years of service.

Professors may also spend up to 30 working days in each year on projects outside their employment duties, such as consultancy, spin-out activity and membership of research councils and other bodies, and there is no limit to the amount of money which staff may earn from these activities. Full details are available on the university website at [www.admin.ox.ac.uk/ps/staff/codes/outsidecov.shtml](http://www.admin.ox.ac.uk/ps/staff/codes/outsidecov.shtml). Guidance on ownership of intellectual property ([www.admin.ox.ac.uk/statutes/regulations/182-052.shtml](http://www.admin.ox.ac.uk/statutes/regulations/182-052.shtml)) and managing conflicts of interest ([www.admin.ox.ac.uk/rso/integrity/#Conflict](http://www.admin.ox.ac.uk/rso/integrity/#Conflict)) is also available on the university website.

### **Pay and conditions**

#### *Salary, benefits and pension*

The salary of the appointee will be determined by the Vice-Chancellor, after appropriate consultation. In addition the professor will be eligible for consideration, in regular reviews, for one of a number of additional salary awards which may be made in recognition of outstanding academic distinction and/or contribution to the academic work of the University (e.g. in leadership in, or in the development of, some field of study).

The salaries of professors at Oxford are generally above the average of those in other leading UK universities.

An additional pensionable allowance (currently £20,985 per annum) will be payable in respect of any period during which the professor is Head of Department. Any allowance payable for a period of less than three years will not, however, be pensionable.

Eligible staff may join the Universities Superannuation Scheme. Details are available on the website at <http://www.admin.ox.ac.uk/finance/pensions/uss/>

#### *Relocation expenses*

The University has a generous relocation expenses scheme for eligible staff, which covers removal and travelling expenses connected with relocation, as well as up to £6,500 to cover professional fees in appropriate cases. Further details are available on the website at <http://www.admin.ox.ac.uk/finance/expenses/relocationscheme/>.

#### *Assistance with house purchase*

Where difficulty arises in regard to housing for a professor moving to the Oxford area to take up appointment (e.g. as may be the case where the move is from an area in which housing

costs are substantially lower than in Oxford), the University will facilitate arrangements to assist house purchase.

#### *Residence*

Professors are required to reside within the University (*i.e.* within twenty-five miles of Carfax, the central point of Oxford) during at least six months in each academic year, between 1 October and 1 August, and in particular during not less than six weeks of each term.

#### *Length of appointment*

The professorship is tenable until retirement. The normal retirement age is 65, but those who are able to demonstrate an interest in a later retirement date under the University's procedures (details are available on request) may retire at a later date.

#### *Family support*

The University has generous maternity and adoption leave arrangements, and also offers support leave to fathers and partners. Details are available on the website at [www.admin.ox.ac.uk/ps/staff/family](http://www.admin.ox.ac.uk/ps/staff/family).

All staff are eligible to apply to use the University nurseries (although there is a long waiting list for nursery places), and the full range of tax and National Insurance savings scheme is in operation. Details are available on the University's childcare website at <http://www.admin.ox.ac.uk/eop/child/>.

The University will try to accommodate flexible working patterns as far as possible and there is considerable flexibility in the organisation of duties. More information on family support and flexible working policies is available on the website at [www.admin.ox.ac.uk/ps/staff/family](http://www.admin.ox.ac.uk/ps/staff/family).

#### *Facilities and services*

The University has a range of facilities and benefits for its staff; more details are available on the website at [www.admin.ox.ac.uk/ps/staff/benefits](http://www.admin.ox.ac.uk/ps/staff/benefits).

The University Disability Office provides support to staff and students with a disability and may be contacted through its website at [www.admin.ox.ac.uk/eop/disab](http://www.admin.ox.ac.uk/eop/disab).

#### *Equality of opportunity*

The policy and practice of the University of Oxford require that all staff are offered equal opportunities within employment. Entry into employment with the University and progression within employment will be determined only by personal merit and the application of criteria which are related to the duties of each particular post and the relevant salary structure. In all cases, ability to perform the job will be the primary consideration. Subject to statutory provisions, no applicant or member of staff will be treated less favourably than another because of age, disability, gender reassignment, marriage or civil partnership, pregnancy or maternity, race, religion or belief, sex, or sexual orientation.

### **The University of Oxford**

The University of Oxford aims to sustain excellence in every area of its teaching and research, and to maintain and develop its position as a leader amongst world-class universities. Placing an equally high value on research and on teaching, the colleges, departments and faculties of Oxford aspire both to lead the international research agenda and to offer a unique and exceptional education to our undergraduate and graduate students.

Oxford's self-governing community of scholars includes university professors, readers, and lecturers, college tutors, senior and junior research fellows and over 2,500 other university

research staff. The University aims to provide facilities and support for colleagues to pursue innovative research and outstanding teaching, by responding to developments in the intellectual environment and society at large, and by forging close links with the wider academic world, the professions, industry and commerce. The Strategic Plan, detailing strategy for the period 2008-12, can be found at [www.admin.ox.ac.uk/prs/planningcycle/stratplan.shtml](http://www.admin.ox.ac.uk/prs/planningcycle/stratplan.shtml).

Research at Oxford combines disciplinary depth with an increasing focus on inter-disciplinary and multi-disciplinary activities addressing a rich and diverse range of issues, from deciphering ancient texts and inscriptions using modern scientific and computational methods developed in Oxford, through to global health, climate change, ageing, energy and the effects on our world of rapid technological change.

Oxford seeks to admit undergraduate students with the intellectual potential to benefit fully from the college tutorial system and small group learning to which Oxford is deeply committed. Meeting in small groups with their tutor, undergraduates are exposed to rigorous scholarly challenge and learn to develop their critical thinking, their ability to articulate their views with clarity, and their personal and intellectual confidence. They receive a high level of personal attention from leading academics.

Oxford has a strong postgraduate student body which now numbers about 7,000, well over a third of the full-time students. Postgraduates are attracted to Oxford by the international standing of the faculty, by the rigorous intellectual training on offer, by the excellent research and laboratory facilities available, and by the resources of the museums and libraries, including one of the world's greatest libraries, the Bodleian Library.

### **Medical questionnaire and the right to work in the UK**

The appointment will be subject to the satisfactory completion of a medical questionnaire and the provision of proof of the right to work in the UK.

Applicants who would need a work visa if appointed to the post are asked to note that under the UK's new points-based migration system they will need to demonstrate that they have sufficient points, and in particular that:

(i) they have sufficient English language skills (evidenced by having passed a test in basic English, *or* coming from a majority English-speaking country, *or* having taken a degree taught in English).

*and*

(ii) that they have sufficient funds to maintain themselves and any dependents until they receive their first salary payment.

Further information is available at:

[www.ukba.homeoffice.gov.uk/workingintheuk/tier1/general/eligibility](http://www.ukba.homeoffice.gov.uk/workingintheuk/tier1/general/eligibility).

### **How to apply**

There is no application form. Applications must include:

- your full contact details including email and full postal addresses, and a telephone number
- a covering letter or statement explaining how you meet the criteria set out above
- a full CV and publications list

- an indication of where you first heard about this post
- the names and contact details (postal and e-mail addresses, telephone and fax numbers) of precisely **three** referees.

You should contact all three of your referees before applying, to ensure they are aware of your application and of the requirements for the post, and to ensure that they would be content to write a reference for you for this post, if they were asked to do so.

The University will assume that it is free to approach your referees at any stage unless your application specifies otherwise. Therefore if you would prefer a referee or referees to be approached only with your specific permission or if you would prefer them to be approached only if you are being called for interview on the final short list, then you must state this in your application, alongside the details of the relevant referee(s). You should provide the names and full contact details of three referees even if you do not wish them to be contacted yet.

If you are shortlisted but only Oxford references are available for you, you will be asked at a later stage to provide the name of an additional referee outside Oxford.

Applications should be sent by email to Dr Gwen Booth, Personnel Officer, Senior Appointments at [professorships@admin.ox.ac.uk](mailto:professorships@admin.ox.ac.uk).

The deadline for applications is **Monday 21 February 2011**.

Should you have any queries about how to apply, please contact Mrs Elaine Eastgate at [professorships@admin.ox.ac.uk](mailto:professorships@admin.ox.ac.uk) or telephone: +44 (0) 1865 280189.

Oxford welcomes applications from candidates who have a disability. These further particulars will be made available in large print, audio or other formats on request. Applicants invited for interview will be asked whether they require any particular arrangements to make the interview more convenient and effective for them.

All data supplied by candidates will be used only for the purposes of determining their suitability for the post and will be held in accordance with the principles of the Data Protection Act 1998 and the University's Data Protection Policy (available on the website at [www.admin.ox.ac.uk/councilsec/dp/policy.shtml](http://www.admin.ox.ac.uk/councilsec/dp/policy.shtml)).

### **Consideration of applications**

All applications will be acknowledged as soon as possible after receipt and will be considered by the board of electors as soon as possible after the closing date. The membership of the board of electors will be published in the University Gazette ([www.ox.ac.uk/gazette](http://www.ox.ac.uk/gazette)) as soon as it is finalised.