

Electronic, Electrical and Computer Engineering PhD (Human Interface Technologies specialism)

Postgraduate doctoral research degree in Electronic, Electrical and Computer Engineering PhD/MSc by Research (Human Interface Technologies specialism):

The Human Interface Technologies Team, formed in 2003, brings together multidisciplinary researchers within the School who focus on human-centred research issues related to future interactive technologies, including task and usability analysis, human factors integration, ergonomics, design and evaluation of advanced interfaces, user and open learner modelling and artificial intelligence in education.

[Study here and find out why the University of Birmingham has been awarded The Times and The Sunday Times University of the Year 2013-14 \(http://www.birmingham.ac.uk/news/latest/2013/09/20-sep-Birmingham-announced-as-University-of-the-Year.aspx\)](http://www.birmingham.ac.uk/news/latest/2013/09/20-sep-Birmingham-announced-as-University-of-the-Year.aspx)

Course fact file

Type of Course: Doctoral research

Study Options: Full time

Duration: PhD - 3 years full-time; MSc by Research - 1 year full-time, 2 years part-time

Start date: Registration for PhD and MSc by Research study can take place at the beginning of any month

Related courses

[Postgraduate doctoral research programmes - Electronic, Electrical and Computer Engineering \(/schools/eece/postgraduate/research.aspx\)](/schools/eece/postgraduate/research.aspx)

Contact

Admissions Tutor: Professor Xiao-Ping Zhang

[Contact us online \(http://bham.hobsons.co.uk/ask.aspx?cid=1223&did=24\)](http://bham.hobsons.co.uk/ask.aspx?cid=1223&did=24) or at +44 (0)121 414 7395.

[School of Electronic, Electrical and Computer Engineering \(/schools/eece/index.aspx\)](/schools/eece/index.aspx)

Details

The Human Interface Technologies Team, formed in 2003, brings together multidisciplinary researchers within the Department who focus on human-centred research issues related to future interactive technologies, including task and usability analysis, human factors integration, ergonomics, design and evaluation of advanced interfaces, user and open learner modelling and artificial intelligence in education.

Areas of expertise

Historically, the team's areas of expertise have evolved from the pioneering efforts of the Pervasive Systems Research Group (<http://wear-it.net> (<http://wear-it.net/>)). From the delivery of educational material via domestic appliances to the distribution of spatial information in forensic archaeology, there are countless human-centred applications waiting to benefit from pervasive computing. Human factors issues are crucial to the success of pervasive computing, helping to ensure that the component technologies – be they portable, wearable or embedded in familiar, everyday objects and equipment – are not only dependable and adaptable to all situations of use, but are also intuitive and non-invasive to the many thousands of potential users. Members of the team have also been instrumental in forming a new UK initiative – Learner Modelling for Reflection (LeMoRe) – together with the Universities of Glasgow and Leeds. The aims of LeMoRe are to advance the theoretical study and the application of approaches to opening the learner model to learners and others involved in the learning process, such as teachers and peers. In doing this, researchers hope to promote an awareness of the potential of this field as a valuable contribution to building hardware and software solutions across a range of learning contexts, such as lifelong learning, training, school and higher education and in the understanding of pedagogical issues in resource-based learning, problem-based learning, instruction and assessment-based learning.

The team also has a particular interest in virtual or synthetic environments, in particular the application of emerging games engine and web-sourced 3D modelling/run-time resources to real-world problems and the exploitation of VR, augmented reality and related technologies to applications in defence, health care, psychology and archaeology.

Research involvements

The team is involved with the international Virtual Heritage Network (www.virtualheritage.net (<http://www.virtualheritage.net/>)) and the Institute for the Visualization of History (www.vizin.org (<http://www.vizin.org/>)) and has been involved in such exciting projects as the Cuneiform tablet writing system study (www.cuneiform.net (<http://www.cuneiform.net/>)) and the reconstruction of parts of the North Sea basin as they existed (and were populated) over 10,000 years ago. This project combines the very best in VR modelling and run-time practice, using seismic survey data from the oil and gas industry for reference topography, but also introduces artificial life (ALife) – the propagation of fauna based on geographical, geological and meteorological knowledge – driven by microscopic elements (such as pollen) extracted from seabed core samples.

This research has been extended to include the modelling of complex marine ecosystems, as they colonise Europe's first artificial reef, the scuttled Royal Navy Frigate HMS Scylla. Working together with colleagues from the National Marine Aquarium, the Marine Biological Association, the University of Plymouth and Plymouth Marine Limited, a dynamic virtual model of the Scylla is being developed. The relationship with these institutions has also recently been boosted as a result of the HIT Team's collaboration with the new European Centre for Environment & Human Health. The Team is undertaking a unique research programme addressing the exploitation of virtual rural scenarios to achieve similar positive mental health and well-being effects to those found when exposing individuals to their real-world counterparts. The project, called VRET (Virtual Restorative Environment Therapy), sets out to model forested and coastal regions and to investigate the importance of visual, auditory and olfactory fidelities on a range of subjective and objective (psychophysiological) parameters.

The team is also involved in a large-scale 12-partner European FP7 project, leading the work on learner modeling for 21st Century skills, aimed at school-level

stakeholders. It has a strong focus on formative assessment and feedback, and supporting teachers' decision-making in the classroom.

Academic collaborations

The team is also one of the main academic collaborators within the Ministry of Defence Human Factors Integration Defence Technology Centre (www.hfidtc.com), conducting research in the analysis of command and control tasks, network-centric warfare, situational awareness and synthetic environments (especially as applied to human interface development for unmanned vehicles), and developing new methods of battlefield information distribution between command centres and field personnel equipped with wearable computing technologies. The DTC researchers also coordinate the dissemination of information from the centre as a whole to the national and international defence community.

Serious gaming

The HIT Team has, since 2005, become recognised as an international leader in the human-centred development of serious games, courtesy both of internal research programmes and those associated with the HFI DTC. Serious gaming is a field of endeavour that focuses on the exploitation of high-quality computer games and associated software tools such as those underpinning the 'first person shooter' (FPS) or 'role-playing' (RP) games. These tools which include Unity3D, Quest3D and Blender, enable simulation and serious games developers to design and build their own interactive 3D content, including internal and external environments, virtual humans or 'avatars', vehicles and visually rich scenarios.

With nearly 25 years of experience in the interactive 3D or Virtual Reality arena, the HIT Team has been pioneering the development and uptake of serious games technologies in the UK. The Team's participation within the UK's Human Factors Integration Defence Technology Centre has also provided a range of excellent opportunities to work closely with stakeholders and end users in the development of methodologies supporting human-centred design for serious games-based part-task trainers. In particular, the Team's research is helping to avoid the technology push failures evident in the VR "era" of the 1990s by developing and evaluating demonstrators that emphasise the critical importance of exploiting human factors knowledge when specifying issues such as task and context fidelity, learning content, evaluation metrics and interactive technology appropriateness. Examples of the Team's work to date include part-task trainers for close-range naval weapons procedures, submarine safety systems awareness and periscope skills training, defence mental health therapy support (including recent developments in virtual restorative environments for rehabilitation), explosive ordnance disposal, unmanned air and ground vehicles, specialist surgery and healthcare (including participation in the US Pulse!! virtual healthcare project), and marine archaeology (the Virtual Scylla artificial reef initiative). The Team is also active in the advanced telerobotics arena, conducting human factors research in support of simulated robotic vehicle and manipulator design and operation.

Facilities

The HIT Team has a range of interactive 3D devices available to researchers, although each project typically demands its own unique hardware and software solution, especially if early research is conducted in the field or later experimentation/evaluation has to be carried out with subject matter experts who are not part of the immediate academic team. Over the years, the Team has developed its own hardware solutions, including wearable computing and augmented reality devices, in addition to collaborating with companies developing specific interaction solutions, from haptic feedback devices to novel olfactory/scent delivery techniques.

Related links

- [School of Electronic, Electrical and Computer Engineering \(/schools/eece/index.aspx\)](http://schools/eece/index.aspx)
- [Human Factors Integration Defence Technology Centre \(http://www.hfidtc.com\)](http://www.hfidtc.com)
- [Human computer interaction \(/research/activity/eece/human-computer/index.aspx\)](http://research/activity/eece/human-computer/index.aspx)

Why study this course

Our research and teaching stretches from materials, devices and systems - with close links with physics - through the generation and distribution of electrical energy, the railway network, communications and applied computing, to activities in serious games and human interaction technologies, which border on applied psychology.

With 30 academic staff and nearly 40 support staff, it's likely that we will be active in whichever aspect of Electrical and Computer Engineering is of interest to you. Our turnover on research is around £3million per year, which comes from a variety of sources including UK government and industry as well as the EU. We are keen to welcome new students who have ability, enthusiasm and commitment.

Over 25 years, the Institution of Engineering and Technology (IET) has recognised our taught programmes as the first step towards professional chartered engineer status, and accreditation of our courses was confirmed by the IET in 2008.

In the 2008 Research Assessment Exercise, 85% of our research was judged to be of international standing while 60% was internationally leading. Our aim is to maintain and improve on this high quality in all aspects of our work.

Fees and funding

[Standard fees \(/postgraduate/dr-fees/tuition.aspx\)](http://postgraduate/dr-fees/tuition.aspx) apply.

Learn more about [fees and funding \(/postgraduate/dr-fees/index.aspx\)](http://postgraduate/dr-fees/index.aspx)

Scholarships and studentships

For home/EU applicants, full funding from EPSRC or from other sources can usually be arranged through us; the closing date for EPSRC studentships is late June, please contact the School directly for more information. Alternatively email financialsupport@bham.ac.uk (<mailto:financialsupport@bham.ac.uk>).

International students can often gain funding through overseas research scholarships, Commonwealth scholarships or their home government.

Entry requirements

The normal entrance requirements for MSc by Research or PhD study are a first degree of at least good UK upper second-class Honours standard, an appropriate standard of English and adequate financial support. The requirements also allow for entry based on comparable ability, as indicated by a good UK MSc performance or a lower first degree performance plus substantial relevant experience.

Learn more about [entry requirements \(/postgraduate/requirements-dr/step1.aspx\)](http://postgraduate/requirements-dr/step1.aspx).

International students

We accept a range of qualifications from different countries – learn more about [international entry requirements \(/postgraduate/requirements-dr/step1.aspx\)](http://postgraduate/requirements-dr/step1.aspx).

[Standard English language requirements \(/postgraduate/requirements-pgt/international/index.aspx\)](http://postgraduate/requirements-pgt/international/index.aspx) apply.

How to apply

Learn more about [applying \(/postgraduate/requirements-dr/index.aspx\)](http://postgraduate/requirements-dr/index.aspx)

When clicking on the Apply Now button you will be directed to an application specifically designed for the programme you wish to apply for where you will create an account with the University application system and submit your application and supporting documents online. Further information regarding how to apply online can be found on the [How to apply pages](#) (<http://www.birmingham.ac.uk/students/courses/postgraduate/apply-pg/index.aspx>)

[Apply now \(https://pga.bham.ac.uk/lpages/EPSo19.htm\)](https://pga.bham.ac.uk/lpages/EPSo19.htm)

Related links

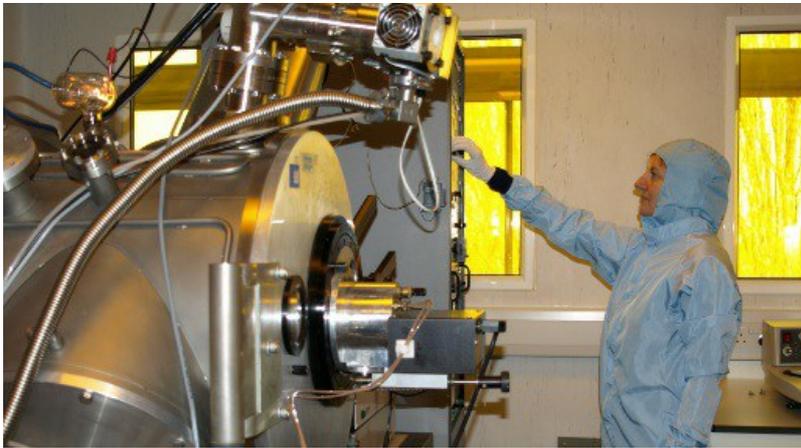
[Postgraduate degree courses - Electronic, Electrical and Computer Engineering \(/schools/eece/postgraduate/index.aspx\)](#)

Related news and events

[A class act: empathetic robot tutors in classrooms to facilitate teaching and learning \(/research/our/news/items/robots.aspx\)](#)

Research interests of staff

The School of Electronic, Electrical and Computer Engineering (EECE) at the University of Birmingham employs some 30 full-time academic staff and approximately 60 research assistants, and has a population of around 100 Doctoral Researchers. EECE has an annual income of around ?3 million. Research is supported through grants from the European Union, UK Research Councils, the Ministry of Defence, and UK Industry.



EECE has a long-standing international reputation in research related to **Microwave Engineering and Radar Systems** and to **Power and Control**, particularly in **Rail Systems**. Over the past decade, it has been investing in, and growing, research in areas related to **Computer Systems Engineering**.

Research themes

[Microwave systems and devices \(/http://www.birmingham.ac.uk/research/activity/eece/systems-devices/index.aspx\)](#)

The primary (but not only) concern of this research centre is the development of devices and systems for communications and radar. The centre's research covers both basic science and applications. An example of basic science is the work on materials such as dielectrics, ferroelectrics and superconductors. This basic work is complemented by the development of devices such as new, passive and active microwave circuits for real world applications. In addition there is significant work on radar and communication systems.

[Birmingham Centre for Railway Research and Education \(/http://www.birmingham.ac.uk/research/activity/railway/index.aspx\)](#)

The Birmingham Centre for Railway Research and Education brings together a multidisciplinary team from across the University to tackle fundamental railway engineering problems. The team actively engage with industry, other universities through Rail Research UK-A, and international partners. The centre also delivers the MSc postgraduate programme in Railway Systems Engineering and Integration.

[Human computer interaction \(/http://www.birmingham.ac.uk/research/activity/eece/human-computer/index.aspx\)](#)

Research at the HCI Centre includes intelligent interaction, natural interaction, utilizing speech, gesture, activity and emotion, social computing, digital economy, future digital technologies, fusing physical and virtual domains, mobile and ubiquitous computing, and the psychology of interaction.

Related research

- [Human computer interaction - Electronic, Electrical and Computer Engineering research \(/research/activity/eece/human-computer/index.aspx\)](#)
- [Electronic, Electrical and Computer Engineering Research \(/research/activity/eece/index.aspx\)](#)

Related staff

[Professor Robert Stone \(/staff/profiles/eece/stone-bob.aspx\)](#)

Employability

About ten per cent of our higher degree students work externally, employed full-time. We have particularly strong links with BT, the Defence Research Agency, London Underground Ltd and Kodak Ltd. Our research is funded roughly 50:50 by the EPSRC and industry/EU.

University Careers Network

Preparation for your career should be one of the first things you think about as you start university. Whether you have a clear idea of where your future aspirations lie or want to consider the broad range of opportunities available once you have a Birmingham degree, our Careers Network can help you achieve your goal.

Our unique careers guidance service is tailored to your academic subject area, offering a specialised team (in each of the five academic colleges) who can give you expert advice. Our team source exclusive work experience opportunities to help you stand out amongst the competition, with mentoring, global internships and

placements available to you. Once you have a career in your sights, one-to-one support with CVs and job applications will help give you the edge.

If you make the most of the **wide range of services** (<https://intranet.birmingham.ac.uk/as/employability/careers/college/eps/index.aspx>) you will be able to develop your career from the moment you arrive.

Destinations of Leavers from Higher Education (DLHE) 2011/12 (postgraduate taught graduates)

The DLHE survey is conducted 6 months after graduation.

Examples of employers

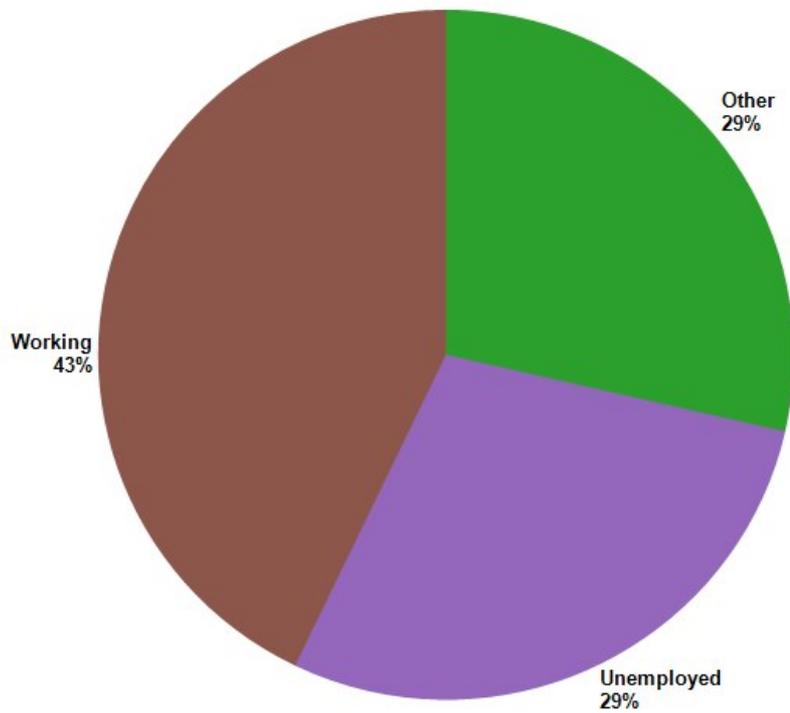
- Aero Engine Controls
- Jaguar Land Rover
- Ministry of Defence
- Price Waterhouse Coopers
- Ernst and Young
- Arup
- Glaxo SmithKline
- NHS
- Talk Talk
- Autologic

Examples of occupations

- Electronic Engineer
- Applications Engineer
- Communications (Electronic) Engineer - Officer
- Optimisation Consultant
- Manufacturing Engineer
- Junior Business Analyst
- Test Engineer
- Service Specialist
- IT Analyst
- Development Engineer

Further study - examples of courses

- MSc Project Management



- MSc Radio Frequency and Microwave Engineering
- MSc Electronic and Computer Engineering
- MSc Physics and Technology
- Postgraduate Certificate in Education - teaching
- AAT accountancy

Visit the **Careers section of the University website** (<https://intranet.birmingham.ac.uk/as/employability/careers/college/eps.aspx>) for further information.