

# Electronic, Electrical and Computer Engineering PhD (Multimodal Interaction Technologies specialism)

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

The goal of our research is to develop the novel theories, algorithms and computer architecture needed to create the technological components of effective multimodal interactive systems.

The group comprises nine academic staff, plus postdoctoral research staff and full-and part-time PhD students. Our research students come from diverse academic backgrounds, ranging from electronic and electrical engineering, mechanical engineering, physics, chemistry, mathematics and computer science, to speech science and linguistics.

**[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 Systems Engineering \(/schools/eece/postgraduate/research.aspx\)](/schools/eece/postgraduate/research.aspx)**

### Contact

Admissions Tutor: Professor Martin Russell

**Contact us online (<http://bham.hobsons.co.uk/ask.aspx?cid=1223&did=24>)** or at +44 (0)121 414 3093.

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

## Details

The goal of our research is to develop the novel theories, algorithms and computer architecture needed to create the technological components of effective multimodal interactive systems. The group comprises nine academic staff, plus postdoctoral research staff and full-and part-time PhD students. Our research students come from diverse academic backgrounds, ranging from electronic and electrical engineering, mechanical engineering, physics, chemistry, mathematics and computer science, to speech science and linguistics.

### Current activities

Current activities include:

- Fundamental and applied research into computer vision and speech
- Image and signalling processing
- Reconfigurable computing
- Technologies for multimodal human-machine interaction (including speech, eye-movement, gesture and tangible interfaces)
- Acoustics
- Music technology

Broader control and decision-support interests are in devising new techniques for handling uncertainty and complexity, and employing intelligence, learning and adaptation. These methods are being applied to target tracking, control of industrial processes, online decision support and control for water supply and wastewater systems.

### Current and recent projects

Examples of current or recent projects include:

- Collaboration with the Medical School in medical image processing
- Basic research in computer vision, including colour image interpretation and symmetry analysis
- Real-time video processing for object tracking and event analysis with application to intelligent video surveillance and autonomous vehicle navigation
- Applications of novel computer architectures, particularly reconfigurable computing, to real, computationally complex problems
- Research into vehicle hazard warning, as part of the EU 'RADARNet' project
- Collaboration with BT Exact, Enigma Technologies and others in the DTI/EPSC 'PUMA' project on personalised spoken language interfaces and 'conventional biometrics'

- Collaboration with the School of Psychology on modelling eye- and body-movement for multimodal human-machine interaction
- Research into novel 'tangible acoustic interfaces' for human-machine interaction, as part of the EU FP6 'TAICHI' project
- Spoken language processing for children in the FP5 'PF\_STAR' collaboration with universities and research laboratories in Italy, Germany and Sweden
- Development of EPSRC-supported research into novel 'unified' models of human speech that can support recognition, synthesis and coding technologies
- Research into novel techniques for noise-robust speech processing
- Modelling and characterisation of regional and non-native British English accents for speech technology
- Collection of the ABI (Accents of the British Isles) speech database; the largest collection of accents of British English and an invaluable resource for research into spoken language processing.
- Recurrent neural networks for non-linear adaptive control of uncertain systems
- Fuzzy-logic supervisory control
- Multi-target tracking
- Constraint logic programming for integrated management, maintenance and operational control
- Intelligent predictive control of hybrid dynamical systems
- Hierarchical systems for online decision support, and control of integrated quantity and quality in water networks and waste water systems
- Intelligent control of engine emissions
- Online risk assessment and monitoring

## Funding

We have a diverse multidisciplinary portfolio of activities involving collaborators in university, commercial and government laboratories in the UK and overseas, as well as other researchers at Birmingham. These projects are funded by a range of sources, including the EPSRC, EU, industry, and UK and overseas governments.

## Professional development

We are known internationally for our post-experience courses on Underwater Acoustics and Sonar Signal Processing, which are attended by sonar system designers from around the world. In recent years, we have also delivered a CPD course in Spoken Language Technologies and Computer Vision.

## Related links

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

[Multimodal Interaction Laboratory \(/research/activity/eece/human-computer/multimodal/index.aspx\)](/research/activity/eece/human-computer/multimodal/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 \(/postgraduate/dr-fees/tuition.aspx\)](/postgraduate/dr-fees/tuition.aspx) apply.

Learn more about [fees and funding \(/postgraduate/dr-fees/index.aspx\)](/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) (<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 \(http://www.birmingham.ac.uk/students/dr/requirements\)](http://www.birmingham.ac.uk/students/dr/requirements).

## International students

We accept a range of qualifications from different countries – learn more about [international entry requirements \(http://www.birmingham.ac.uk/students/dr/requirements/international\)](http://www.birmingham.ac.uk/students/dr/requirements/international).

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

## How to apply

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

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

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](#)

## Related links

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

## Related news and events

[Birmingham academic explores developments in voice recognition technology \(/research/our/news/items/Birmingham-academic-explores-developments-in-voice-recognition-technology.aspx\)](#)

## Research interests of staff

The School of Electronic, Electrical and Systems Engineering (ESEE) 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. ESEE 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.



ESEE 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

- [Multimodal Interaction Laboratory - HIT - Electronic, Electrical and Computer Engineering research \(/research/activity/eece/human-computer/multimodal/index.aspx\)](#)
- [Electronic, Electrical and Systems Engineering Research \(/research/activity/eece/index.aspx\)](#)

## Related staff

[Professor Martin Russell \(/staff/profiles/eece/russell-martin.aspx\)](#)

## 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.

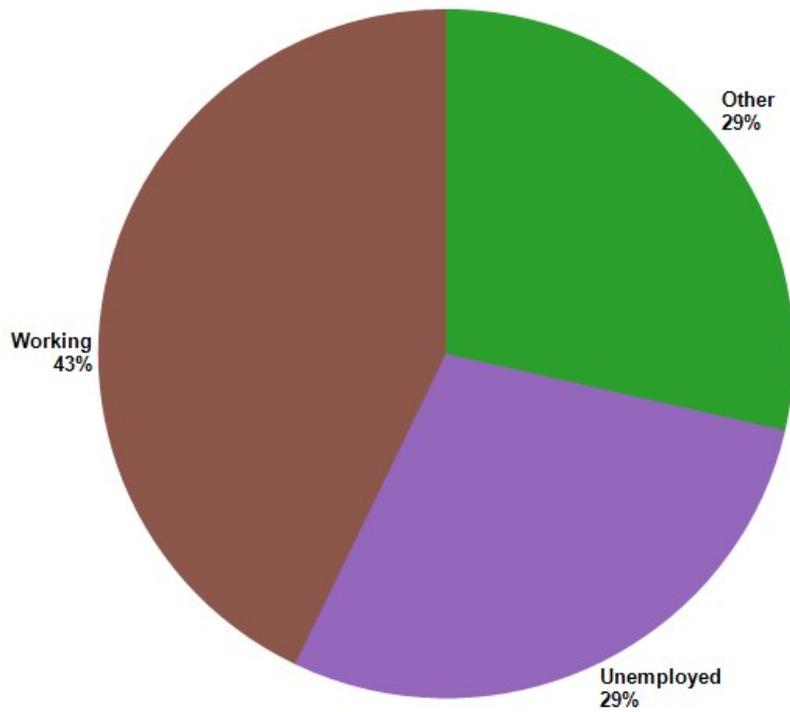
## University Careers Network

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)**



#### 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.