School of Engineering and Informatics
Department of Informatics
Research Fellow in Human-computer Interaction for Acoustic Levitation (Full time, fixed term for 36 months)
Salary range: starting at £32,004 and rising to £38,183 per annum
Expected start date: 01 April 2017 or soon after

An exciting new position has become available to join the newly formed Interact lab at the School of Engineering and Informatics of the University of Sussex, to assist in the development of novel interactions using acoustic levitation systems.

This is an FET Open project with the University of Glasgow, Chalmers University, Aarhus University and Ultrahaptics.

The primary goal of this project is to apply the principles of acoustic wavefront manipulation and metamaterials to explore a combination of acoustic levitation, mid-air haptics and parametric audio to create dynamic 3D physical shapes made of lightweight levitating objects that support haptic feedback and directional audio. This will also allow us to explore its potential for human computer interaction and the creation of novel user experiences.

We will create the novel technology to generate multi-object physical levitation, identify user-interaction principles and create multiple system demonstrators. To this end, it is important that the Research Fellow is able to collaborate and coordinate his/her research activities with other researchers and artists.

The Research Fellow from Sussex will be expected to
1. Identify the design of phased arrays to create haptics, levitation and directional audio devices; develop and implement the principles of how multiple smaller objects can be assembled to form larger objects that can react to user input through touch and sound.
2. Identify interaction design principles and visualisation techniques that can support users in their interactions with this new technology.

The position will involve a variety of tasks: design and construction of light-weight objects that could be levitated, implementing pair-wise combinations of levitation, haptics and directional audio, implement interaction techniques, conduct user-studies to identify interaction principles and publishing these results in scientific venues. The applicant will also be expected to help in the teaching of related units.

The position would be suitable for someone with experience on technical aspects of one or more of the following areas

a) Embedded system design and hardware engineering
b) human-computer interaction (i.e. audio processing, interactive graphics, augmented reality systems and levitation),
c) acoustic signal processing (with some demonstrated interest and experience with human-computer interaction)
d) computer graphics (with some interest and experience in human-computer interaction and/or audio processing).

Some previous experience with electronics and using maker space tools (e.g. laser cutters, 3D printers) will be essential.
The research fellow will have considerable freedom in shaping the nature of the research project. So we seek a highly organised and motivated individual able to multi-task and work independently with minimal supervision while maintaining excellent attention to detail and bring energy and enthusiasm a vibrant research group. Excellent written and communication skills are also essential.

The Interact Lab is internationally renowned for its research in creating novel interactive devices for enabling new forms of human-computer interaction (HCI). HCI is about applying human abilities to the design of tools, systems, and environments that are safe, effective and comfortable for use.

The lab consists of three permanent members of Staff led by Prof. Subramanian. Alongside these staff members it currently hosts three post-doctoral researchers, 3 PhD students and several visiting researchers. The work of lab members often attracts media attention and offers many public engagement opportunities. One of our successful lines of research is in the field of mid-air haptics and we would draw on our expertise in this topic to propel this area of acoustic levitation.

Employment will be subject to the right to work in the UK. You will work directly with Prof. Sriram Subramanian, with a base in the Department of Informatics. You can find more information about the group at www.interact-lab.com

For informal inquiries please contact Prof. Subramanian, Department of Informatics, University of Sussex, Falmer, Brighton BN1 9QJ, UK; sriram@sussex.ac.uk.

Closing date for applications: 15 February 2017

For full details and how to apply see www.sussex.ac.uk/jobs

The University of Sussex is committed to equality of opportunity

2. Senior leadership and management

The Vice-Chancellor (Professor Adam Tickell) is the senior academic officer and, as Chief Executive, is responsible to the University Council for management of the University. He is supported by an executive group which includes the three Pro-Vice-Chancellors, the Registrar and Secretary, the Director of Finance and the Director of Human Resources. The Heads of the Schools of Studies at Sussex report to the Pro-Vice-Chancellors.

The Registrar and Secretary heads the Professional Services of the University. In addition, under the University Statutes, the Registrar and Secretary is Secretary to the University Council. The Director of Finance reports to the Vice-Chancellor. The Director of ITS reports to the Registrar and Secretary, and the Librarian reports to one of the Pro-Vice-Chancellors.

3. The School / Division

The School of Engineering and Informatics covers the disciplines of computer, electrical and electronic engineering, mechanical, and automotive engineering, product design, digital media, computer science and informatics.

Distinctive characteristics of the School are: creativity, interdisciplinarity, strong links with industry, and an international outlook in both research and teaching. £10m (£4.9m from HEFCE) is being invested in a new Computing, Robotics, Electronics and Mechatronics Centre (CREaM) as a result of a 60% surge in applications for the School's degrees.
The School offers a range of undergraduate and postgraduate degrees in its areas of expertise, often in collaboration with other schools at Sussex, to create a distinctive focus that addresses the needs of industry, commerce and society. Examples include joint degrees with the MSc in Evolutionary and Adaptive Systems (EASy) that includes modules from the Schools of Engineering and Informatics and Psychology; and the MScs in Engineering Business Management, and Management of Information Technology, which were developed in collaboration with the School of Business, Management and Economics.

This interdisciplinary approach also applies to our research, with current and recent externally funded projects with researchers in a wide range of other subject areas including: geomorphology, media practice, medical imaging, neuroscience, anthropology, English literature, epidemiology, geography, international development, mathematics, psychiatry, psychology and sociology.

The School has strong links with industry, and has an established Strategic Advisory Board. Innovative research across the School has led to a number of patents which are being commercialised including: novel electric potential sensors (EPS) licensed to Plessey Semiconductors and marketed as the EPIC sensor chip; and University spin-out companies, including TribeHive, which is deploying delay-tolerant networking to provide smartphone connectivity in large crowds, and TexRAD, which has developed software for the analysis of medical images and has recently demonstrated the ability to detect brain texture anomalies in Asperger’s Syndrome patients. These developments have been supported by the University’s Enterprise fund. The EPS sensor technology was awarded the IET Innovation award for ‘Measurement in Action’, and was shortlisted for two other IET categories and for a THES award.

The School is, for administrative purposes, comprised of two departments: the Department of Engineering and Design, and the Department of Informatics. Staff teach across the School, and undertake research on cross-School, as well as cross-University projects.

The Department

The Department of Informatics is highly rated for its teaching and research. Its researchers work in an environment that was deemed to be wholly 4*/3* (world-leading/internationally excellent) in the REF 2014.

Sussex was ranked in the top 25 in the UK in The Guardian University Guide 2014. Our students are highly employable: in early 2014, 95% of our previous year’s graduates were employed, and of those, 100% were in professional or managerial jobs.

The Department maintains a strong emphasis on interdisciplinary teaching and research, and has substantive links with almost all other Schools of study at Sussex. Its research spans the theoretical and applied.

The Department’s research is organised into three groups:

- Cognitive and Language Processing Systems (www.sussex.ac.uk/calps/)
- Evolutionary and Adaptive Systems (www.sussex.ac.uk/easy/)
- Foundations of Software Systems (www.sussex.ac.uk/foss/),

and also plays leading roles in cross-disciplinary research centres:

- Sackler Centre for Consciousness Science (www.sussex.ac.uk/sackler/)
- Centre for Computational Neuroscience and Robotics (CCNR) (www.sussex.ac.uk/ccnr/)
- Centre for Cognitive Science (COGS) (www.sussex.ac.uk/cogs/)
- Sussex Neuroscience (www.sussex.ac.uk/sussexneuroscience/).

The Department has long-standing collaborations with a range of external organisations including Animazoo, the Clinical Practice Research Datalink, and American Express, which has sponsored over 120 MSc students in Informatics over the past 10 years.
The Department currently has 33 teaching faculty, 420 undergraduates, 80 taught postgraduates, and 60 doctoral students. Detailed information about the Department can be found at www.sussex.ac.uk/informatics
4. **Job Description**

**Job Title:** Research Fellow in Human-computer Interaction for Acoustic Levitation

**Grade:** Research Fellow I, Grade 7

**School:** Engineering and Informatics

**Location:** Sussex Campus

**Responsible to:** Prof. Sriram Subramanian through to head of School

**Direct reports:** n/a

**Key contacts:** Prof. Sriram Subramanian

**Purpose of the post:**
Research Fellow I is an early career-grade research position. Post-holders will be expected to contribute to the work of the research team, and also to develop their research skills with support from more experienced members of staff. This position in particular aims to identify the principles of acoustic levitation to create dynamic 3D physical shapes made of large collections of lightweight levitating objects while exploring its potential for human computer interaction and the creation of novel user experiences.

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4.1. **PRINCIPAL ACCOUNTABILITIES**

1. To engage in individual and/or collaborative research activity resulting in high-quality publications; and to develop research funding and knowledge exchange income individually or in collaboration with others, as appropriate, depending on the size and scope of the bid.

2. To contribute to School teaching activities.

   a. **KEY RESPONSIBILITIES**

4.2.1. **Research, Scholarship & Enterprise**

- Develop research objectives and proposals for own or joint research, at acceptable levels, with assistance if required.
- Conduct research projects individually and in collaboration with others.
- Analyse and interpret research findings and draw conclusions on the outcomes.
- Produce high-quality research outputs for publication in monographs or recognised high-quality journals, or performance/exhibition, as appropriate, and contribute to the School’s REF submission at acceptable levels of volume and academic excellence.
- Contribute to the preparation of proposals and applications to external bodies, for example for funding purposes.
- Individually or with colleagues, explore opportunities for enterprise activity, knowledge exchange income and/or consultancy, where permissible.
- Build internal contacts and participate in internal networks and relevant external networks in order to form relationships and collaborations.
- Continually update knowledge and understanding in field or specialism, and engage in continuous professional level.

4.2.2. **Teaching & Student Support**

- Undertake teaching duties, if required.
- Assist in the assessment of student knowledge and supervision of student projects if required.
- Assist in the development of student research skills, for example as part of a postgraduate supervision team.

4.2.3. **Contribution to School & University**
Attend and contribute to relevant School and project meetings.
Undertake additional duties, as required by the Principal Investigator and/or Head of School.

4.2.4. Role-specific duties
- Design and build hardware prototypes (using combinations of phased arrays and metamaterials) to create mid-air haptics, levitation and directional audio.
- Develop required rendering algorithms and software for experiments.
- Characterize the potential and limitations of the resulting systems through experiments.
- Develop interaction design principles and visualisation techniques that support interactions with such systems.
- Assess, through users studies, the benefits of the proposed interactions for direct manipulation 3D environments.
- Write internal reports (i.e describing the results obtained) and scientific papers in high quality venues, such as SIGGRAPH, UIST or CHI.

This Job Description sets out current duties of the post that may vary from time to time without changing the general character of the post or level of responsibility entailed. Training will be provided in those areas where the post-holder lacks experience.

INDICATIVE PERFORMANCE CRITERIA
- A PhD or equivalent scholarly activity
- Pursuing a line of independent research within a research group.
- Publishing research (either from a recently completed PhD or new original research).
- Other forms of externally recognised professional practice of creative output of a standing equivalent to regular publication of original research.
- Initiating, developing or participating in links between the University and external bodies such as business and industry, the professions, community organisations and policy-makers.
- Evidence of successful engagement in teaching or supervision.

5. PERSON SPECIFICATION

5.1. ESSENTIAL CRITERIA
1. Normally educated to doctoral level, or other equivalent qualification, or appropriate level of experience, as appropriate to the discipline (see role-specific criteria below).
2. Evidence of engagement in high-quality research activity.
3. Excellent presentation skills, with the ability to communicate effectively, both orally and in writing, with students, colleagues and external audiences.
4. Ability to work individually on own initiative and without close supervision, and as part of a team.
5. Ability to exercise a degree of innovation and creative problem-solving.
6. Excellent organisational and administrative skills.
7. Ability to prioritise and meet deadlines.
8. Excellent IT skills.

5.2. ESSENTIAL ROLE-SPECIFIC CRITERIA
1. Knowledge in acoustic graphics or audio signal processing.
3. Experience in working in human-computer interaction and/or interactive computer-graphics.
4. Experience conducting experiments and/or user studies.

5.3. DESIRABLE CRITERIA

1. Emerging track record of high-quality publications in reputable journals and other appropriate media of similar standing.
2. Experience using maker space tools (i.e. 3D printers, laser cutters, Arduino, electronics, etc).
3. Experience of generating research or knowledge exchange income.

The University is committed to equality and valuing diversity, and applications are particularly welcomed from women and black and minority ethnic candidates, who are under-represented in academic posts in science and engineering at Sussex.