1 Advertisement

Post Title: Research Fellow in Wearable Technologies
School/department: School of Engineering and Informatics - Department of Engineering and Design - Sensor Technology Research Centre
Hours: full time
Requests for flexible working options will be considered (subject to business need).
Contract: fixed term until 31 October 2020
Reference: 5216
Salary: Starting at £33,797 to £40,322 per annum , pro rata
Placed on: 18 December 2020
Closing date: 20 January 2021 Applications must be received by midnight of the closing date.
Expected Interview date: First week in February 2021
Expected start date: 1 March 2021

The Sensor Technology Research Centre at the University of Sussex is looking for a full time research fellow with a strong mathematical and computer science background to work with Dr Niko Münzenrieder and Dr Daniel Roggen on the research-intensive project "Shape sensing textile for orthotics - SmartSensOtics".

This project aims to develop a textile sleeve with an integrated array of stretch and bend sensors. Once this sleeve wrapped around a body part, such as a leg or an arm, a computational model must infer the shape of the sleeve based on the readings from the stretch and bend sensors. In the domain of orthotics, this would offer a digital alternative to traditional plaster cast molds. More generally, this technology could be an alternative to current motion capture systems using video markers or inertial measurement units.

Your role will be to create an algorithm and associated software to reconstruct the sleeve shape based on the stretch and bend sensor readings. The sleeve itself is developed by other research fellows. An initial step will involve simulating the deformation of a sleeve around a shape to simulate the readings of virtual stretch and bend sensors located on it. Based on this, a reconstruction algorithm will be developed, for example based on minimising an energy function, or using machine learning. Afterwards, you will interact with the research fellows in charge of developing the hardware to verify and improve your algorithm based on the acquisition of real sensor data.

This project is well suited for publications. Publications could include: shape reconstruction characterisation based on simulated deformation and simulated sensor models including effect of noise and non-linearities; shape reconstruction based on real data; motion capture; etc.

Additional information on the project to date is available in the paper "Lugoda et al., ShapeSense3D: textile-sensing and reconstruction of body geometries, Ubicomp/ISWC Adjunct Proceedings, 2019."
This project is based at the Sensor Technology Research Centre at the University of Sussex.

**Key Requirements.** This post is well suited to a highly motivated individual with excellent software programming skills, creativity, and ability to address multiple aspects of the project simultaneously, as well as a willingness to operate in a dynamic research environment within an international team.

Candidates should have a MSc or PhD degree in computer science, computer engineering, electrical engineering, mathematic, physics, or equivalent, with as a key requirement strong programming expertise. They should be able to tackle the problems making up this project, such as: shape deformation simulation using software libraries (e.g. an existing code base is available in Matlab and Python using PyChrono), mathematical modelling applied to physical/mechanical or equivalent systems, mathematical formulation of optimisation problems and their resolution through gradient descent and other optimisation algorithms, graphical visualisation, sensitivity analysis, etc.

The candidate should be able to interact with hardware engineers to define with them an experimental protocol to obtain the sensor readings for particular sleeve deformations, in order to verify the reconstruction method.

**Background.** The Sensor Technology Research Centre at the University of Sussex works on the interface between electrical engineering, computer science, and physics to develop advanced and innovative sensor systems for applications in sports, healthcare, or wearable electronics.

**Advantages and career development.** This short term position is ideally suited for somebody who wants to broaden his/her knowledge in sensors, wearable technologies and mathematical modelling, to support patients and professionals in the healthcare sector.

Please contact Daniel Roggen (d.roggen@sussex.ac.uk) for informal enquiries.

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, Technology, Engineering, Medicine and Mathematics (STEMM) at Sussex.

For full details and how to apply see our [vacancies page](#).

*The University of Sussex values the diversity of its staff and students and we welcome applicants from all backgrounds.*

2. **The School / Division**

Please find further information regarding the school/division at [www.sussex.ac.uk/engineering](http://www.sussex.ac.uk/engineering)

3. **Job Description**

Job Description for the post of: Research Fellow in Sensor Technology

**Department:** Department of Engineering and Design
Section/Unit/School: School of Engineering and Informatics
Location: Sensor Technology Research Centre
Grade: 7.0
Responsible to: Principal Investigator through to Head of School

KEY RESPONSIBILITIES

1. Research, Scholarship & Enterprise
   2.1 Contribute to research projects in collaboration with others.
   2.2 Analyse and interpret findings and draw conclusions on the outcomes.
   2.3 Individually or with colleagues, explore opportunities for enterprise activity, knowledge exchange income and/or consultancy, where permissible.
   2.4 Build internal contacts and participate in internal networks and relevant external networks in order to form relationships and collaborations.
   2.5 Continually update knowledge and understanding in field or specialism and engage in continuous professional development.

2. Teaching & Student Support
   2.1 Undertake teaching duties, if required.
   2.2 Assist in the assessment of student knowledge and supervision of student projects if required.

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

4. Role-specific duties
   4.1 Development of a shape deformation simulation software allowing to read the data of simulated bend and stretch sensors, including their imperfections (e.g. noise, non-linearities.
4.2 Development of a shape reconstruction method based on a mathematical model linking sleeve shape with sensor readings, which is amenable to resolution with optimisation techniques, or possibly machine learning techniques.

4.3 Evaluation of the reconstruction performance in comparison to simulation with a well selected set of target shapes allowing to emphasize strengths and weaknesses of the approach, as well as influence of virtual sensor parameters and other model parameters.

4.4 Evaluation of the reconstruction performance on the real hardware. This requires collaborating with the hardware research fellows to define a suitable test protocol (e.g. shapes, number of sensors and placement).

4.5 Graphical visualisation of the shape reconstruction.

4.6 Support a potential commercialization of the developed technologies.

4.7 Publish scientific results in high quality journals and present your work at international conferences.

4.8 Generate innovation ideas which may result in patents.

4.9 Exchange expertise with PhD students and colleagues.

4.10 Collaborate with the industrial partners, generate deliverables and reports and assist with flow of information among stakeholders.

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.

**INDICATIVE PERFORMANCE CRITERIA**

- An MSc or PhD (or being in the final phase of the PhD studies) in computer science, computer engineering, electronic engineering, mathematics, physics, or equivalent.

- Publishing research (either from a recently completed PhD or new original research).

- Published reviewed publications, and citation index.

- 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.
4. **Person Specification**

**ESSENTIAL CRITERIA**

1. Educated to MSc or doctoral level, or other equivalent qualification, 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.

**ESSENTIAL ROLE-SPECIFIC CRITERIA**

1. A degree in computer science, computer engineering, electronics engineering, mathematics or physics.

2. Programming expertise in Python and Matlab to reuse the current code base, or other suitable languages (e.g. C++).

3. Ability to use third party libraries, such as physics engines (e.g. PyChrono), optimisation libraries, rendering libraries, data acquisition libraries, GUI libraries (e.g. Qt).

4. Programming expertise of 3D graphical visualisation.

5. Ability to mathematically model physical systems.

6. Ability to solve optimisation problems.

7. Experience of writing high-quality technical reports and publications.

8. Ability to interact with other research fellows within the project.

9. Ability to work independently and creatively within a team and meet deadlines.

**DESIRABLE CRITERIA**
1. Experience of generating research or knowledge exchange income.

2. Interest in wearable technologies and human activity sensing


4. Experience with embedded systems, notably data acquisition, to collaborate with the hardware research fellows.