Marie Curie Early Stage Researcher
ETN SAS
Department of Computer Science

Closing date: 20 November 2018
Interview date: To be confirmed
Vacancy reference: 7068
INTRODUCTION

The CS department has been granted 4 PhD positions ("Early Stage Researchers" or "ESRs") to be funded by the Marie-Sklodowska-Curie Innovative Training Network "SAS – Safer Autonomous Systems" within the Horizon 2020 Programme of the European Commission. SAS is a consortium of high profile universities, research institutions and companies located in Belgium, UK, France, Germany, The Netherlands, Norway and Ireland.

Each ESR will carry out research in a specific sub-area of the safety of autonomous systems, supporting the department's range of existing work in this area.

The ESRs will have regular contacts with the other 11 ESRs in the SAS ETN and their supervisors. Each ESR will also have two external supervisors (typically one academic in another country and one industrialist).

Each ESR will be managed, and their PhD primarily supervised, by the following existing staff:

ESR 7 — Rigorous Design and Evaluation of Situation Coverage Testing for Autonomous Vehicles — Rob Alexander

ESR 10 — From Static Assurance Cases at Design-Time to Executable Assurance Cases at Run-Time — Simon Foster


ESR 13 — Safety assurance for Clinical Conversational Bots — Ibrahim Habli
Each of the ESRs will carry out research on the safety of autonomous systems, in a specific area determined by the project they choose to apply for:

- **ESR7**: "Rigorous Design and Evaluation of Situation Coverage Testing for Autonomous Vehicles" will create and empirically evaluate a testing method and prototype tools for simulated-situation testing of autonomous robots in a complex ground-based environment. The method will take as input a high level description of an environment and then, exploiting combinatorial testing techniques, it will determine exactly which simulation runs should be performed to maximally challenge the robot’s ability to cope with the features of its environment.

- **ESR10**: "From Static Assurance Cases at Design-Time to Executable Assurance Cases at Run-Time" will establish an executable and interpretable model of structured argumentation (based UoY’s previous work on the OMG Structured Assurance Case Meta-model) in which the safety case (and these patterns) consists of an executable and interpretable set of rules (claims, truths) to be sustained and maintained at run-time, with options and criteria to be resolved as the system configuration and environment evolve. ESR10 will explore the use of Isabelle/HOL to manage the development and evolution of the safety case, to provide assurance cases that are dynamic living documents that can be modified in light of new hazards, counter-evidence, or violated assumptions. ESR10 will evaluate the ‘executable’ safety case in a series of challenging scenarios for two different given application contexts.

- **ESR11**: "Assurance Case Structures for Machine Learning in the Decision Making of Highly Autonomous Systems" will rigorously establish and evaluate assurance case structures (expressed as GSN – Goal Structuring Notation – and SACM – Structured Assurance Case patterns) for the assurance of machine learning in safety-critical applications. ESR11 will evaluate the application of the assurance case patterns in a number of autonomous driving applications and scenarios.

- **ESR13**: "Safety assurance for Clinical Conversational Bots" will create a systematic understanding of the safety challenges associated with the use of intelligent conversational bots. The ESR will develop a safety concept and architectural strategies for clinical conversational bots, considering the intended clinical use, core technologies (natural language processing, clinical knowledge representation, automated reasoning and machine learning), medical conditions and patient variations and preferences.

All ESRs are required to enrol on a full time PhD degree. In pursuing this they will be supported by a carefully chosen supervisory team that maximizes both scientific excellence as well as interdisciplinary and intersectoral collaboration.

In addition to their individual scientific projects, all fellows will pursue further continuing education, which includes internships and secondments, a variety of training modules as well as transferable skills courses and active participation in workshops and conferences.

**Key responsibilities**

*Role holders will be required to undertake some or all of the duties below*

- To enrol in and meet the requirements of York’s full-time PhD programme in Computer Science.

- To conduct individual and collaborative research projects, duties to include: analysis and interpretation of research data; use of appropriate research techniques and methods; writing up of research results and dissemination through publications, seminar and conference presentations and public engagement and outreach activities; contributing to the identification of possible new areas of research.
JOB DESCRIPTION

- To contribute to the preparation of research proposals and applications to external bodies.

- To undertake appropriate organisational and administrative activities connected to the research project, including conference organisation, and the development of promotional or educational material including website maintenance and development.

- To develop and initiate collaborative working internally and externally, duties to include: the building of internal contacts and participation in internal networks; collaboration with colleagues on joint projects as required; participation in and identification of external networks in order to share information and identify potential opportunities for collaboration and possible sources of funding; attendance at and contribution to relevant meetings.

- To provide guidance to other staff and students, as required, as well as coordinating the work of small research teams.

- To assist with undergraduate teaching in own area of expertise.
PERSON SPECIFICATION - below is the person specification for all of the Marie Curie Early Stage Researcher posts

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<tr>
<th>Qualifications</th>
<th>Essential/ Desirable</th>
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<tbody>
<tr>
<td>First degree in Computer Science, Software Engineering, Electronic Engineering, or Robotics, or a closely-related discipline</td>
<td>Essential</td>
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<tr>
<td>Master’s degree in Computer Science, Software Engineering, Electronic Engineering, or Robotics, or a closely-related discipline</td>
<td>Desirable</td>
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<tr>
<th>Knowledge</th>
<th>Essential/ Desirable</th>
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<tr>
<td>Knowledge of software engineering sufficient to engage in high quality research</td>
<td>Essential</td>
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<tr>
<td>Knowledge of a range of research techniques and methodologies</td>
<td>Desirable</td>
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<tr>
<td>Has research expertise in an area that will complement and enhance the department’s research strategy and goals</td>
<td>Desirable</td>
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<tr>
<th>Skills, abilities and competencies</th>
<th>Essential/ Desirable</th>
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<tr>
<td>Ability to undertake academic research</td>
<td>Essential</td>
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<td>Ability to organise own research activities to agreed deadlines and quality standards</td>
<td>Essential</td>
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<td>Strong written communication in order to contribute effectively to the production of research reports and publications</td>
<td>Essential</td>
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<tr>
<td>High level oral communication skills to enable the effective presentation of research progress and outcomes to key stakeholders</td>
<td>Essential</td>
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<td>Ability to work as part of a team and also to work independently using own initiative</td>
<td>Essential</td>
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<th>Experience</th>
<th>Essential/ Desirable</th>
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<tr>
<td>Experience of undertaking an extensive project in Computer Science, Software Engineering or a related field</td>
<td>Essential</td>
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<td>Experience of carrying out both independent and collaborative research</td>
<td>Desirable</td>
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<td>Experience of writing up research work for publication</td>
<td>Desirable</td>
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<th>Personal attributes</th>
<th>Essential/ Desirable</th>
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<tr>
<td>Attention to detail and commitment to high quality</td>
<td>Essential</td>
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<td>Collaborative ethos</td>
<td>Essential</td>
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<td>Interest in and enthusiasm for the subject matter of the specific ESR</td>
<td>Essential</td>
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<td>Positive attitude to colleagues and students</td>
<td>Essential</td>
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<td>A passion for conducting high quality research with impact</td>
<td>Essential</td>
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<td>Willingness to work proactively with colleagues in other work areas/institutions</td>
<td>Essential</td>
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<td>Ability to plan and prioritise own work in order to meet deadlines</td>
<td>Essential</td>
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<tr>
<td>Commitment to personal development and updating of knowledge and skills</td>
<td>Essential</td>
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Further skills and experience specific to each Marie Curie Early Stage Researcher posts is included on the following page
### Additional criteria for the ESR7: Rigorous Design and Evaluation of Situation Coverage Testing for Autonomous Vehicles

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**Skills**
- Software Engineering with strong programming skills and ability to quickly learn new programming technologies: **Essential**
- Experience of learning third-party APIs and adapting existing software for new projects: **Essential**
- Experience with mobile robots: **Desirable**
- Experience with programming robotics simulations: **Desirable**
- Experience as the main programmer for complex software: **Desirable**
- Experience with safety-critical development processes: **Desirable**

### Additional criteria for the ESR10: From Static Assurance Cases at Design-Time to Executable Assurance Cases at Run-Time

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**Skills**
- Competent with formal methods for analysis of software: **Essential**
- Competent in functional programming: **Desirable**

**Experience**
- Experience of using theorem provers: **Desirable**
- Experience of using and/or developing assurance cases: **Desirable**
- Experience with the Eclipse platform: **Desirable**
- Experience of meta-modelling: **Desirable**

### Additional criteria for the ESR11: Assurance Case Structures for Machine Learning in the Decision Making of Highly Autonomous Systems

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**Skills**
- Software Engineering with strong programming skills and ability to quickly learn new programming technologies: **Essential**

**Experience**
- Experience with Artificial Intelligence and Machine Learning: **Essential**
- Experience of using and/or developing assurance cases: **Desirable**
- Experience with the Eclipse platform: **Desirable**
- Experience of meta-modelling: **Desirable**

### Additional criteria for the ESR13: Safety assurance for Clinical Conversational Bots

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**Skills**
- Software Engineering with strong programming skills and ability to quickly learn new programming technologies: **Essential**

**Experience**
- Experience with Artificial Intelligence and Machine Learning: **Desirable**
- Experience with digital health technologies: **Desirable**
- Experience with designing and programming IoT devices and mobile apps: **Desirable**
The Department of Computer Science (www.cs.york.ac.uk/) has a very strong international research record. The Research Excellence Framework (REF) 2014 results ranked York’s Computer Science 7th overall in the UK, 5th for impact and 6th for environment. 90 per cent of our academic staff were rated as “world leading” or “internationally excellent”.

This result confirms the long-standing global reach and real-world significance of our research and makes us one of the best Departments in the country for nurturing excellent research by staff and research students alike. All aspects of our impact and environment were judged to be of world-leading or international standard.

The Department has strong and long-standing links with industry and is highly regarded for its CPD courses. It has strategic partnerships with several large companies including IBM and QinetiQ, and we deliver our CPD courses to safety engineers around the world.

The Department currently comprises ten large research groups: Advanced Computer Architectures, Artificial Intelligence, Computer Vision, High Integrity Systems Engineering, Human-Computer Interaction, Enterprise Systems, Non-Standard Computation, Programming Languages and Systems, Real-time Systems, and Games.

The Department is housed in purpose-built accommodation on Campus East (opened in 2010), including a specialist CPD suite designed to deliver our intensive one-week courses. The Department currently has 54 members of academic and teaching staff including seven members of the CPD teaching team led by Professor Tim Kelly. About 40 research associates and fellows are employed on research grants and contracts and we have a vibrant graduate school of approximately 130 PhD students. Each year we have around 400 undergraduate and 100 full-time and part-time taught postgraduate students. The support team comprises 24 administrative staff and 13 technical and computing staff.

The department recently launched the Assuring Autonomy International Programme which spearheading research, training and standards in the safety of robotics and autonomous systems in the UK and beyond. The Programme is a £12 million initiative funded by Lloyd’s Register Foundation and the University of York. Its work includes the development of standards and guidance for assurance of robotic and autonomous systems, assessment methods and open toolsets as well as the production of internationally accessible educational and training resources.
THE UNIVERSITY

Founded on principles of excellence, equality and opportunity for all, the University of York opened in 1963 with just 230 students. In 2018 it is the home of more than 17,000 students across more than 30 academic departments and research centres. Since opening over fifty years ago, we have become one of the world's leading universities and a member of the prestigious Russell Group.

We are consistently recognised as one of the leading Higher Education Institutes and are ranked 16th in the Times & Sunday Times league table (2017). The University of York has won six Times Higher Education (THE) Awards and five Queen’s Anniversary Prizes.

The University is proud of its association with Athena SWAN, holding 12 awards in support of gender equality, representation and success for all, with gold awards for Chemistry and Biology and a University-wide bronze award.

Of 154 universities that took part in the Research Excellence Framework (REF) in 2014, The University of York ranked 14th overall and 10th for the impact of our research. The University is consistently in the top ten UK research universities and attracts over £60m a year of funding from research alone.

Our vision is to make the University of York a world leader in the creation of knowledge through fundamental and applied research, the sharing of knowledge by teaching students from varied backgrounds and the application of knowledge for the health, prosperity and well-being of people and society.
Attractive workplace

Centred around the picturesque village of Heslington on the edge of the city of York, our colleges are set in an attractive landscaped campus. York enjoys a safe, friendly atmosphere with facilities including bars, shops, theatres and concert halls all within easy walking distance.

The University has undergone an unprecedented period of expansion and renewal since 2000. We have invested in twenty new buildings on the original campus and have completed the first and second phases of a £750m campus expansion. Our investment in new colleges, teaching and learning spaces, laboratories, research facilities and a new sports village mean there has never been a better time to join us.

During this period of change we’ve worked hard to retain our friendly, informal and collegiate atmosphere, which is important to our core values of inclusivity and interdisciplinarity.

We have a thriving international community and are committed to providing staff moving to York with as much support as possible through our Relocation Package and Welcome Officers.

The University is committed to promoting a diverse and inclusive community - a place where we can all be ourselves and succeed on merit. We offer a range of family friendly, inclusive employment policies, flexible working arrangements, staff engagement forums, campus facilities and services to support staff from different backgrounds.

For further information please visit our employee benefit pages.
**THE CITY AND THE REGION**

**The City of York**

Internationally acclaimed for its rich heritage and historic architecture, York’s bustling streets are filled with visitors from all over the world. Within its medieval walls you will find the iconic gothic Minster, Clifford’s Tower and the Shambles - just a few of the many attractions.

But York isn’t just a great place to visit - it’s also a great place to live and work. While nourishing a vibrant cosmopolitan atmosphere, York still maintains the friendly sense of community unique to a small city.

Visit [www.visityork.org](http://www.visityork.org) for more information on the city of York.

**Shopping, culture and entertainment**

York boasts specialist and unique boutiques but also all the high street stores on its busy shopping streets. Alongside them you will find cinemas, theatres, an opera house, art galleries, a vast range of restaurants, live music venues and clubs. York is particularly renowned for its multitude of pubs and bars, from the modern to the medieval.

**Housing and schools**

Whether you choose to live close to the city, in one of the surrounding villages or further afield, you will find a wide range of housing within comfortable distance of York and the University. For families, the area has a range of excellent schools both in the state and independent sector.

**Great location**

York is one of Britain’s best-connected cities. Halfway between London and Edinburgh on the East Coast mainline, on intercity trains you can reach London King’s Cross in less than two hours and Edinburgh in two and a half hours. York is also well served by road links, and it is easily accessible from the A1, M1 and the M62.

For those travelling from overseas, Manchester Airport is two hours away and Heathrow Airport just three and a half. Flights from nearby Leeds Bradford Airport provide easy access to mainland Europe. By Eurostar from London St Pancras, Paris is just over six hours away.

**Yorkshire**

The Lonely Planet guide recently declared Yorkshire the third best region in the world to visit. There is something to cater to every taste, whether it be the rugged landscapes of the Moors or the Dales, the picturesque seaside towns of Scarborough and Robin Hoods Bay, the gothic architecture of Whitby or the vibrancy of cosmopolitan Leeds.
Apply online

- Go to https://jobs.york.ac.uk
- Find this job using reference 7068
- Complete the online application form

You will need to submit your completed application by midnight (local UK time) on 20 November 2018

What will I need?

You will need to upload:
- your CV
- a letter describing how you meet the requirements of the job

You will also need details of 2 referees.

Help and assistance

Direct any informal queries to rob.alexander@york.ac.uk

If you have any questions about your application, contact the HR Services team:

recruitment@york.ac.uk
+44 (0)1904 324835