University of Salford MANCHESTER

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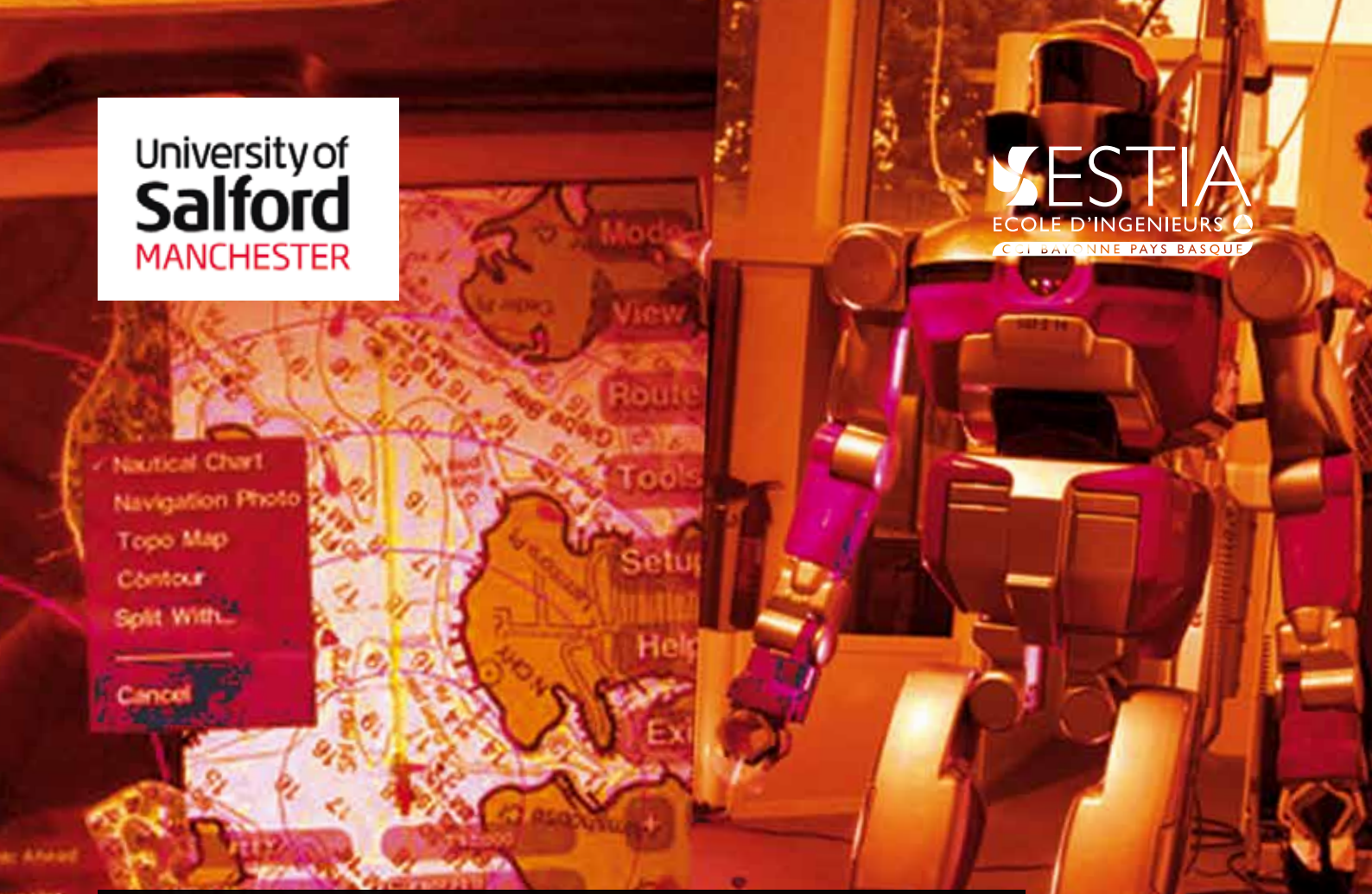
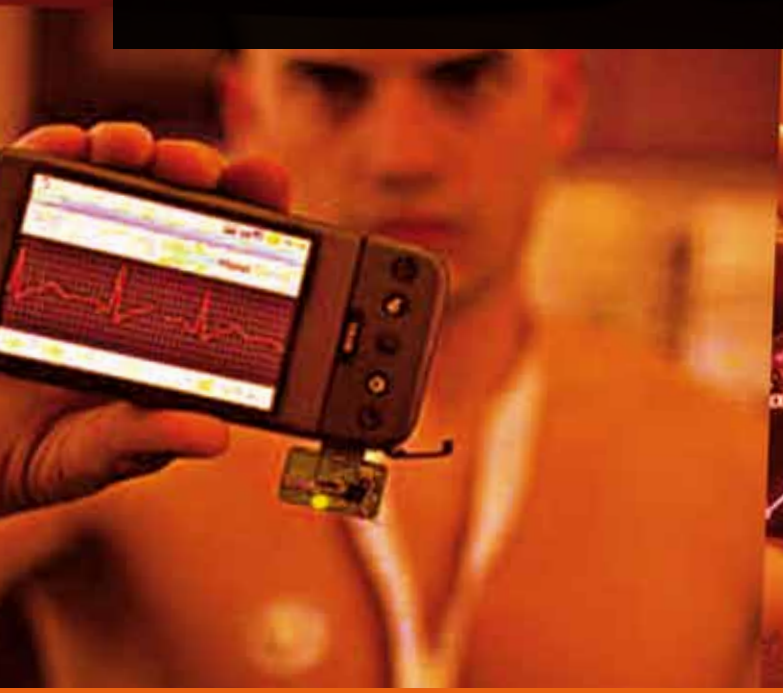


MSc/PgDip

Robotics and Embedded Systems



www.salford.ac.uk

www.estia.fr

This Postgraduate programme is for students who already have an Engineering, Computer Science or Bio-engineering, and Mechanical background and wish to specialise in Systems engineering, Robotics and Real time systems.
With a particular emphasis on Advanced Robotics, the learning will focus on systems that are designed to operate with a degree of intelligence and autonomy.

After spending 4 weeks in Salford (G.B.), the students will stay in Biarritz (French bask seaside), taught by the Salford lecturers, by Estia lecturers, and by Industrial experts.
The MSc Robotics and Embedded Systems will give you a firm grounding in control engineering and intelligent systems concepts, along with the ability to comprehend and fully specify integrated Embedded Systems embodying intelligence, Robotic and Onboard hardware and software, and real time software technologies. This qualification also provides a suitable background for research in advanced autonomous systems with reference to robotics.

Embedded System are ever more capable engineering systems that we all use in our daily lives, ranging from applications in mobile telephones to washing machines, cars to aeroplanes.
This is currently one of the major growth areas and there is an increasing demand from industry for engineers who possess in-depth expertise in embedded systems.. Another important field of engineering involves robotic systems. This programme brings both fields together to provide multidisciplinary skills with employment potential in a wide range of areas. These include the utilities, transport systems management, automated manufacturing, consumer electronics, robot systems, design, process control, the space industry, entertainment, robotics and smart homes. Students develop practical skills in the design, programming and interfacing of embedded microcontrollers and you will have the opportunity to design autonomous embedded systems through robotic and aerospace applications.

Systems Engineering

Systems engineering is an interdisciplinary field of engineering that focuses on how complex engineering projects should be designed and managed over the life cycle of the project. Issues such as automatic control of machinery, logistics, and the coordination of different teams become more difficult when dealing with large, complex projects. Systems engineering deals with work-processes and tools to manage risks on such projects, and it overlaps with both technical and human-centered disciplines such as control engineering, industrial engineering and project management.

Modules

Embedded Systems

This Module provides a detailed understanding of the tools, techniques and platforms that are used for programming of Embedded Systems. Further it gives in-depth insight into a family of currently used microcontrollers. The module also aims at developing a comprehensive knowledge of Real Time needs of the Embedded System, by understanding the framework of RTOS and using state of the art microcontrollers to designing and programme a range of RTOS based applications.

Advanced Embedded Systems

The aim of this module is to explore different 32-bit microcontroller hardware architectures, to understand ARM core architecture and provide a deep insight into programming and optimization on ARM7. In addition a practical understanding of device I/O types including UART and interfacing using I2C, USB, CAN and high speed buses- ISA, PCI, PCI-X, cPCI is fully addressed. The Module also develops a comprehensive knowledge of Embedded Linux programming with ARM, RTLinux APIs and Device Driver programming.

Artificial Intelligence

Explore the role of Artificial Intelligence in engineering applications. The module develops both theoretical understanding and practical experience of using Knowledge Based Systems, Fuzzy Logic, Artificial Neural Networks, Evolutionary Computing and Swarm Intelligence in a broad range of Engineering applications. You will gain experience at applying AI techniques to a broad range of industrial problems including diagnostics, control. robotics, scheduling, planning and optimisation.

Mobile Robotics

Autonomous intelligent systems are at the forefront of technology. This module will give you an understanding of the underlying principles of mobile systems, a practical knowledge of its applications, and an ability to to analyse and solve related real-world autonomous systems problems. With this knowledge you will be able to critically review and analyse current autonomous systems by having the opportunity to programme and deploy a range of industrial standard mobile robotic/ software platforms.

MSc Project

You will work under the direction of an academic supervisor to carry out an advanced research or development project related to Robotics, Automation and/or Systems Engineering. As part of this project you will be expected to:
- Plan, manage and implement a project related to Robotics and/or Automation and Systems Engineering
- Utilise appropriate sources of information to carry out and produce a literature review
- Develop a framework for critical assessment and evaluation
- Organise and produce an MSc Dissertation.

It may be carried out everywhere in the world, specially in conjunction with scientific platforms or companies associated with the University of Salford or with Estia.

Teaching and assessment

Teaching is by a series of lectures and workshops with many modules taught via extensive hands-on practical lab-based design and implementation of lecture material. Practical experience includes the use of robotics platforms to produce a software system using the MATLAB toolboxes or the C programming language or to produce a finished hardware/software based Embedded or Robotics System.

Facilities

There are dedicated labs and facilities for Robotics and Automation students, including: Industrial robots, humanoid robots (Nao), embedded platform (ARM µC board, real time OS kernel) and various mobile Robots, stereovision cameras, industrial cameras, plus dedicated computing facilities.
If you carry out your MSc Project with an aerospace or automotive company, as many of our students do, then you will also have access to their facilities.

Job Prospects

Graduates can expect to find employment in a range of industries. Robotics and Automation presents many career opportunities in areas such as control systems design and integration, manufacturing automation, robotic design, software engineering, mechanical and mechatronic engineering, process control, engineering management and research. Our graduates have gone on to successful careers with organizations such as Airbus, Thales, Dassault Systems, Dassault Avation, RATP and Siemens, BAE Systems, Electro Impact.

Graduate profiles

Joan GOYENETCHE
Responsable du développement de systèmes embarqués et d'architecture/installation électrique (BHR Aircraft Corporation).

"Lors de ma mission de fin d'étude ESTIA, j'ai conçu un prototype de Govemor pour un hélicoptère bi-place ultraléger développé par BHR. À l'issue de cette mission, j'ai été recruté par cette entreprise afin de porter ce Govemor à un niveau industriel de mise en production. Depuis 2010, je suis Responsable Électronique chez BHR pour le développement et la fabrication des équipements embarqués. Les enseignements et les nombreux projets réalisés en groupe à l'ESTIA m'ont bien préparé à prendre en main les technologies et méthodologies liées aux systèmes critiques."

Thierry MOINE
Ingénieur en Recherche et Développement (CFD Suresnes).

"Mon parcours de fin d'étude ESTIA c'est plutôt déroulé dans le domaine de la robotique et j'ai participé par exemple à la conception, la réalisation et la mise au point d'un poste robotisé de triage de plaquette d'usinage ou encore la mise en œuvre d'un système de vision et d'une application informatique de pilotage et de supervision du poste (Actemium, Toulouse, France). Depuis 2010, je travaille au sein du département R&D de CFD Suresnes en tant que chef d'un projet qui porte sur l'élaboration d'un système embarqué temps réel pour la géolocalisation d'une locomotive et l'orientation d'essieux. Je suis issu de l'école d'ingénieurs Ferroviaire."

Staff profile

Prof Samia NEFTI-MEZIANI (Salford)

"Prof Samia Nefti-Meziani is the Head of the Autonomous Systems and Robotics Research Centre. She is a leading expert in Artificial Intelligence and Robotics. Her research interests are concerned with the development of cognitive models for information processing, decision support systems and robotics. She has published and edited extensively in the above areas in leading academic journals and leads an expert team of researchers producing work that is recognised internationally."
She is the Director and the programme leader of the Robotics curriculums.

Dr Olivier PATROUIX (Estia)

"Dr Olivier PATROUIX, a lecturer and researcher in robotics and image processing, is the academic referent for this programme in Estia, while several Estia teachers and researchers and involved to complete the Systems Engineering point of view."

The MSc Robotics and Embedded Systems is closely aligned with the research carried out in our Centre for Advanced Robotics Research. The Centre houses a multidisciplinary group lead by Prof. Samia NEFTI-MEZIANI with interests in Artificial Cognitive Systems and Robotics and their constituent technologies. The group has strong National and International links with both industry and other research institutes.

The Centre's activities have their origin in 1987 when Salford University was chosen as the site of the United Kingdom's National Advanced Robotics Research Centre. Since then Robotics has formed a major strategic direction within Engineering in the University of Salford where Researchers have been at the forefront of strategic national developments initiated by the Department of Trade and Industry (DTI), the Department for Environment, Food and Rural Affairs (DEFRA) and the Engineering and Physical Sciences Research Council (EPSRC) and international developments within the E.U.

ESTIA is a well known Academic French Institute in UK. They have been in Partnership with the University of Salford for nearly a decade. ESTIA has a very strong partnership with the industry (primes and SMEs). They has been chosen as a site to host the technical Centre «Compositadour» for Research, Knowledge transfer, and training in the aread of Robotics, Composites products design and manufacturing. www.estia.fr

Entry requirements:
A minimum of a 2.2 honours degree in engineering or sciences and English proficiency.
The French equivalent is : a Master-M1 (part1 validated) ; a Master degree (M2), a French or Spanish "titre d'ingénieur" / "titulo de ingeniero" are also suitable for this programme.

Estia has been in partnership with the University of Salford for seven years. If you are currently studying an engineering subject at Estia you will be able to complete this MSc as part of your final year of study. Please enquire for further information.

For information about the University of Salford visit www.salford.ac.uk
about Estia visit www.estia.fr or www.compositadour.estia.fr
See also : Msc/PgDip Robotics and automation

Enquiries

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