

## Elio Tuci

First, last name: Elio, Tuci  
 Nationality: Italian  
 Place, date of birth: Pistoia (Italy), 3<sup>rd</sup> May, 1972  
 Current employment: **Senior Lecturer**  
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**Area of Technical Expertise:** Swarm Robotics, Evolutionary Robotics, Intelligent Systems, Neural Computing, Evolutionary Algorithms, Adaptive Systems. Dr Tuci has co-authored about 70 peer-reviewed scientific publications in above areas and 4 book chapters.

### Employment History

1<sup>st</sup> Oct. 2016 - **Senior Lecturer** at the Computer Science Department, Middlesex University, London, UK.  
 1<sup>st</sup> Sept. 2010 - 30<sup>th</sup> Sept. 2016 **Lecturer** (Assistant Professor) at the Computer Science Department, Aberystwyth University, Aberystwyth, UK.  
 16<sup>th</sup> Apr. 2008 - 31<sup>st</sup> Aug. 2010 **Research Associate** at ISTC-CNR (Institute of Cognitive Sciences and Technologies, Italian National Research Council), Rome, Italy.  
 3<sup>rd</sup> Nov. 2003 - 31<sup>st</sup> Mar. 2008 **Research Associate** at IRIDIA, Université Libre de Bruxelles, Brussels, Belgium.

### Qualifications

31<sup>st</sup> Jan. 2014 - 31<sup>st</sup> Dec. 2018 **Qualification aux fonctions de maître de conférences** (France). Qualification to apply for research and teaching positions in Higher Education Institutions in France.  
 25<sup>th</sup> Jun. 2013 **Postgraduate Certificate in Teaching in Higher Education (PGCTHE)**, Aberystwyth University. This is a Master's level qualification in the form of a Postgraduate Certificate, as well as registration with the UK Higher Education Academy as a Fellow (FHEA).  
 20<sup>th</sup> Feb. 2004 **PhD in Computer Science and Artificial Intelligence**, University of Sussex, Brighton (UK), with a thesis titled "An exploration on the evolution of learning behaviour using robot based models", under the supervision of Prof. I. Harvey.  
 6<sup>th</sup> Dec. 1996 **Laurea in Experimental Psychology** (equivalent to Master in Experimental Psychology, 5 years), University of Rome "Sapienza", 110/110 *cum laude*, with a final dissertation titled "Spatial Constraints and Regulatory Functions in Monkeys' (Cebus apella) Search" (in Italian). This research work has been carried out at the Animal and Comparative Psychology Lab (CNR), under the supervision of Prof. P. Renzi and Prof. E. Visalberghi.

### Memberships

5<sup>th</sup> February 2014 **Fellow of the Higher Education Academy (HEA)**

### Grants and Awards

2016 **EnHeRS Project: Engineering Heterogeneous Swarm, funded by Qinetiq (UK)**, £ 92.000,00 for a 3 years project (from Oct. 2016 to Oct. 2019).

- 2015 **Newton Fund project, funded by the Brazilian State Funding Agency CONFAP**, R\$ 214.400.00, about £ 45,000.00, for a 3 years project (from Oct. 2015 to Nov. 2018) in collaboration with Prof De Souza, Entomology Department, Federal University of Viçosa (BR), to look at the phenomenon of Inquilinism in termites using computational models.
- 2014 **British Council Researcher Links Travel Grant**, £ 4790, for a two months visit (from 15<sup>th</sup> Sept. to 15<sup>th</sup> Nov. 2014) to The Department of Entomology at Federal University of Viçosa (Brazil), directed by Prof Og De Souza. During my visit, I studied the phenomenon of cohabitation in termites.
- AIRBAS Defence & Space (UK)**, £ 110.000,00, project title “Network-Aware Evolutionary Coordination for Aerial Backbone (NEVOCAB)”. The aim of this project is to investigate the use of Evolutionary Algorithms to coordinate the movement of Unmanned Aerial Vehicles (UAVs) which are used to provide a reliable communication path from mobile ground based units to a base controller either directly, or through satellite links. Dr Tuci and Dr M.S. Wilson from Aberystwyth University are both Principal Investigator of this 15 months project (start date 1<sup>st</sup> Jan. 2014, end date 31<sup>st</sup> March 2015).
- 2013 **Fujitsu-HPC Wales**, £ 74.896,00, project title “Evolution of Autonomous Road Following Vehicles”. This project aims to design control systems for robotic vehicles required to autonomously navigate, using a camera vision system, poorly delineated roads without straying from the boundaries. Dr Tuci is the Principal Investigator of this 36 months project (start date 1<sup>st</sup> Jan. 2014, end date 31<sup>st</sup> Dec. 2017).
- AIRBAS Defence & Space (UK)**, £ 53.500,00, project title “Evolutionary Bee-Inspired Wireless Communication Networks”. The aim of this project is to run explorative simulated studies for the design of control systems for autonomous flying units. These units are intended to construct dynamic ad-hoc wireless networks within disaster areas, and to maintain and optimize the efficiency of the communication by exploiting a bee-inspired routing protocol. Dr Tuci was the Principal Investigator of this 7 months project (start date 18<sup>th</sup> Feb. 2013, end date 18<sup>th</sup> Sept. 2013).
- 2012 **The Royal Society London**, £11.000,00 project title “Evolution of cooperation in swarms of homogeneous robots a through dynamic task-allocation”. Research Grant (RG120023) funding for specialised equipment awarded to Dr Tuci to carry out research work in Swarm Robotics (from Nov. 2012 to Nov. 2013).
- Welsh European Collaboration Fund**, £ 2.000,00 awarded to Dr Tuci to cover costs of travelling to participate at meeting to prepare a project proposal to submit to the FP7 ICT Call 9, Challenge 2/Objective 2.1 - Cognitive Systems and Robotics.
- Aberystwyth University Research Funding**, £ 2.000,00 awarded to Dr Tuci to cover costs of travelling to participate at meeting to prepare a project proposal to submit to the FP7 ICT Call 9, Challenge 2/Objective 2.1 - Cognitive Systems and Robotics.
- 2007 **Ariadna Initiative, European Space Agency (ESA)**, 30.000 Euro, project title “Evolving a Collective Consciousness for a Swarm of Pico-Satellites”. The aim of this project was to investigate the idea of using swam intelligence and evolutionary robotics methods to design control systems for swarms of pico-satellites. I was the co-investigator in this project led by Prof M. Dorigo.
- 2002 **Marie Curie Training Site Fellowship**, funded by the European Commission Improving Human Potential (IHP) programme, grant n° HPRN-CT-2000-00032. I have been awarded this grant by Prof. M. Dorigo to join his lab (IRIDIA-ULB) for 1 year as visiting PhD student.
- 1999 – 2000 – 2001 **Department Bursary**, School of Cognitive and Computing Sciences - University of Sussex, Brighton - UK.
- 1998 **Italian National Research Council Studentship (CNR)**, to carry out research work in a foreign country, duration 1 year.
- 1996 **Dissertation Research Award**, University of Rome, “Sapienza”, Department of Psychology.

1994 – 1995 – 1996      **Department Bursary**, University of Rome, “Sapienza”, Department of Psychology.

## Other Research Experiences

- 15<sup>th</sup> Sept. - 15<sup>th</sup> Nov. 2014      **Visiting scientist**, Entomology Dept. Federal University of Viçosa, Brazil
- 1<sup>st</sup> Nov. 2002 - 31<sup>st</sup> Oct. 2003      **Visiting PhD Student**, IRIDIA, Université Libre de Bruxelles, Belgium.
- 1<sup>st</sup> Oct. 1998 - 30<sup>th</sup> Sep. 1999      **Visiting Student**, Centre of Adaptive Behaviour and Cognition, Max Planck Institute, Berlin, Germany.
- 1<sup>st</sup> Feb. 1997 - 1<sup>st</sup> Feb. 1998      **Visiting Student**, ISTC-CNR, Rome, Italy.
- 1<sup>st</sup> Sep. 1996 - 30<sup>th</sup> Nov. 1996      **Visiting Student**, University of Edinburgh, UK, Cognitive Neuroscience and Intelligent System Lab. Directed by Prof. Brendan McConigle.

## Teaching

- 1<sup>st</sup> Sep. 2010 - present      Module title: **The Artificial Intelligence Toolbox - Part II**, 10 credits module.  
**Adaptive Behaviour From Natural Systems**, 20 credits module.  
**Current Issues in Distributed Systems**, 20 credits module.  
**Current Issues in Software Engineering**, 20 credits module.  
**Applied Intelligent Systems**, 20 credits module.  
**Professional and Personal Development**, 10 credits module.
- Oct. 2006      **Evolutionary Robotics**, a series of 4 lectures of 2 hours each for PhD students in Applied Sciences at IRIDIA, Université Libre de Bruxelles, Belgium.
- Oct. 1999 - Jun. 2002      **Tutor in a Computing Lab**, teaching C, C++, Java, Matlab and Python, for first year students at the Informatics Departments, University of Sussex, Brighton, (UK).
- Sep. 1994 - Sep. 1996      **Tutor in a Computing Lab and Data Analysis**, teaching statistics at first and second year students in Psychology, University of Rome, “La Sapienza”, Rome, Italy.

## Supervision

- Doctoral Students      I am currently supervising the following **doctoral students**:  
*Ashraf Zia*, Aberystwyth University, starting date October 2014.  
*Muhanad H. Muhammed*, Aberystwyth University, starting date Oct. 2013.  
*Olalekan A. Lanihun*, Aberystwyth University, starting date Oct. 2013.  
*Aparajit Nurayan*, Aberystwyth University, starting date November 2013.
- Apr. 2015 - Jun. 2015      *Hugo Flirden*, French undergraduate from Institut Universitaire de Technologie, Clermont-Ferrand (France), doing a four months internship at Aberystwyth University.
- Apr. 2014 - Jun. 2014      *Alexandre Raberin*, French undergraduate from Institut Universitaire de Technologie, Clermont-Ferrand (France), doing a four months internship at Aberystwyth University.
- Apr. 2012 - Jul. 2012      *Yannis Guyon*, French undergraduate from Institut Universitaire de Technologie, Clermont-Ferrand (France), doing a four months internship at Aberystwyth University.  
*Sebastian Clarke*, final project, Master in Autonomous Adaptive Systems, Department of Computer Science, Aberystwyth University.
- Oct. 2005 - Oct. 2008      *Christos Ampatzis*, doctoral student at IRIDIA, Université Libre de Bruxelles, Brussels, Belgium (co-supervision with Prof M. Dorigo).
- Mar. 2007 - Jun. 2007      *Philippe Duchesne*, Master in Cognitive Systems at the Université Libre de Bruxelles, Brussels, Belgium (co-supervision with Prof M. Dorigo).
- Oct. 2006 - Jun 2006      *Federico Vicentini*, PhD Student, Engineering Department, Politecnico di Milano,

Italy, (co-supervision with Prof M. Dorigo, during Federico's time at IRIDIA, Université Libre de Bruxelles, Brussels, Belgium).

Mar. 2006 - Jun. 2006 *Julien Hubert*, Master in Cognitive Systems, Université Libre de Bruxelles, Brussels, Belgium (co-supervision with Prof M. Dorigo).

## Invited Talks

3<sup>rd</sup> May 2016 *"Task-allocation in Swarm robotic"* University of Middlesex, London, UK

2<sup>nd</sup> May 2016 *"Overview of my Research Activity"*, UPMC Paris, France

1<sup>st</sup> Dec. 2015 *"Overview of my Research Activity"*, University of Bournemouth, UK

29<sup>th</sup> Oct. 2015 *"Artificial Evolution: a Alternative Method for Synthetic Biology"*, Dept. Entomology, UFV (Federal University of Viçosa) Viçosa, Brazil.

23<sup>rd</sup> Oct. 2015 *"Swarm Robotics, Active Perception, Flying Vehicles, and Artificial Termites: Different Applications and a Common Methodological Approach"*, Dept. Computer Science, UFPB (Federal University of Paraíba), João Pessoa, Brazil.

21<sup>st</sup> Oct. 2015 *"Artificial Evolution: a Alternative Method for Synthetic Biology"*, III Simpósio Brasileiro de Termitologia, João Pessoa, Brazil.

8<sup>th</sup> Oct. 2015 *"Task-allocation in Swarm Robotics"*, Inria Nancy, France

12<sup>th</sup> Feb. 2015 *"Evolutionary Swarm Robotics Methods"*, York University, York, UK

6<sup>th</sup> Jan. 2015 *"Evolutionary Swarm Robotics"*, Southampton University, Southampton, UK

4<sup>th</sup> Jun. 2014 *"Overview of my Research Activity"*, University of Kent, Medway, UK

15<sup>th</sup> May 2014 *"Model of Task-Alocation in Swarm Robotics"*, Inria Rennes Bretagne Atlantique, Rennes, France

16<sup>th</sup> Jan. 2014 *"Overview of my Research Activity"*, University of Hull, Hull, UK

27<sup>th</sup> Nov. 2013 *"Dynamic Task-Allocation in Swarm Robotics"*, Keele University, Keele, UK

1<sup>st</sup> Aug. 2013 *"Overview of my Research Activity"*, University of West of Scotland, Glasgow, UK

5<sup>th</sup> Jan. 2011 *"Semantic Compositionality in Autonomous Robots"*, Université Charles De Gaulle Lille III, URECA group, Lille, France.

31<sup>st</sup> May 2010 *"The ITALK project: an introduction to research work on the development of language skills in autonomous robots"*, ISTC-CNR, Rome, Italy.

26<sup>th</sup> Nov. 2009 *"Overview of my Research Activity"*, University of Abertay Dundee, UK.

15<sup>th</sup> Oct. 2009 *"Overview of my Research Activity"*, Aberystwyth University, UK.

23<sup>rd</sup> April 2009 *"Overview of my Research Activity"*, Keele University, Newcastle-under-Lyme, UK.

14<sup>th</sup> May 2008 *"The origin of Communication"*, University of Minho, Guimaraes, Portugal.

10<sup>th</sup> Dec. 2006 *"Overview of my Research Activity"*, Fraunhofer Institute, Frankfurt Am Main, Germany.

6<sup>th</sup> Nov. 2006 *"Evolutionary Robotics and the Evolution of Communication"*, University of Leicester, Leicester, UK.

27<sup>th</sup> Oct. 2006 *"Overview of my Research Activity"*, University of Sussex, Brighton, UK.

12<sup>nd</sup> Apr. 2006 *"Overview of my Research Activity"*, University of Leeds, Leeds, UK.

29<sup>th</sup> Nov. 2005 *"Swarm Robotics"*, Maastricht University, Maastricht, The Netherlands.

17<sup>th</sup> Sep. 2004 *"Evolving the 'feeling' of time"*, University of Leeds, Leeds, UK.

29<sup>th</sup> Apr. 2004 *"Swarm Evolutionary Robotics"*, Center of Adaptive Behavior and Cognition, Max Planck Institute, Berlin, Germany.

- 15<sup>th</sup> Jun. 2002      “*The evolution of learning mechanism*”, Fraunhofer Institute for Experimental Software Engineering, St. Augustine, Bonn, Germany.
- 10<sup>th</sup> Apr. 2002      “*The Evolution of Learning*”, University of Plymouth, Plymouth, UK.
- 10<sup>th</sup> Mar. 1999      “*Social learning and information sharing: An evolutionary simulation model of foraging in Norway rats*”, The Darwiniano, ISTC-CNR, Rome, Italy.

## Editorial and Reviewing Activities

I am **Associate Editor** of the International Journal of Advance Robotics Systems, and **Review Editor** of the Journal Frontiers in Robotics and AI.

I serve as a **member of the program committee** of the following National and International Conferences:

- International Conference on Simulation of Adaptive Behavior, SAB (since 2006)
- International Conference on the Simulation and Synthesis of Living Organisms, Alife (since 2008)
- IEEE Congress on Evolutionary Computation CEC, (since 2008)
- International Conference on Swarm Intelligence, ANTS (since 2010)
- Italian Workshop on Artificial Life and Evolutionary Computation, WIVACE (since 2009)
- International Conference on Genetic and Evolutionary Computation, GECCO (since 2008)
- UK National Conference Towards Autonomous Robotics Systems, TAROS (since 2010)
- European Conference on Artificial Life, ECAL (since 2007)
- International Symposium on Distributed Autonomous Robotics Systems, DARS (since 2010)

In the last 10 years, I have been serving as **reviewer** for various International Scientific Journals, such as Artificial Life Journal, Adaptive Behavior, Swarm Intelligence, IEEE Trans. Evolutionary Computation, PLOS Biology. Since 2010, I have been reviewing project proposals for EPSRC.

Since 2012, I serve as **reviewer** for the Romanian National Council for Research and Development, for the Partnership Programme, Joined Applied Research Project. Since 2014 I serve as project reviewer for the European Commission, FET programme.

In August 2015, I have been interviewed by Science Magazine to comment on a research work looking at the problem of task-allocation in natural and artificial systems (<http://news.sciencemag.org/plants-animals/2015/08/antlike-robots-might-help-explain-origins-animal-cooperation>).

In July 2015, I have been interviewed by the Austrian Radio Station ORF, das Ö1 Radiokolleg "Schwarmintelligenz-Modell und Metapher" 30th, July, 2015, to discuss and comment on the latest research development in Swarm Robotics.

## Other Scientific Activities

- 2016      *Conference Program Chair*, 14<sup>th</sup> International Conference on the Simulation of Adaptive Behavior: from Animals to Animats (SAB 2016), Aberystwyth, 24-26 August 2016.
- 14<sup>th</sup> Dec. 2012      *Internal Examiner* at Michael Sheldon PhD defence.
- 19<sup>th</sup> Jul. 2010      *Member of the Jury*, Iñaki Navarro Oiza's PhD defence – Universidad Politécnica de Madrid, Madrid, Spain.
- 29<sup>th</sup> Jul. 2009      *Workshop Chair*, Swarm Cognition Workshop, held at the Annual Meeting of the Cognitive Science Society (CogSci 2009), Amsterdam, The Netherlands.
- 22<sup>nd</sup> Jun. 2009      *Member of the Jury*, at Álvaro Gutiérrez Martín's PhD defence – Universidad Politécnica de Madrid, Madrid, Spain.
- 15<sup>th</sup> Oct. 2008      *Member of the Jury*, at Christos Ampatzis' PhD defence - Université Libre de Bruxelles, Brussels, Belgium.

22 <sup>nd</sup> Oct. 2007	<i>Member of the Jury</i> , at Roderich Gross' PhD defence - Université Libre de Bruxelles, Brussels, Belgium.
8 <sup>th</sup> Jun. 2007	<i>Member of the Jury</i> , at Halva Labella's PhD defence - Université Libre de Bruxelles, Brussels, Belgium.
26 <sup>th</sup> Sep., 2006	<i>Member of the Jury</i> , at Vito Trianni's PhD defence- Université Libre de Bruxelles, Brussels, Belgium.
10 <sup>th</sup> Sep. 2006	<i>Workshop Chair</i> , III Evolution and Emergence of Language and Communication Workshop, held at the Simulation of Adaptive Behavior International Conference (SAB 2006), Rome, Italy.
15 <sup>th</sup> Sep. 2005	<i>Workshop Chair</i> , Evolution of Learning Mechanisms, held at the European Conference of Artificial Life (ECAL 2005), Canterbury, UK.

## Participation to International Research Programmes

<p><i>ITALK</i> Integration and Transfer of Action and Language Knowledge in Robots 2008 - 2011</p>	<p>Project funded by Cognitive Systems and Robotics Technologies - Information and Communication Technologies of the European Commission (grant n° 214668). My role: <i>Research Associate</i>, member of the scientific board at ISTC-CNR, Rome, Italy. Description: ITALK project aims to develop artificial embodied agents able to acquire complex behavioural, cognitive, and linguistic skills through individual and social learning. This will be achieved through experiments with the ICub humanoid robot.</p>
<p><i>Ariadna Initiative</i> Evolving a Collective Consciousness for a Swarm of Pico-Satellites. Oct. 2007 - Jan. 2008.</p>	<p>Project funded by the European Space Agency, Ariadna Initiative ID 07/8101. My role: <i>Co-Investigator</i>, main scientist responsible for the development of the project at IRIDIA, Université Libre de Bruxelles, Brussels, Belgium. Description: the project aimed to study the use of swarm intelligence and evolutionary robotics methods for the control system design of a swarm of pico-satellites.</p>
<p><i>Swarmanoid</i> Towards Humanoid Robotic Swarms. 2006 - 2010</p>	<p>Project funded by the Future and Emerging Technologies Programme - Information Society Technologies of the European Commission (grant n° IST-022888). My role: <i>Research Associate</i>, member of the scientific board and responsible for the organisation activities related to the work-package IV "Control" at IRIDIA, Université Libre de Bruxelles, Brussels, Belgium. Description: the main scientific objective of this research project is the design, implementation and control of a novel distributed robotic system. This system is made up of heterogeneous, dynamically connected, small autonomous robots that can fly, or walk, or climb.</p>
<p><i>ECAgents</i> Embodied and Communicating Agents. 2004 - 2008</p>	<p>Project funded by the Future and Emerging Technologies Programme - Information Society Technologies of the European Commission (grant n° 001940). My role: <i>Research Associate</i>, member of the scientific board at IRIDIA, Université Libre de Bruxelles, Brussels, Belgium. Description: this project aimed to investigate basic properties of different communication systems, from simple communication systems in animals to human language and technology-supported human communication, to clarify the nature of existing communications systems and to provide ideas for designing new technologies based on collections of embodied and communicating devices.</p>
<p><i>SWARM-BOTS</i> Swarms of self-assembling artefacts 2001 - 2005</p>	<p>Project funded by the Future and Emerging Technologies Programme - Information Society Technologies of the European Commission (grant n° IST-2000-31010). My role: <i>Research Associate</i>, member of the scientific board at IRIDIA, Université Libre de Bruxelles, Brussels, Belgium, and responsible for the organisation activity concerning the work-package IV "Control at IRIDIA". Description: this project aimed to study new approaches to the design and implementation of self-organizing and self-assembling artefacts.</p>

## Languages

*Italian*: mother tongue

*English*: fluent written and spoken

*French*: fluent written and spoken

## Bibliometrics

From Google Scholar:

- Citations: 1514 (866, since 2011)
- h-index: 21 (15, since 2011)
- i10-index: 28 (19, since 2011)