

Niall Murphy

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Research Group on Natural Computation
Dept. of Computer Science & Artificial Intelligence,
University of Seville, Seville, Spain

Career

- October 2008 – present **Visiting Researcher** – Research Group on Natural Computing, University of Seville. Computational complexity of membrane (P-)systems.
<http://www.gcn.us.es>
- March 2010 – August 2010 **Post-doctoral researcher** – National University of Ireland Maynooth. Analysing holographic digital micrographs of cancer cells. Isolating images of the front and back cell membrane from a series of digital holograms.
- September 2005 – October 2009 **Ph.D. in Computer Science** – National University of Ireland Maynooth. “Uniformity conditions for membrane systems: uncovering complexity below P” (exam March 2010)
- September 2004 – September 2005 **Software developer** – IBM Lotus Dublin Software Lab, Ireland. Java developer on local & international teams building “Workplace Managed Client” applications & development tools. Mentor for incoming Extreme Blue interns.
<http://www.alphaworks.ibm.com/tech/wmctoolkit>
- June 2004 – September 2004 **IBM Extreme Blue Internship** – IBM Lotus Dublin Software Lab, Ireland. Worked in a tight-knit team designing, developing, and marketing software to translate Visual Basic 6 source to Java.
<http://www.ibm.com/extremeblue>
- September 2000 – July 2004 **B.Sc. (Hons) Computer Science & Software Eng (1st Class)** – NUI Maynooth. Final Project: “Java simulation of a super-Turing optical model of computation”.

Awards and Scholarships

- Best student paper award at DNA16 conference (2010).
<http://nicosia.is.s.u-tokyo.ac.jp/dna/award.html>
- Ph.D. funded by an IRCSET scholarship (2005 – 2009).
- Achieved highest possible bonus level in IBM (2004).
- Earned a place in the elite IBM internship, Extreme Blue (2004).

Tuition and teaching assistant:

- **Theory of Computation:** Tutor, provided & demonstrated solutions to problem sets. Formal Languages, automata, Turing machines, computability, complexity, NP completeness.
- **Introduction to Computer Science:** Tutor, provided & demonstrated solutions to problem sets. Formal languages, regular expressions, context-free grammars, finite automata, push-down automata, and basic programming.
- **Functional Programming:** Head demonstrator, provided & explained solutions to problem sets. Scheme, Haskell.

Research Expertise

- Computational Complexity, especially classes contained in P (AC^0 , NC^1 NL, etc.)
- Defining models of computation of physical systems, experience with many different paradigms (Cellular Automata, Turing machines, RAMs, Boolean circuits, Membrane systems, optical models)

Publications

Journal Papers

- (Invited) “Implementations of a model of physical sorting” 2008, vol 4,8 pp 3-12, International Journal of Unconventional Computing. N. Murphy, T.J. Naughton, D. Woods, B. Henley, K. McDermott, E. Duffy, P. J. M. van der Burgt, and N. Woods. (JCR)
- (Invited) “The computational power of membrane systems under tight uniformity conditions”, Natural Computation (awaiting print). N. Murphy and D. Woods
- (In preparation) journal version of “On acceptance conditions for membrane systems: characterisations of L and NL” N. Murphy and D. Woods.
- (In preparation) journal version of “Active Membrane Systems Without Charges and Using Only Symmetric Elementary Division Characterise P” N. Murphy and D. Woods.

Conference Papers (peer reviewed)

- “Uniformity conditions in natural computing”, *DNA16 2010 - 16th International Conference on DNA Computing*, (Winner of best student award). N. Murphy and D. Woods.
- “Membrane dissolution and division in P”, *Unconventional Computation 2009*, Springer LNCS, vol 5715 , pp 268–282. D. Woods, N. Murphy, M.J. Pérez-Jiménez, A. Riscos-Núñez.
- (Invited) “On acceptance conditions for membrane systems: characterisations of L and NL”, *The Complexity of Simple Programs*, Cork, Ireland, 2008. EPTCS volume 1 pp. 172–184 arXiv:0906.3327v1 [cs.CC]. N. Murphy and D. Woods
- “Active membrane systems without charges and using only symmetric elementary division characterise P”, *Membrane Computing, 2007*, LNCS vol. 4860, pp. 367–384. N. Murphy and D. Woods.
- “A characterisation of NL using membrane systems without charges and dissolution”, *Unconventional Computing 2008*, LNCS, vol 5204, pp 164–176. N. Murphy and D. Woods
- “Bio-Computation using Holliday junctions”, 4th Mathematical Foundations of Computer Science and Information Technology (MFCSIT), pp. 317–320, Cork, Ireland, 1–5 August 2006. N. Murphy, D. Woods and T.J. Naughton.

Editor

- The Complexity of Simple Programs (Proceedings), 25 June 2009. EPTCS volume 1. Editors: Turlough Neary, Damien Woods, Anthony K. Seda, and Niall Murphy. Cork University Press, 2008 and <http://arxiv.org/abs/0906.4612> [cs.CC]

Reviewing

- Journal of Logic and Computation
- Romanian Journal of Information Science and Technology
- International Journal of Unconventional Computation
- **Conferences:** Language and Automata Theory and Applications 2011; Complexity of Simple Programs 2008; Unconventional Computation 2006 and 2007; Machines Computability and Universality 2007

References

- **Damien Woods** (*Thesis Supervisor*), woods@caltech.edu, Senior Postdoctoral Scholar in Computer Science, Division of Engineering & Applied Science, California Institute of Technology, CA, USA.
- **Petr Sosík** (*Thesis examiner*), petr.sosik@fpf.slu.cz, Associate Professor, Faculty of Philosophy and Science, Silesian University in Opava, Czech(ia). Visiting Researcher, Artificial Intelligence Group, Polytechnic University of Madrid.
- **Thomas J. Naughton** (*Thesis Supervisor*), tomn@cs.nuim.ie, Senior Lecturer, Department of Computer Science, National University of Ireland Maynooth, Ireland.
- **Prof. Mario de J. Pérez-Jiménez** (*Host*), marper@us.es, Professor of the University of Computer Science and Artificial Intelligence, Professor of Mathematics of I.N.E.M. Head of the Research Group on Natural Computation, University of Seville, Spain.