

Curriculum Vitae

Professor Marian Gheorghe

Professor of Computational Models and Software Engineering

University of Bradford		+44 (0) 1274 233930
Faculty of Engineering and Informatics		+44 (0) 7745 879360
Bradford BD7 1DP, West Yorkshire		m.gheorghe@bradford.ac.uk
United Kingdom		

General

MG is a 50th Anniversary Chair in Computational Models and Software Engineering in the Department of Computer Science at the University of Bradford. MG was *Head of the Department of Computer Science* (2018-20), *Director of Research of the School of Electrical Engineering and Computer Science* (2016-18) and is currently *Head of the Computational Modelling Research Unit*. MG is one of the *co-directors of the Computing Enterprise Centre*, whereby students, academics and partners from industry are developing software solutions for various businesses. Between September 2010 and February 2015 MG was *Head of the Verification and Testing group* (VT), at the University of Sheffield, the largest research group in the department. MG joined the University of Bradford in February 2015.

MG has more than 250 publications (according to the Research Gate profile <https://www.researchgate.net/profile/Marian-Gheorghe>), of which 62 journal papers and 58 conference papers are featured in DBLP (https://dblp.org/pers/hd/g/Gheorghe_0001:Marian), and co-edited 7 books and several journal special issues. In 2019 MG was awarded the Grigore C Moisil prize of the Romanian Academy of Sciences -the most prestigious computer science prize in Romania- for the book (published in collaboration with Gexiang Zhang and Mario Perez-Jimenez), "Real-life applications with membrane computing", Springer, 2017. MG's papers have been cited more than 4250 times (more than 1700 since 2016) and my H-index is 32, according to Google scholar (<http://scholar.google.co.uk/citations?user=OnJzjukAAAAJ&hl=en>). He has been involved, since 2000, in more than 10 research projects supported by different research or funding organisations - EPSRC, EU, RAE, RS, BC. MG has been collaborator on research grants funded by the Romanian or Chinese governments. MG has published in top computer science journals (Theoretical Computer Science, Information Sciences, Journal of Algebraic and Logic Programming, International Journal of Foundations of Computer Science) and interdisciplinary ones (Bioinformatics, ACS Synthetic Biology, IEEE/ACM Transactions on Computational Biology and Bioinformatics, Integrated Computer-Aided Engineering, BioSystems). *His internationally renowned results in computational models and software engineering have led to multiple collaborations, attracted research projects and contributed to building several software tools*. MG is a member of the EPSRC Peer Review College since 2010 and has reviewed for major computer science journals in his field and for several research councils.

Current position

2015 – to date **Professor of Computational Models and Software Engineering, 50th Anniversary Chair**,
Head of the Department of Computer Science, Faculty of Engineering and Informatics.
– Co-Director of the Computing Enterprise Centre

Professional membership

- Member of the Computability in Europe Association and ESRC Peer Review College
- Member of the International Membrane Computing Society

Education

- 1989-1991 **PhD in Computer Science:** Formal Languages and Programming Languages, University of Bucharest, Romania (one of the most prestigious universities in Romania)
- 1972-1976 **BSc (Hons) Mathematics and Computer Science (1st Class)** University of Bucharest, Romania

Work experience

- 2015 – 50th Anniversary Chair in Computational Modelling and Software Engineering, University of Bradford, UK
- 2000 – 2015 Lecturer/Senior Lecturer/Reader, Department of Computer Science, University of Sheffield, UK
- 1998 – 2000 Reader, Faculty of Sciences, University of Pitesti, Romania
- 1992 – 1998 Lecturer, Department of Computer Science, Faculty of Mathematics, University of Bucharest, Romania
- 1980 – 1992 Programmer/Senior Analyst at the Computer Centre of The University of Bucharest, Romania
- 1976 – 1980 Programmer at the Institute of Calculus Techniques, Bucharest, Romania

MG is interested in a broad spectrum of research topics ranging from fundamental research into core areas of computer science, such as machines and languages, rewriting systems and parallel and distributed computational models, to applications in formal verification and testing, large scale simulations of complex systems.

Research

MG's main research areas are **Computational Models** - unconventional computing, membrane computing, applications of modelling and formal verification in systems and synthetic biology; **Testing and Formal Methods**; and **General Software Engineering**.

Computational models have been core to all his research activities. Before joining the University of Sheffield he had been working on various rewriting models, like grammar systems, valence grammars, initial grammars, contextual grammars, variants of L-systems, properties of the languages generated, decidability results and applications to parsing. After joining the University of Sheffield his research related to computational models has been focusing on membrane systems and X-machines. Membrane systems (also called P systems) are computational models abstracted from the living cell structure and functionality. The following four topics have been considered: (i) computational properties (generative power, complexity, decidability, relations between models); (ii) relationships with other computational models - X-machines, Petri nets; (iii) applications to self-assembly; (iv) optimization problems. X-machines are a generalisation of finite state machines and they have been studied in connection with distributed grammar systems and for their potential in modelling agent systems. MG has studied applications of computational models in systems and synthetic biology.

Software testing, mostly model based testing, has been investigated in connection with the above mentioned models - X-machines based testing and membrane systems based testing. **General software engineering** methodologies have been considered in the context of agile approaches.

Research Grants

- 2020 – 2022 KTP, Innovate UK grant with Xalient Ltd (co-I)
- 2018 – 2019 Access Innovation with Xalient Ltd (co-I)
- 2017 – 2022 EU – Interreg, SCORE, (Bradford Co-I)
- 2017 – 2019 Innovate UK, KTP with Rakusen's Ltd, (Bradford Co-I)
- 2011 – 2016 EPSRC, ROADBLOCK (Sheffield PI)
- 2011 – 2013 EPSRC, HPC – FLAME (Sheffield Co-I)
- 2011 – 2013 Royal Society, Verification & Computation (Co-I)
- 2010 – 2012 EU Interreg, OSEPA (Sheffield Co-I);
- 2010 Royal Academy of Engineering, UK-India Exchanges (PI)
- 2006 – 2009 EPSRC, Observatory (Co-I)

2004 - 2006 British Council, Unconventional Computing (PI)
2002 – 2005 EPSRC MoLEx (PI)
2002 – 2004 EU MolCoNet network (Sheffield PI)

The projects above provided appropriate opportunities for *collaborations with research groups in the UK* - Nottingham, Newcastle and Warwick [EPSRC ROADBLOCK], but also great scope for *international collaborations* with the Institute of Mathematics of the Hungarian Academy (I. Nemeti and H. Andreka) [Royal Society Project], Indian Institute of Technology, Chennai (K. Krithivasan and R. Rama) [RAE Project], Universities of Paris 12 (S. Verlan) and Metz (M. Margenstern) [British Council Project], Universities of Leiden (G. Rozenberg) Milan (G. Mauri and C. Zandron), Vienna (R. Freund), Seville (M.J. Perez-Jimenez) [EU MolCoNet]. Some of these projects [Royal Society, RAE, MolCoNet] have been appropriately used for *training PhD students and young researchers*. Other projects provided the opportunity to develop *interdisciplinary research* - investigations in synthetic biology (involving biologists and chemical engineers - ROADBLOCK); research on software engineering methodologies (performed together with work psychologists – EPSRC Observatory); and applications of open source software (studied in connection with their usage in public administration – EU OSEPA).

Research experience

2002 – to date Principal Supervisor for 11 PhD students and 1 MPhil. One of them, Francesco Bernardini, was a runner-up of the prestigious BCS Theoretical Computer Science award. Ioanna Stamatopoulou is now associate professor at City College, Thessaloniki; Fran Romero-Campero is a lecturer at the University of Seville; Dario Pescini is assistant professor at the University of Milan Bicocca, Mehmet Bakir postdoc researcher at the University of Sheffield.

2010 – 2015 Chair of the Steering Committee of the Membrane Computing Conference, PC member of various international conferences and workshops

2016 – 2020 Publicity chair of the International Membrane Computing Society and editor of the Bulletin of IMCS 2018 – 2021.

2015 – 2019 Editorial board member of the PeerJ publication

2015 – to date Editorial board member the International Journal of Membrane Computing

2004 – to date Guest editor of special issues for BioSystems, Natural Computing, Fundamenta Informaticae, ROMJIST and five Lecture Notes in Computer Science volumes

2005 – to date Editor of two research monographs, on Unconventional Computing and Systems and Synthetic Biology

2004 – to date **Expert evaluator** for research proposals for EPSRC, BBSRC, Qatar Research Council, Romanian Research Council

2002 – to date Reviewing for high profile research journals: Theoretical Computer Science, BioSystems, Bioinformatics, Fundamenta Informaticae, International Journal of Foundations of Computer Science, Information sciences, Integrated Computer-Aided Engineering, ROMJIST

2010 – to date Invited researcher on research projects funded by the Chinese Research Council and Romanian Research Council

2002 – to date **External Examiner:** PhD theses at Universities of Newcastle, Nottingham, Oxford, Liverpool, Bradford, Middlesex (UK), Seville (Spain), Leiden (The Netherlands), Auckland (New Zealand), IIT Chennai (India).

Research Publications

MG co-authored three books, co-edited 6 volumes (Springer, Idea Group). MG has more than 200 publications (according to the Research Gate profile), of which 62 journal papers and 58 conference papers are featured by DBLP – the key database of publications in computer science.

Books

1. G. ZHANG, M.J. PEREZ-JIMENEZ, A. RISCOS-NUNEZ, S. VERLAN, S. KONUR, T. HINZE, M. GHEORGHE: *Membrane Computing Models: Implementations*, Springer 2021
2. G. ZHANG, M.J. PEREZ-JIMENEZ, M. GHEORGHE: *Real-life Applications with Membrane Computing*,

Springer 2016

- 3 P. FRISCO, M. GHEORGHE, M.J. PEREZ-JIMENEZ (Eds): *Applications of Membrane Computing in Systems and Synthetic Biology*, Springer, 2014
- 4 A. ALHAZOV, S. COJOCARU, M. GHEORGHE, Y. ROGOZHIN, G. ROZENBERG, A. SALOMAA (Eds): *Membrane Computing, Conference Proceedings, LN CS 8340*, Springer, 2013
- 5 E. CSUHAI-VARJU, M. GHEORGHE, G. ROZENBERG, A. SALOMAA, G. VASZIL (Eds): *Membrane Computing, Conference Proceedings, LN CS 7762*, Springer, 2012
- 6 M. GHEORGHE, GH. PAUN, G. ROZENBERG, A. SALOMAA, S. VERLAN (Eds): *Membrane Computing, Conference Proceedings, LN CS 7184*, Springer, 2011
- 7 M. GHEORGHE, T. HINZE, GH. PAUN, G. ROZENBERG, A. SALOMAA (Eds): *Membrane Computing, Conference Proceedings, LN CS 6501*, Springer, 2010
- 8 M. GHEORGHE (Ed): *Molecular Computational Models: Unconventional Models*, Idea- Group, 2004
- 9 T. BALANESCU, S. GAVRILA, H. GEORGESCU, M. GHEORGHE, L. SOFONEA, I. VADUVA: *Programming in Pascal and Turbo Pascal* (in Romanian), Technical Publishing House, 1992, 2 volumes

Journal papers (after 2013)

- 1 F. IPATE, M. GHEORGHE, R. LEFTICARU: Fundamental results for learning deterministic extended finite state machines from queries. *Theor. Comput. Sci.*, 862, 2021, 160-173.
- 2 S. FAN, Y. GONG, G. ZHANG, Y. XIAO, H. RONG, P. PAUL, X. MA, H. HUANG, M. GHEORGHE: Implementation of kernel P systems in CUDA for solving NP-hard problems. *Int. J. Unconv. Comput.* 16(2-3), 2021, 259-278.
- 3 S. KONUR, L. MIERLA, F. IPATE, M. GHEORGHE: kPWorkbench: A software suit for membrane systems. *SoftwareX* 11, 2020, 100407.
- 4 B. K. MISHRA, D. THAKKER, S. MAZUMDAR, D. NEAGU, M. GHEORGHE, S. SIMPSON: A novel application of deep learning with image cropping: a smart city use case for flood monitoring. *J Reliab. Intell. Environ.* 6(1), 2020, 51-61.
- 5 A. TURLEA, M. GHEORGHE, F. IPATE, S. KONUR: Search-based testing in membrane computing. *J Membr. Comput.* 1(4), 2019, 241-250.
- 6 M. GHEORGHE, R. CETERCHI, F. IPATE, S. KONUR, R. LEFTICARU: Kernel P systems: From modeling to verification and testing. *Theor. Comput. Sci.*, 724, 2018, 45-60.
- 7 S.N. KRISHNA, M. GHEORGHE F. IPATE, E. CSUHAI-VARJU, R. CETERCHI: Further results on generalised communicating P systems. *Theor. Comput. Sci.*, 701, 2017, 146-160.
- 8 M. GHEORGHE, F. IPATE, S. KONUR: Kernel P systems: Design and implementation of membrane controllers for trajectory tracking of nonholonomic wheeled mobile robots. *Integrated Computer Aided-Engineering*, 23, 2016, 15-30.
- 9 X. WANG, G. ZHANG, F. NERI, T. JIANG, J. ZHAO, M. GHEORGHE, F. IPATE, R. LEFTICARU: Kernel P systems: Testing based on identifiable P systems using cover automata and X-machines. *Inf. Sci.*, 372, 2016, 565-578.
- 10 E. CSUHAI-VARJU, M. GHEORGHE, M. STANNETT, G. VASZIL: Spatially localised membrane systems. *Fundam. Inform.*, 138(1-2), 2015, 193-205.
- 11 S. KONUR, M. GHEORGHE: A property-driven methodology for formal analysis of synthetic biology systems. *IEEE/ACM Trans. Comput. Biology Bioinform.*, 12(2), 2015, 360-371.
- 12 S. KONUR, M. GHEORGHE, C. DRAGOMIR, L. MIERLA, F. IPATE, N. KRASNOGOR: Qualitative and quantitative analysis of systems and synthetic biology constructs using P systems. *ACS Synthetic Biology*, 4(1), 2014, 83-92.
- 13 S. KONUR, M. GHEORGHE, C. DRAGOMIR, F. IPATE, N. KRASNOGOR: Conventional verification for unconventional computing: a genetic XOR gate example. *Fundam. Inform.*, 134(1-2), 2014, 97-110.
- 14 G. ZHANG, M. GHEORGHE, L. PAN, M. J. PEREZ-JIMENEZ: Evolutionary membrane computing: A comprehensive survey and new results. *Inf. Sci.*, 279, 2014, 528-551.
- 15 I. M. NICULESCU, M. GHEORGHE, F. IPATE, A. STEFANESCU: From kernel P systems to X-machines and FLAME. *Journal of Automata, Languages and Combinatorics*, 19(1-4), 2014, 239-250.
- 16 G. ZHANG, J. CHENG, M. GHEORGHE, Q. MENG: A hybrid approach based on differential evolution and

tissue membrane systems for solving constrained manufacturing parameter optimization problems, *Appl. Soft Comput.*, 13(3), 2013, 1528-1542

- 17 M. GHEORGHE, F. IPATE, R. LEFTICARU, M.J. PEREZ-JIMENEZ, A. TURCANU, L. VALENCIA-CABRERA, M. GARCIA-QUISMONDO, L. MIERLA: 3-Col problem modelling using simple kernel P systems, *Int. J. Comput. Math.*, 90(4), 2013, 816-830
- 18 M. GHEORGHE, GH. PAUN, M.J. PEREZ-JIMENEZ, G. ROZENBERG: Research frontiers of membrane computing: Open problems and research topics, *Int. J. Found. Comput. Sci.*, 24(5), 2013, 547-624
- 19 M. GHEORGHE, GH. PAUN, M.J. PEREZ-JIMENEZ: Foreword, *IJUC*, 9(5-6), 2013, 347-349

Conference papers (after 2013)

- 1 S.N. PREDUT, F. IPATE, M. GHEORGHE, F. CAMPEAN: Formal modelling of cruise control system using Event-B and Rodin platform. HPCC/SmartCity/DSS 2018, 1541-1546.
- 2 A.I. TAMB UWAL, D. NEAGU, M. GHEORGHE: An experimental comparison of ensemble classifiers for evolving data streams, *SGAI Conf. 2017*, 156-162
- 3 M.E. BAKIR, M. GHEORGHE, S. KONUR, M. STANNETT: A comparative analysis of statistical model checking tools, *Int. Conf. on Membrane Computing*, 2016, 119-135
- 4 M. GHEORGHE, R. CETERCHI, F. IPATE, S. KONUR: Kernel P systems: modeling, testing and verification, *Int. Conf. on Membrane Computing*, 2016, 233-250
- 5 M. GHEORGHE, S. KONUR, F. IPATE, L. MIERLA, M.E. BAKIR, M. STANNETT: An integrated model checking toolset for kernel P systems, *Int. Conf. on Membrane Computing*, 2015, 153-170
- 6 S.N. KRISHNA, M. GHEORGHE, C. DRAGOMIR: Kernel P systems: Applications and implementations, *BIC-T A*, 2013, 1081-1089
- 7 S.N. KRISHNA, M. GHEORGHE, C. DRAGOMIR: Some classes of generalised communicating P systems and simple kernel P systems, *CiE* 2013, 284-293
- 8 M. GHEORGHE, F. IPATE: A kernel P systems survey, *CMC* 2013, 1-9