Curriculum Vitæ et Studiorum

Giuseppe Filippone

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1 Personal information and research activity

1.1 Personal information

Name and surname:	Giuseppe Filippone
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1.2 Current position

Big Data Analyst Developer in Risk & Finance Technology at JPMorgan, Glasgow, UK.

1.3 Previous positions

- Postdoctoral Researcher in Parallel Computing at the School of Engineering of the University of Edinburgh, UK.

- Postdoctoral Research Fellow in Computer Science (subject area INF/01) at the Department of Mathematics and Computer Science, University of Calabria, Italy.

1.4 Research interests

Parallel and High Performance Computing (GPGPU Computing, OpenMP, MPI, Distributed Computing), Big Data handling (Hadoop, Hive, HBase, Spark, MapReduce paradigm), Modeling and Simulation (Cellular Automata, DEM, FEM, CFD), Scientific Visualization (Computer Graphics, Real-time rendering, Scalable visualization), Evolutionary Computation (Genetic Algorithms, Neural Network), Decision Support.

1.5 Research activity

My research areas of interest mainly regard **Parallel Computing**, **Big Data**, **Scientific Visualization** and **Evolutionary Computation**.

In particular, in the context of **Parallel Computing** my research focuses mainly on CUDA (besides MPI, OpenMP and Map-Reduce) application to accelerate complex system simulations, e.g., large number of simultaneous Cellular Automata models simulations or large-scale engeneering simulations.

Within the **Big Data handling** domain, my research work is focused on the implementation of novel methods to accelerate distributed simulations by adopting Big Data tools and architectures for the engineering and scientific community.

In the **Scientific Visualization** research area, my interests regard new visual analysis methods and computer graphics innovative algorithms and techniques for three-dimensional representation and interactive visualization of large-scale scientific data.

Finally, regarding the **Evolutionary Computation** research line, I'm involved in evolutionary applications (e.g. Genetic Algorithms) to complex systems such as geological simulations models (e.g. lava flows, debris flows or avalanches) for the morphological evolution of protection measures for risk mitigation.

1.6 Short Biography

After obtaining my Bachelor's Degree in Computer Science at the University of Calabria (Italy) in 2006, I completed (in 2010) my Master of Science in Computer Science with the maximum final score.

In the same year, I was accepted as a member of the High Performance Computing Center and I was admitted to the Doctoral Program in Mathematics and Computer Science at the Department of Mathematics of the University of Calabria. I conducted my research, as a part of my PhD studies, at the School of Computing and Mathematics of Plymouth University in the UK (Centre for Robotics and Neural Systems) where I focused on several aspects of computer science regarding different fields, from parallel computing to simulation of complex systems, from genetic algorithms to computer graphics.

Thanks to the combination of the knowledge acquired in the field of modeling and simulation and expertise in software developing and real-time rendering, during the PhD path I had the opportunity to work for some University spin-off companies as a consultant and software engineer on several research projects.

On 12 December 2013, I received my Ph.D. in Mathematics and Computer Science at the University of Calabria, by defending my Thesis entitled "Parallel and evolutionary applications to Cellular Automata models for mitigation of lava flow invasions" which was awarded in 2014 as the best italian PhD thesis in Modeling, Simulation and Virtual Reality.

Starting from November 2013, I have been a Postdoctoral Research Fellow at the Department of Mathematics and Computer Science at the University of Calabria and, in the same year, I have been co-founder of the GPU Education Center of the same university.

Since May 2015 to February 2016, I have been a Postdoctoral Researcher Parallel Computing at the School of Engineering of the University of Edinburgh (UK). My research activity covers a range of several topics related to different fields of Computer Science such as Parallel Computing, Big Data, Modeling and Simulation, Data analytics for engineering simulation data, Scientific Visualization, Evolutionary Computation and Decision Support. During my experience at the University of Edinburgh I have been involved in the VELaSSCo (Visual Analysis for Extremely Large-Scale Scientific Computing) Project, an EC funded Project which deals with end-user visualization and analysis of Big Data produced by engineering simulations.

Since February 2016, I'm working as Big Data Analyst Developer in Risk & Finance Technology at JPMorgan. At the moment, I'm working extensively on Hadoop Big Data technologies using mainly using Spark (PySpark), Hive, Flume etc.

2 Education

2.1 University education

PhD in Mathematics and Computer Science. I received the title of Ph.D. in Mathematics and Computer Science on **12 December 2013** at the University of Calabria.

Thesis title:	Parallel and evolutionary applications to Cellular Automata models for mitigation of lava flow invasions
Thesis Supervisors:	Prof. William Spataro, Prof. Donato D'Ambrosio, Prof. Davide Marocco
Ph.D. Coordinator:	Prof. Nicola Leone

During the PhD path, I attended the following courses:

- Advanced Topics of Computational Complexity - Wolfgang Faber (24 hours);

- Combinatoria delle parole - Giuseppe Pirillo (10 hours);

- Scientific writing - Teresa Thing (40 hours);

- Graph Theory - Francesco Scarcello (12 hours);

- Concetti avanzati di Data Mining - Giuseppe Manco, Fabrizio Angiulli (12 hours);

- Fuzzy Logic and Fuzzy Answer Set Programming - Wolfgang Faber (9 hours);

- CUDA lecture series - Ari Hietanen (15 hours);

Master of Science in Computer Science. I obtained the MSc degree in Computuer Science on **29 July 2010** at the University of Calabria with the maximum final score.

Thesis title:	Progettazione ed implementazione di un motore grafico tridimensionale in ambiente C++ e VTK integrato in Qt GUI per la visualizzazione interattiva di dati scientifici
Thesis Supervisors:	Prof. William Spataro, Prof. Donato D'Ambrosio

During the two-year degree the main courses I attended and exams taken are listed below:
Data Warehousing and Data Mining, Knowledge Management, Modeling and Simulation, Numerical Approximation and Algorithms, Network and Computer Security, Parallel Algorithms and Distributed Systems, Theoretical computer science, Intelligent Systems, Cryptography and Coding Theory.

Bachelor of Science in Computer Science. I obtained the BSc degree in Computuer Science on **9 October 2006** at the University of Calabria.

Thesis title:	Progettazione e realizzazione di un'applicazione per la gestione di un'attività di ristoro
Thesis Supervisors:	Prof. Gianluigi Greco

During the three-year degree the main courses I attended and exams taken are listed below:
Analysis, Discrete Mathematics, Integral Calculus, Physics, Operations Research, Probability Theory and Statistics, Computer Architecture, Data bases,Object-Oriented Programming, Algorithms and Data Structures, Computer Graphics, Graphical Interfaces and Event-Oriented Programming, Artificial Intelligence, Formal languages and Compilers, Operating Systems and Networks, Software Engineering, Web based Information systems.

3 Research stays

3.1 National stays

- From 15/06/2013 to 3/10/2011 I had a **Stage** within FIXO program Politiche del lavoro a favore dei dottorandi e dottori di ricerca at GeoSafer S.p.A., Incubatore TechNest, P.zza Vermicelli, University of Calabria, Italy. During the stage period I worked on the develompment of an interactive visualisation system for lava flows cellular automata simulations.

- From 04/09/2008 to 3/10/2011 I had an **Internship** at the High Performance Computing Center (HPCC) for Parallel and Distributed Processing, University of Calabria, Italy, under the supervision of Prof. William Spataro and Prof. Donato D'Ambrosio. During the Internship period I worked on my MSc thesis whilst improving my Parallel Computing skills.

3.2 International stays

- From 06/05/2014 to 06/01/2015 I had a **fellowship visit** at the School of Computing and Mathematics, University of Plymouth,UK.

- From 23/05/2012 to 23/10/2013 I had a **research visit** at the School of Computing and Mathematics, University of Plymouth,UK, under the supervision of the Prof. Davide Marocco. During the visit period I worked on my PhD thesis by applying concepts of evolutionary robotics to geological processes for morphological co-evolution of protection measures for risk mitigation.

4 Partecipation in Committees

4.1 Program Committee merbership

- **PDP 2015 -** 23rd Euromicro International Conference on Parallel, Distributed, and Network-Based Processing - Special Session on High Performance Computing in Modelling and Simulation

(HPCMS), 20-22 September 2013 (expected), 4-6 March 2015, Turku, Finland.

4.2 Other merbership

- **HPCC Unical -** Memeber of The High Performance Computing Center for Parallel and Distributed Processing of the University of Calabria, Italy.

- **CUDA Education Center -** Member of The CUDA teaching center of the University of Calabria, Italy.

5 Partecipation at conferences and workshops

5.1 Conferences and workshops attended as a speaker

- **MIMOS 2014 -** 1st edition of MIMOS (Modeling and Simulation Italian Movement) Convention, 12 November 2014, Rome, Italy.

- **ECTA 2013 -** 5th International Conference on Evolutionary Computation Theory and Applications, 20-22 September 2013, Vilamoura, Algarve, Portugal.

- **GTC 2013 -** GPU Technology Conference, 18-22 March 2013, San Jose, California.

5.2 Other conferences and workshops attended

- **EUCog 2014 -** Sixth EUCogIII Members Conference - European Network for the Advancement of Artificial Cognitive Systems, Interaction and Robotics, 17-18 October 2014, Genoa, Italy.

- **EUCog 2014 -** Fifth EUCogIII Members Conference - European Network for the Advancement of Artificial Cognitive Systems, Interaction and Robotics, 19-20 March 2014, Bochum, Germany.

- **PDP 2014 -** 22nd Euromicro International Conference on Parallel, Distributed and network-based Processing, 12-14 February 2014, Turin, Italy.

- **EUCog 2013 -** Fourth EUCogIII Members Conference - European Network for the Advancement of Artificial Cognitive Systems, Interaction and Robotics, 23-24 October 2013, Falmer/Brighton, UK.

- **PCCAT 2012 -** Postgraduate Conference for Computing, Applications and Theory, 6 June 2012, Plymouth, UK.

- **WOA 2011 -** Dodicesimo Workshop Nazionale "Dagli Oggetti agli Agenti", 4-6 July 2011, Rende, Italy.

6 Teaching activity

6.1 Tutoring activity

- Student Ambassador activity at the Plymouth University CUDA teaching Center in Parallel Computing and GPGPU computing (A.A. 2013)

- Tutoring for the BSc in Computer Science at the University of Calabria (A.A. 2009/2010).

6.2 Teaching Assistant activity

- Teaching Assistant for the Computer Science course "Advanced programming in Java" at the University of Calabria (A.A. 2009/2010).

6.3 Thesis Supervisor activity

- Luana Scicchitano, "Implementazione di una Web Application in ambiente GWT per la Visualizzazione interattiva e l'Analisi di Mappe di Rischio di Colate Laviche" - Computer Science Msc Thesis, University of Calabria, A.A. 2011-2012;

- Maria Chiara Gallo, "Progettazione di una Web Application in ambiente GWT per la Visualizzazione interattiva e l'Analisi di Mappe di Rischio di Colate Laviche: Ottimizzazione del modulo di visualizzazione" - Computer Science MSc Thesis, University of Calabria. A.A. 2011-2012.

- Maria Alessandra Scavo, "Progettazione, implementazione e testing del modello ad Automi Cellulari SCIARA-fv2 in ambiente CUDA-GPGPU" - Computer Science MSc Thesis, University of Calabria. A.A. 2011-2012.

7 Reviewer activity

7.1 Workshops and conferences papers

- **RCRA 2011 -** 18th RCRA International Workshop "Experimental Evaluation of Algorithms for solving problems with combinatorial explosion", 17-18 July 2011, Barcelona, Spain.

7.2 Journal papers

- **JHPA -** Journal of High Performance and Applications, 2014.

- **ACM TOMACS -** Journal of Transactions on Modeling and Computer Simulation, 2015.

8 Awards

- Best italian PhD thesis in Modeling, Simulation and Virtual Reality - MIMOS 2013 Award (Modeling and Simulation Italian Movement - Movimento Italialiano MOdellazione e Simulazione).

- ECTA 2013 Best Paper Award Candidate.

- CUDA Academic Hardware donation grant for research support.

9 Other projects and research experiences

9.1 Research Projects

In the last few years I was involved, as project manager, in the following research projects:

- **GeoLab Project** Design and implementation of a software for simulation and visualisation of the transport of pollutants in water.

- **SuSy Project - Predictive Survey System** Definition of a predictive model based on neural networks and genetic algorithms for the classification of statistical surveys responses. (2014)

- **SCIARA Software 1.0** Design and implementation of an interactive visualisation system for lava flows cellular automata simulations. In particular the implemented framework is based on a three-dimensional graphics engine implemented in C++ and VTK/OpenGL and integrated in Qt Graphical User Interface (Qt GUI). (2012)

- **Bearing GUI** Design and implementation of a real-time interactive visualisation system for the virtual human movement reproduction in medical enviroments. (2011)

10 Publications

10.1 International Journals

- Filippone G., D'Ambrosio D., Spataro W., and Marocco D., Morphological co-evolution for fluid dynamical-related risk mitigation, ACM Transactions on Modeling and Computer Simulation (ACM TOMACS on Advances of Cellular Automata Models), 2015. (Accepted)

- Spataro D., D'Ambrosio D., Filippone G., Rongo R., Spataro W., and Marocco D., The new SCIARA-fv3 numerical model and acceleration by GPGPU strategies, International Journal of High Performance Computing Applications, SAGE Publications, 2015.

- Di Gregorio S., Filippone G, Spataro W., and Trunfio G. A., Accelerating wildfire susceptibility mapping through GPGPU, Journal of Parallel and Distributed Computing, Elsevier, Vol. 73, pp. 1183-1194, 2013.

- D'Ambrosio D., Filippone G., Marocco D., Rongo R., and Spataro W., Efficient application of GPGPU for lava flow hazard mapping, The Journal of Supercomputing, Spriger US, Vol. 65(2), pp. 630-644, 2013.

- D'Ambrosio D., Filippone G., Rongo R., Spataro W., and Trunfio G.A, Cellular Automata and GPGPU: An Application to Lava Flow Modeling, International Journal of Grid and High Performance Computing (IJGHPC), IGI Global, Vol. 4(3), pp. 30-47, 2012.

10.2 Proceedings of international conferences

- Filippone G., Spataro W., D'Ambrosio D., Marocco D., Trunfio G.A., CUDA dynamic active thread list strategy to accelerate debris flow simulations, Proceedings of the 23nd Euromicro International Conference on Parallel, distributed and network-based Processing (PDP 2015), Turku, Finland, 4-6 March, 2015.

- D'Ambrosio D., Spataro W., Parise R., Rongo R., Filippone G., Spataro D., Iovine G., and Marocco D., Lava flow modeling by the SCIARA-fv3 parallel numerical code: First simulations at Mt. Etna, Proceedings of the 22nd Euromicro International Conference on Parallel, distributed and network-based Processing (PDP 2014), Turin, Italy, 12-14 February, 2014.

- Filippone G., Spataro W., D'Ambrosio D., and Marocco D., A new methodology for mitigation of lava flow invasion hazard: Morphological evolution of protective works by Parallel Genetic Algorithms, Proceedings of the 5th International Conference on Evolutionary Computation Theory and Applications (ECTA), Vilamorua, Algarve, Portugal, 20-22 September, 2013.

- Parise R., D'Ambrosio D., Spingola G., Filippone G., Rongo R., Trunfio G.A., and Spataro W., Swii2, a HTML5/WebGL Application for Cellular Automata Debris Flows Simulation, Cellular Automata, Proceedings of the 10th International Conference on Cellular Automata for Research and Industry, Vol. 7495, pp.444-453, 2012.

- D'Ambrosio D., Di Gregorio S., Filippone G., Rongo R., Spataro W., and Trunfio G.A., Fast Assessment of Wildfire Spatial Hazard with GPGPU, Proceedings of the 2nd International Conference on Simulation and Modeling Methodologies, Technologies and Applications (Simultech),pp. 260-269, 2012.

- Filippone G., Spataro W., Spingola G., D'Ambrosio D., Rongo R., Perna G., and Di Gregorio, S., GPGPU programming and cellular automata: implementation of the SCIARA lava flow simulation code, Proceedings of the 23rd European Modeling and Simulation Symposium (EMSS), pp. 696-702, Rome, Italy, September 12-14, 2011.

- Spataro W., D'Ambrosio D., Filippone G., Rongo R., Spingola G., Zaccaro P., and Zito G., A Multithread Scientific Library for Complex Systems, Proceedings of The 2010 International Conference on Scientific Computing, pp. 47-54, Las Vegas, USA, July 12-15, 2010.

10.3 Book Chapter and collections

- Filippone G., Parise R., Spataro D., D'Ambrosio D., Rongo R. and Spataro W., Evolutionary applications to Cellular Automata models for volcano risk mitigation, Advances in Artificial Life and Evolutionary Computation, 445, 99-112, Springer Interational Publishing, 2014.

- Filippone G., Spataro W., D'Ambrosio D., and Marocco D., Evolving protection measures for lava risk management decision making, Studies in Computational Intelligence, Springer-Verlag, 2014. (In press)

- D'Ambrosio D., Di Gregorio S., Filippone G., Rongo R., Spataro W., and Trunfio G.A., A Multi-GPU Approach to Fast Wildfire Hazard Mapping, Simulation and Modeling Methodologies, Technologies and Application, Advances in Intelligent Systems and Computing, 256, 183-195, Springer International Publishing, 2014.

10.4 Other

- Filippone G., Marocco D., Spataro W., D'Ambrosio D., Multi-GPU accelerated morphological co-evolution of protective works for lava flow mitigation, GTC 2014 - GPU Technology Conference, San Jose, California, March 24-27, 2014.

- Marocco D., Spataro W., D'Ambrosio D., Filippone G., Rongo R., Iovine G., Neri M., Morphological evolution of protective works by Genetic Algorithms: An application to Mt Etna, EGU General Assembly Conference Abstracts,Vienna, Austria, April 7-12, 2013.

- Filippone G., Spataro W., D'Ambrosio D., Marocco D., An Interactive Visualization System for Lava Flows Cellular Automata Simulations using CUDA, GTC 2013 - GPU Technology Conference, San Jose, California, March 18-22, 2013.