

Curriculum Vitae

Gianni A. Di Caro

■ FAMILY, FIRST AND MIDDLE NAME:	Di Caro, Gianni Andrea
■ NATIONALITY:	Italian
■ AFFILIATION:	Carnegie Mellon University (CMU) Dept. of Computer Science, Qatar Campus, Doha
■ POSITION:	Associate Teaching Professor
■ MAIN DOMAINS OF INTEREST:	Swarm intelligence, multi-robot systems, optimization, AI
■ E-MAIL, WEB PAGE:	gdicaro AT cmu DOT edu, http://www.giannidicaro.com
■ TOTAL CITATIONS / H-INDEX / I10-INDEX :	24,800 / 33 / 67 (Source: <i>Google Scholar</i>)

Contents

1 Education	2
2 Employment: Academic and Research Positions	2
3 Scientific Publications	4
3.1 Books	4
3.2 Chapters in Books	4
3.3 Refereed Journal Papers - Published	5
3.4 Refereed Journal Papers - Accepted	6
3.5 Refereed Conference/Workshop Papers	7
3.6 Unpublished Technical Reports	14
3.7 Refereed Video Productions	15
4 Evidence of External Reputation	16
4.1 Citations and Awards	16
4.2 Invited Talks	16
4.3 Seminars and Colloquia	17
5 External Professional Activities	18
5.1 Conferences and Workshops Committees: Chair	18
5.2 Conference and Workshop Committees: Associate Editor, PC Member, or Reviewer	18
5.3 Memberships in Professional Societies	19
5.4 Editorial Board Memberships	19
5.5 Editor of Journal Special Issues	19
5.6 Journal Reviewer	19
5.7 External Expert for Research Projects	19
6 Contract and Grant Support	20
6.1 Current	20
6.2 Past Grant Support	20
6.3 Past Individual Project Grants and Fellowship Support	22
7 Evidence of Teaching Performance	23
7.1 Courses Taught at Carnegie Mellon	23
7.2 Courses Planned for Next Semester at Carnegie Mellon	23
7.3 Courses Taught Outside Carnegie Mellon	24
7.4 Short Courses and Conference Tutorials	24
7.5 Outreach Courses	25
8 Student Advising	26
8.1 Completed Ph.D. Students	26
8.2 Undergraduate Senior Thesis and Research Projects	26
8.3 M.S. Thesis or M.S. / Ph.D. Research Projects	27
8.4 Ph.D. Thesis Committee Service	27
8.5 External Examiner for M.S. or Ph.D. Thesis	28

1 Education

- **Doctorate, with Full Honors - 11/2004**

INSTITUTION: Faculty of Applied Sciences, Université Libre de Bruxelles (ULB), Brussels, Belgium

DISSERTATION: *Ant Colony Optimization and its application to adaptive routing in telecommunication networks*

SUPERVISOR: Prof. M. Dorigo, FNRS & IRIDIA

- **Diplôme d'Études Approfondies (D.E.A.) (Master of Applied Sciences) - 05/2001**

INSTITUTION: Faculty of Applied Sciences, Université Libre de Bruxelles, Brussels, Belgium

DISSERTATION: *A society of ant-like agents for adaptive routing in networks*

SUPERVISOR: Prof. M. Dorigo, FNRS & IRIDIA

- **Laurea in Physics (MSc. equivalent), Summa Cum Laude - 03/1992**

INSTITUTION: Faculty of Mathematical and Physical Sciences, University of Bologna, Bologna, Italy

DISSERTATION: *Implementation of a transputer-based system for real-time parallel data acquisition and the online control of large detectors for particle physics* (in Italian)

SUPERVISORS: Prof. R. Campanini and Dr. I. D'Antone, Department of Physics, Bologna

2 Employment: Academic and Research Positions

1. **Associate Teaching Professor [08/2016 - 07/2019]**

INSTITUTION: *Carnegie Mellon University (CMU), CS Department - Qatar Campus*

ACTIVITIES: Teaching in the domains of robotics and artificial intelligence, research in related domains with a focus on swarm and multi-robot systems and on the application of AI to robotic scenarios.

2. **Senior Researcher, permanent position [03/2010 - 08/2016]**

INSTITUTION: *"Dalle Molle" Institute for Artificial Intelligence (IDSIA), Lugano (CH)*

ACTIVITIES: Research, teaching, and project writing in the domains of networking, swarm robotics, swarm intelligence, human-robot interaction, coordination and cooperation in multi-agent systems, ambient assisted living, autonomous robotics, combinatorial optimization, smart grids.

3. **Post-Doctoral Researcher [10/2006 - 03/2010]**

INSTITUTION: *"Dalle Molle" Institute for Artificial Intelligence (IDSIA), Lugano (CH)*

RESEARCH: Design and control of an innovative robotic system made of a swarm of heterogeneous autonomous robots acting and interacting in the full 3D space (EU-funded FET project *Swarmanoid*).

4. **Post-Doctoral Researcher [05/2003 - 09/2006]**

INSTITUTION: *"Dalle Molle" Institute for Artificial Intelligence (IDSIA), Lugano (CH)*

RESEARCH: Study of nature's complex adaptive systems to design robust self-organizing systems for optimization and control in peer-to-peer and mobile ad-hoc networks (EU-funded FET project *BISON*).

5. **Marie Curie Postdoc Fellow [11/2001 - 04/2003]**

INSTITUTION: *IRIDIA, Université Libre de Bruxelles (ULB), Brussels (Belgium)*

RESEARCH: Application of artificial intelligence techniques for control and optimization in telecommunication networks, modeling of complex biological systems.

6. **Research Assistant for Japan Science and Technology Corporation (JST) [01/2001 - 09/2001]**

INSTITUTION: *Advanced Telecommunications Research (ATR), Kyoto (Japan)*

RESEARCH: Brain modeling, reinforcement learning in partially observable environments, adaptive setting of meta-parameters for learning algorithms, multi-agent learning.

7. **Science and Technology in Japan Fellow [02/1999 - 11/2000]**
INSTITUTION: *HIP Labs, Advanced Telecommunications Research (ATR), Kyoto (Japan)*
RESEARCH: Distributed multi-agent algorithms for sequential decision making in non-Markovian situations, simulation and analysis of the human immune system.
8. **TMR - Marie Curie Fellow [08/1996 - 02/1999]**
INSTITUTION: *IRIDIA, Université Libre de Bruxelles (ULB), Brussels (Belgium)*
RESEARCH: Reinforcement learning algorithms for distributed and partially observable environments, applications to adaptive routing and load balancing in telecommunication networks.
9. **Research Assistant [03/1996 - 06/1996]**
INSTITUTION: *Department of Biomedical Sciences, University of Modena, Modena (Italy)*
RESEARCH: Modeling of biological and evolutionary systems, management of local computing resources.
10. **Research Consultant [12/1995 - 02/1996]**
INSTITUTION: *Istituto per la Ricerca Scientifica e Tecnologica (IRST), Trento (Italy)*
RESEARCH: Software integration and design of architectures for autonomous robot programming.
11. **Research Assistant [01/1995 - 12/1995]**
INSTITUTION: *Department of Mathematics, University of Trento, Trento (Italy)*
RESEARCH: Development of heuristic algorithms for combinatorial optimization, administration of unix systems and web sites, application of image processing and software engineering techniques.
12. **Post-Graduate Research Fellow [01/1994 - 12/1994]**
INSTITUTION: *IRST, Trento (Italy)*
RESEARCH: Implementation of a real-time stereoscopic vision system for autonomous robotic navigation using a parallel network of digital signal processors.
13. **Post-Graduate Research Fellow [07/1993 - 12/1993]**
INSTITUTION: *IRST, Trento (Italy)*
RESEARCH: Design and realization of a concurrent real-time software architecture for the management of the activities of a mobile autonomous robot equipped with multiple sensors.
14. **Graduate Research Assistant [04/1992 - 07/1993]**
INSTITUTION: *Department of Physics, University of Bologna, Bologna (Italy)*
RESEARCH: Parallel implementations of genetic algorithms for optimization, application of fuzzy logic and classical pattern recognition techniques to the discrimination of sub-atomic particle beams.

3 Scientific Publications

3.1 Books

1. G. A. Di Caro and G. Theraulaz, editors. *Bio-Inspired Models of Network, Information, and Computing Systems - Proceedings of the 7th BIONETICS International Conference, 2012*, volume 134 of *LNCS*. Springer, 2014. Lugano, Switzerland, December 10–11, 2012.
2. C. Di Chio, A. Agapitos, S. Cagnoni, C. Cotta, F. Fernández de Vega, G. A. Di Caro, R. Drechsler, A. Ekárt, A. Esparcia-Alcázar, M. Farooq, W.B. Langdon, J.-J. Merelo-Guervós, M. Preuss, H. Richter, S. Silva, A. Simoes, G. Squillero, E. Tarantino, A. Tettamanzi, J. Togelius, N. Urquhart, A. Şima Uyar, and G. Yannakakis, editors. *Applications of Evolutionary Computation - Proceedings of EvoApplications 2012: EvoCOMNET, EvoCOMPLEX, EvoFIN, EvoGAMES, EvoHOT, EvoIASP, EvoNUM, EvoPAR, EvoRISK, EvoSTIM, and EvoSTOC*, volume 7248 of *LNCS*. Springer, 2012. Malaga, Spain, April 11–13, 2012.
3. C. Di Chio, A. Brabazon, G.A. Di Caro, R. Drechsler, M. Farooq, J. Grahl, G. Greenfield, C. Prins, J. Romero, G. Squillero, E. Tarantino, A. Tettamanzi, N. Urquhart, and A.S. Uyar, editors. *Applications of Evolutionary Computation - Proceedings of EvoApplications 2011, Part II: EvoCOMNET, EvoFIN, EvoHOT, EvoMUSART, EvoSTIM, and EvoTRANSLOG*, volume 6625 of *LNCS*. Springer, 2011. Turin, Italy, April 27–29, 2011.
4. M. Dorigo, M. Birattari, G.A. Di Caro, R. Doursat, A. Engelbrecht, D. Floreano, L.M. Gambardella, R. Groß, E. Sahin, H. Sayama, and T. Stützle, editors. *Swarm Intelligence, Proceedings of the 7th International Conference ANTS 2010*, volume 6234 of *LNCS*. Springer, 2010. Brussels, Belgium, September 8–10, 2010.
5. C. Di Chio, A. Brabazon, G.A. Di Caro, M. Ebner, M. Farooq, A. Fink, J. Grahl, G. Greenfield, P. Machado, M. O’Neill, E. Tarantino, and N. Urquhart, editors. *Proceedings of EvoApplications 2010: EvoCOMNET, EvoENVIRONMENT, EvoFIN, EvoMUSART, and EvoTRANSLOG*, volume 6025 of *LNCS*. Springer, 2010. Istanbul, Turkey, April 7–9, 2010.
6. M. Giacobini, A. Brabazon, S. Cagnoni, G.A. Di Caro, R. Drechsler, A. Ekart, A. Esparcia-Alcazar, M. Farooq, A. Fink, J. McCormack, M. O’Neill, J. Romero, F. Rothlauf, G. Squillero, A.S. Uyar, and S. Yang, editors. *Proceedings of EvoWorkshops 2008: EvoCOMNET, EvoENVIRONMENT, EvoFIN, EvoGAMES, EvoHOT, EvoIASP, EvoINTERACTION, EvoMUSART, EvoNUM, EvoPhD, EvoSTOC, and EvoTRANSLOG*, volume 5484 of *LNCS*. Springer, 2009. Tübingen, Germany, April 15–17, 2009.
7. M. Giacobini, A. Brabazon, S. Cagnoni, G.A. Di Caro, R. Drechsler, A. Ekart, A. Esparcia-Alcazar, M. Farooq, A. Fink, J. McCormack, M. O’Neill, J. Romero, F. Rothlauf, G. Squillero, A.S. Uyar, and S. Yang, editors. *Proceedings of EvoWorkshops 2008: EvoCOMNET, EvoFIN, EvoHOT, EvoIASP, EvoMUSART, EvoNUM, EvoSTOC, and EvoTRANSLOG*, volume 4974 of *LNCS*. Springer, 2008. Naples, Italy, March 26–28, 2008.
8. M. Giacobini, A. Brabazon, S. Cagnoni, G. A. Di Caro, R. Drechsler, A. Ekart, , M. Farooq, A. Fink, , E. Lutton, P. Machado, S. Minner, M. O’Neill, J. Romero, F. Rothlauf, G. Squillero, H. Takagi, A.S. Uyar, and S. Yang, editors. *Proceedings of EvoWorkshops 2007: EvoCOMNET, EvoFIN, EvoIASP, EvoINTERACTION, EvoMUSART, EvoSTOC, and EvoTRANSLOG*, volume 4448 of *LNCS*. Springer, 2007.
9. M. Dorigo, G.A. Di Caro, and M. Sampels, editors. *Ant Algorithms - Proceedings of ANTS 2002, Third International Workshop on Ant Algorithms, Brussels, Belgium, September 12–14, 2002*, volume 2463 of *Lecture Notes in Computer Science*. Springer-Verlag, 2002.

3.2 Chapters in Books

1. G.A. Di Caro, F. Ducatelle, and L.M. Gambardella. *Routage dans les réseaux mobiles ad hoc en environnement urbain (in French, "Routing in urban mobile ad hoc networks")*. In N. Monmarché, F. Guinand, and P. Siarry, editors, **Fourmis artificielles 2, nouvelles directions pour une intelligence collective**. Hermès Science Publications, France, 2009.

2. G.A. Di Caro, F. Ducatelle, and L.M. Gambardella. *Routing in urban mobile ad hoc networks (translated and reprinted from Hermès Science Publications)*. In N. Monmarché, F. Guinand, and P. Siarry, editors, **Artificial ants**, page 576. Wiley-ISTE, 2010.
3. M. Farooq and G.A. Di Caro. *Routing protocols for next generation networks inspired by collective behaviors of insect societies: An overview*. In C. Blum and D. Merckle, editors, **Swarm Intelligence: Introduction and Applications**, Natural Computing. Springer, 2008.
4. G.A. Di Caro, F. Ducatelle, and L.M. Gambardella. *Theory and practice of Ant Colony Optimization for routing in dynamic telecommunications networks*. In N. Sala and F. Orsucci, editors, **Reflecting interfaces: the complex coevolution of information technology ecosystems**, pages 185–216. Idea Group, Hershey, USA, 2008.
5. M. Dorigo and G.A. Di Caro. *The ant colony optimization meta-heuristic*. In D. Corne, M. Dorigo, and F. Glover, editors, **New Ideas in Optimization**, pages 11–32. McGraw-Hill, 1999.

3.3 Refereed Journal Papers - Published

1. R. Magán-Carrión, J. Camacho, P. Garcia-Teodoro, E. Feo-Flushing, and G. A. Di Caro. *A dynamical relay node placement solution for MANETs*. **Computer Communications**, 114:36–50, Elsevier, December 2017.
2. A. Giusti, J. Guzzi, D. Ciresan, F. Lin, J. P. Rodríguez, F. Fontana, M. Faessler, C. Forster, J. Schmidhuber, G. A. Di Caro, D. Scaramuzza, and L. Gambardella. *A machine learning approach to the visual perception of forest trails for mobile robots*. **IEEE Robotics and Automation Letters**, 1(2):661–667, IEEE RAS, 2016.
3. G. A. Di Caro. *Principi di swarm intelligence per problemi di routing adattivo in reti di telecomunicazione*. **Sistemi Intelligenti**, 26(3):443–464, Il Mulino, December 2014. [In Italian].
4. A. Reina, L. M. Gambardella, M. Dorigo, and G. A. Di Caro. *zePPELIN: Distributed path planning using an overhead camera network*. **International Journal of Advanced Robotic Systems**, 11(119):1–22, InTech, 2014.
5. F. Ducatelle, G. A. Di Caro, A. Förster, M. Bonani, M. Dorigo, S. Magnenat, F. Mondada, R. O’Grady, C. Pinciroli, P. Réturnaz, V. Trianni, and L. M. Gambardella. *Cooperative navigation in robotic swarms*. **Swarm Intelligence**, 8(1):1–33, Springer, 2014.
6. A. Giusti, M. Salani, G. A. Di Caro, A. E. Rizzoli, and L. M. Gambardella. *Restricted neighborhood communication improves decentralized demand-side load management*. **IEEE Transactions on Smart Grid**, 5(1):92–101, IEEE, January 2014.
7. M. Dorigo, D. Floreano, L. M. Gambardella, F. Mondada, S. Nolfi, T. Baaboura, M. Birattari, M. Bonani, M. Brambilla, A. Brutschy, D. Burnier, A. Campo, A. L. Christensen, A. Decugnière, G. A. Di Caro, F. Ducatelle, E. Ferrante, A. Förster, J. Guzzi, V. Longchamp, S. Magnenat, J. Martinez Gonzales, N. Mathews, M. Montes de Oca, R. O’Grady, C. Pinciroli, G. Pini, P. Réturnaz, J. Roberts, V. Sperati, T. Stirling, A. Stranieri, T. Stützle, V. Trianni, E. Tuci, A. E. Turgut, and F. Vaussard. *Swarmanoid: A novel concept for the study of heterogeneous robotic swarms*. **IEEE Robotics & Automation Magazine**, 20(4):60–71, IEEE RAS, 2013.
8. M. Kudelski, L. M. Gambardella, and G. A. Di Caro. *RoboNetSim: An integrated framework for multi-robot and network simulation*. **Robotics and Autonomous Systems**, 61(5):483–496, Elsevier, 2013.
9. R. Montemanni, M. Mojana, G. A. Di Caro, and L. M. Gambardella. *A decomposition-based exact approach for the sequential ordering problem*. **Journal of Applied Operational Research (JAOR)**, 5(1):2–13, ORLab, 2013.
10. C. Pinciroli, V. Trianni, R. O’Grady, G. Pini, A. Brutschy, M. Brambilla, N. Mathews, E. Ferrante, G. A. Di Caro, F. Ducatelle, M. Birattari, L. M. Gambardella, and M. Dorigo. *ARGoS: A modular, parallel, multi-engine simulator for multi-robot systems*. **Swarm Intelligence**, 6(4):271–295, Springer, 2012.

11. F. Ducatelle, G.A. Di Caro, C. Pinciroli, and L. Gambardella. *Self-organized cooperation between robotic swarms*. **Swarm Intelligence**, 5(2):73–96, Springer, 2011.
12. M. Saleem, G.A. Di Caro, , and M. Farooq. *A review of swarm intelligence based routing protocols for wireless sensor networks*. **Information Sciences**, 181(20):4597–4624, Elsevier, October 2011.
13. F. Ducatelle, G.A. Di Caro, and L. Gambardella. *Principles and applications of swarm intelligence for adaptive routing in telecommunications networks*. **Swarm Intelligence**, 4(3):173–198, Springer, 2010.
14. G. A. Di Caro, S. Giordano, M. Kulig, D. Lenzarini, A. Puiatti, F. Schwitter, and S. Vanini. *Deployable application layer solution for seamless mobility across heterogeneous networks*. **Ad Hoc & Sensor Wireless Networks**, 4(1–2):1–42, Old City Publishing, 2007.
15. O. Babaoglu, G. Canright, A. Deutsch, G.A. Di Caro, F. Ducatelle, L.M. Gambardella, N. Ganguly, M. Jelasity, R. Montemanni, A. Montresor, and T. Urnes. *Design patterns from biology for distributed computing*. **ACM Transactions on Autonomous and Adaptive Systems (TAAS)**, 1(1), ACM Press, September 2006.
16. G.A. Di Caro, F. Ducatelle, L.M. Gambardella, and A. Rizzoli. *Building blocks from biology for the design of algorithms for the management of modern dynamic networks*. **European Research Consortium for Informatics and Mathematics (ERCIM) News, Special Issue on Swarm Intelligence**, 64, ERCIM, January 2006.
17. G.A. Di Caro, F. Ducatelle, and L.M. Gambardella. *BISON: Biologically-inspired techniques for self-organization in dynamic networks*. **Kuenstliche Intelligenz, Special Issue on Swarm Intelligence**, 4:36–39, Springer, November 2005.
18. F. Ducatelle, G.A. Di Caro, and L.M. Gambardella. *Using ant agents to combine reactive and proactive strategies for routing in mobile ad hoc networks*. **International Journal of Computational Intelligence and Applications, Special Issue on Nature-Inspired Approaches to Networks and Telecommunications**, 5(2):169–184, World Scientific, June 2005.
19. G.A. Di Caro, F. Ducatelle, and L.M. Gambardella. *AntHocNet: an adaptive nature-inspired algorithm for routing in mobile ad hoc networks*. **European Transactions on Telecommunications**, 16(5):443–455, Wiley-Blackwell, 2005.
20. G.A. Di Caro and M. Dorigo. *AntNet: Distributed stigmergetic control for communications networks*. **A Quarterly in Artificial Intelligence**, 12(3 & 4):2–37, Vivek Publication, 1999. JAIR reprint.
21. M. Dorigo, G.A. Di Caro, and L. M. Gambardella. *Ant algorithms for discrete optimization*. **Artificial Life**, 5(2):137–172, MIT Press, 1999.
22. G.A. Di Caro and M. Dorigo. *AntNet: Distributed stigmergetic control for communications networks*. **Journal of Artificial Intelligence Research (JAIR)**, 9:317–365, AI Access Foundation, 1998.
23. F. Valentinotti, G.A. Di Caro, and B. Crespi. *Real-time parallel computation of disparity and optical flow using phase difference*. **Machine Vision and Applications**, 9(3):87–96, Springer, 1996.
24. R. Campanini, G.A. Di Caro, M. Villani, I. D’Antone, and G. Giusti. *Parallel architectures and intrinsically parallel algorithms: Genetic algorithms*. **International Journal of Modern Physics C**, 5(1):95–112, World Scientific, 1994.
25. R. Campanini, I. D’Antone, G.A. Di Caro, and G. Giusti. *A transputer-based parallel expert diagnostic system*. **Parallel Computing**, 19(6):685–692, Elsevier, 1993.

3.4 Refereed Journal Papers - Accepted

1. J. Banfi, J. Guzzi, , F. Amigoni, E. Feo-Flushing, A. Giusti, L. Gambardella, and G. A. Di Caro. *An integer linear programming model for fair multitarget tracking in cooperative multirobot systems*. **Autonomous Robots**, 2018. Accepted for publication.

3.5 Refereed Conference/Workshop Papers

1. J. Guzzi, A. Giusti, L. Gambardella, and G. A. Di Caro. *A model of artificial emotions for behavior-modulation and implicit coordination in multi-robot systems*. In **Proceedings of the Genetic and Evolutionary Computation Conference (GECCO)**, Kyoto, Japan, July 15–19, 2018.
2. J. Guzzi, A. Giusti, J. Nagi, L. Gambardella, and G. A. Di Caro. *Artificial emotions as dynamic modulators of individual and group behavior in multi-robot system* (Extended abstract). In **Proceedings of the 17th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)**, Stockholm, Sweden, July 10–15, 2018.
3. A. Giusti, J. Guzzi, G. A. Di Caro, and L. M. Gambardella. *Mighty Thymio for robotics education* (poster). In **Proceedings of the 8th AAI Symposium on Educational Advances in Artificial Intelligence (EAAI-18)**, New Orleans, USA, February 2–5, 2018.
4. E. Feo-Flushing, L. Gambardella, and G. A. Di Caro. *Simultaneous spatial task allocation, data routing and transmission scheduling in mobile multi-robot teams*. In **Proceedings of the 30th IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)**, Vancouver, Canada, September 24–28, 2017.
5. B. Gromov, L. Gambardella, and G. A. Di Caro. *Wearable multi-modal interface for human multi-robot interaction*. In **Proceedings of the 14th IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR)**, Lausanne, Switzerland, October 23–27, 2016.
6. E. Feo-Flushing, L. Gambardella, and G. A. Di Caro. *Robot rostering: Coalition formation for long-term missions with work shifts*. In **Proceedings of the 14th IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR)**, Lausanne, Switzerland, October 23–27, 2016.
7. E. Feo-Flushing, L. Gambardella, and G. A. Di Caro. *On using mobile robotic relays for supporting data communications in search and rescue missions*. In **Proceedings of the 14th IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR)**, Lausanne, Switzerland, October 23–27, 2016.
8. J. Guzzi and G. A. Di Caro. *From indoor GIS maps to path planning for autonomous wheelchairs*. In **Proceedings of the 29th IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)**, Daejeon, South Korea, October 9–14, 2016.
9. B. Gromov, L. Gambardella, and G. A. Di Caro. *Wearable multi-modal interfaces for mixed-initiative interaction in human multi-robot teams*. In **ICRA Workshop on Fielded Multi-robot systems operating on land, sea, and air (Poster with extended abstract)**, Stockholm, Sweden, May 20, 2016.
10. R. Magán-Carrión, J. Camacho, P. Garcia-Teodoro, E. Feo-Flushing, and G. A. Di Caro. *Drns: Dynamical relay node placement solution*. In LNCS Springer, editor, **Proceedings of the 14th International Conference on Practical Applications of Agents and Multi-Agent Systems (PAAMS) – Demonstrations Track**, Sevilla, Spain, June 1–3, 2016.
11. E. Feo-Flushing, L. Gambardella, and G. A. Di Caro. *On decentralized coordination for spatial task allocation and scheduling in heterogeneous teams*. In **Proceedings of the 15th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)**, pages 988–996, Singapore, May 9–13, 2016.
12. A. Giusti, J. Guzzi, D. Ciresan, F.-L. He, J. P. Rodriguez, F. Fontana, M. Faessler, C. Forster, J. Schmidhuber, G. A. Di Caro, D. Scaramuzza, and L. M. Gambardella. *A machine learning approach to visual perception of forest trails for mobile robots*. In **Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)**, Stockholm, Sweden, May 16–21, 2016.
13. J. Guzzi and G. A. Di Caro. *Towards supporting elderly’s orientation, mobility, and autonomy*. In **Workshop on Improving the quality of life in the elderly using robotic assistive technology: benefits, limitations, and challenges - International Conference on Social Robotics (ICSR)**, Paris, France, October 30, 2015.

14. A. Giusti, J. Guzzi, D. Ciresan, F. Lin, J. P. Rodríguez, F. Fontana, M. Faessler, C. Forster, J. Schmidhuber, G. A. Di Caro, D. Scaramuzza, and L. Gambardella. *A machine learning approach to the visual perception of forest trails*. In **IROS Workshop on Vision-based Control and Navigation of Small, Lightweight UAVs**, Hamburg, Germany, October 2, 2015.
15. R. Magán-Carrión, J. Camacho, P. Garcia-Teodoro, E. Feo-Flushing, and G. A. Di Caro. *Dynamical relay node placement solution in MANETs*. In **Proceedings of the 3rd IEEE International Black Sea Conference on Communications and Networking (BlackSeaCom), Demonstration Session**, Constanta, Romania, May 18–21, 2015.
16. J. Banfi, J. Guzzi, A. Giusti, L. Gambardella, and G. A. Di Caro. *Fair multi-target tracking in cooperative multi-robot systems*. In **Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)**, Seattle, USA, May 26 – 30, 2015.
17. J. Nagi, H. Ngo, L. Gambardella, and G. A. Di Caro. *Wisdom of the swarm for human-swarm interaction*. In **Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)**, Seattle, USA, May 26 – 30, 2015.
18. J. Nagi, F. Nagi, A. Giusti, L. Gambardella, and G. A. Di Caro. *Human-swarm localization: online learning of symmetric face poses*. In **Proceedings of the IEEE International Conference on Image Processing (ICIP)**, Paris, France, October 27–30, 2014.
19. E. Feo-Flushing, L. Gambardella, and G. A. Di Caro. *A mathematical programming approach to collaborative missions with heterogeneous teams*. In **Proceedings of the 27th IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)**, Chicago, IL, USA, September 14–18, 2014.
20. J. Nagi, A. Giusti, L. Gambardella, and G. A. Di Caro. *Human-swarm interaction using spatial gestures*. In **Proceedings of the 27th IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)**, Chicago, IL, USA, September 14–18, 2014.
21. F. Ghiringhelli, A. Giusti, J. Guzzi, G. A. Di Caro, V. Caglioti, and L. Gambardella. *Interactive augmented reality for understanding and analyzing multi-robot systems*. In **Proceedings of the 27th IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)**, Chicago, IL, USA, September 14–18, 2014.
22. A. Pesenti Gritti, O. Tarabini, A. Giusti, J. Guzzi, G. A. Di Caro, V. Caglioti, and L. Gambardella. *Kinect-based people detection and tracking from small-footprint ground robots*. In **Proceedings of the 27th IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)**, Chicago, IL, USA, September 14–18, 2014.
23. E. Feo-Flushing, M. Kudelski, L. Gambardella, and G. A. Di Caro. *Spatial prediction of wireless links and its application to the path control of mobile robots*. In **Proceedings of the 9th IEEE International Symposium on Industrial Embedded Systems (SIES)**, Pisa, Italy, June 18–20, 2014.
24. G. A. Di Caro, E. Feo-Flushing, and L. Gambardella. *Use of time-dependent spatial maps of communication quality for network-aware multi-robot path planning*. In **Proceedings of the 8th International Workshop on Wireless Sensor, Actuator and Robot Networks (WiSARN)**, Benidorm, Spain, June 22–27, 2014.
25. M. Kudelski, L. Gambardella, and G. A. Di Caro. *A mobility-controlled link quality learning protocol for multi-robot coordination tasks*. In **Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)**, pages 5024–5032, Hong Kong, China, May 31 – June 5, 2014.
26. J. Nagi, A. Giusti, F. Nagi, L. Gambardella, and G. A. Di Caro. *Online feature extraction for the incremental learning of gestures in human-swarm interaction*. In **Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)**, Hong Kong, China, May 31 – June 5, 2014.
27. H. Ngo, J. Nagi, L. Gambardella, J. Schmidhuber, and G. A. Di Caro. *Human-robot cooperation: fast, interactive learning from binary feedback*. In **Proceedings of the 8th ACM/IEEE International Conference on Human-Robot Interaction (HRI) (Video Session)**, Bielefeld, Germany, March 3–6, 2014.

28. A. Pesenti Gritti, O. Tarabini, A. Giusti, J. Guzzi, G. A. Di Caro, V. Caglioti, and L. Gambardella. *Perceiving people from a low-lying viewpoint*. In **Proceedings of the 8th ACM/IEEE International Conference on Human-Robot Interaction (HRI) (Video Session)**, Bielefeld, Germany, March 3–6, 2014.
29. J. Nagi, A. Giusti, G. A. Di Caro, and L. Gambardella. *HRI in the sky: Controlling UAVs using face poses and hand gestures*. In **8th ACM/IEEE International Conference on Human-Robot Interaction (HRI) (Late breaking reports)**, Bielefeld, Germany, March 3–6, 2014.
30. G. A. Di Caro, A. Giusti, J. Nagi, and L. Gambardella. *A simple and efficient approach for cooperative incremental learning in robot swarms*. In **Proceedings of the 16th International Conference on Advanced Robotics (ICAR)**, Montevideo, Uruguay, November 25–29, 2013.
31. E. Feo-Flushing, L. Gambardella, and G. A. Di Caro. *Strategic control of proximity relationships in heterogeneous search and rescue teams*. In **Proceedings of the 3rd IROS Workshop on Robots and Sensors integration in future rescue INFORMATION system (ROSIN)**, Tokyo, Japan, November 7, 2013.
32. J. Guzzi, A. Giusti, L. Gambardella, and G. A. Di Caro. *Local reactive robot navigation: a comparison between reciprocal velocity obstacle variants and human-like behavior*. In **Proceedings of the 26th IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)**, Tokyo Big Sight, Japan, November 3–8, 2013.
33. E. Feo-Flushing, M. Kudelski, L. Gambardella, and G. A. Di Caro. *Connectivity-aware planning of search and rescue missions*. In **Proceedings of the 11th IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR)**, Linköping, Sweden, October 21–26, 2013. (Nominated for the Best Paper award).
34. E. Feo-Flushing, M. Kudelski, J. Nagi, L. Gambardella, and G. A. Di Caro. *Link quality estimation: A case study for on-line supervised learning in wireless sensor networks* (Extended abstract/Poster). In **Proceedings of the 5th Workshop on Real-World Wireless Sensor Networks (REALWSN)**, Como Lake, Italy, September 19–20, 2013.
35. G. A. Di Caro, M. Kudelski, E. Feo-Flushing, J. Nagi, I. Ahmed, and L. Gambardella. *On-line supervised learning of link quality estimates in wireless networks*. In **Proceedings of the 12th IEEE/IFIP Annual Mediterranean Ad Hoc Networking Workshop (Med-Hoc-Net)**, pages 69–76, Ajaccio, France, June 24–26, 2013.
36. E. Feo-Flushing and G. A. Di Caro. *Relay node placement for performance enhancement with uncertain demand: a robust optimization approach*. In **Proceedings of the 11th International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt)**, pages 556–563, Tsukuba Science City, Japan, May 13–17, 2013.
37. J. Guzzi, A. Giusti, L. Gambardella, and G. A. Di Caro. *Human-friendly robot navigation in dynamic environments*. In **Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)**, pages 423–430, Karlsruhe, Germany, May 6–10, 2013.
38. E. Feo-Flushing and G. A. Di Caro. *A flow-based optimization model for throughput-oriented relay node placement in wireless sensor networks*. In **Proceedings of the 28th ACM Symposium on Applied Computing (SAC), Networking Track**, pages 632–639, Coimbra, Portugal, March 18–22, 2013.
39. E. Feo-Flushing and G. A. Di Caro. *Exploiting synergies between exact and heuristic methods in optimization: an application to the relay placement problem in wireless sensor networks*. In **Proceedings of the 7th International Conference on Bio-Inspired Models of Network, Information, and Computing Systems (BIONETICS 2012)**, number 134 in Springer LNICST, pages 250–268, Lugano, Switzerland, December 10–11, 2014.
40. J. Guzzi, A. Giusti, L. Gambardella, and G. A. Di Caro. *Bioinspired obstacle avoidance algorithms for robot swarms*. In **Proceedings of the 7th International Conference on Bio-Inspired Models of Network, Information, and Computing Systems (BIONETICS 2012)**, volume 134 of Springer LNICST, pages 120–134, Lugano, Switzerland, December 10–11, 2014. (Conference Best Paper award).

41. J. Nagi, G. A. Di Caro, A. Giusti, , F. Nagi, and L. Gambardella. *Convolutional Neural Support Vector Machines: Hybrid visual pattern classifiers for multi-robot systems*. In **Proceedings of the 11th International Conference on Machine Learning and Applications (ICMLA)**, Boca Raton, Florida, USA, December 12–15, 2012.
42. E. Feo-Flushing, L. Gambardella, and G. A. Di Caro. *GIS-based mission support system for wilderness search and rescue with heterogeneous agents*. In **Proceedings of the 2nd IROS Workshop on Robots and Sensors integration in future rescue INformation system (ROSIN)**, Vilamoura, Portugal, October 7–12, 2012.
43. A. Giusti, J. Nagi, L. Gambardella, and G. A. Di Caro. *Cooperative sensing and recognition by a swarm of mobile robots*. In **Proceedings of the 25th IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)**, pages 551–558, Vilamoura, Portugal, October 7–12, 2012.
44. M. Kudelski, M. Cinus, L. Gambardella, and G. A. Di Caro. *A framework for realistic simulation of networked multi-robot systems*. In **Proceedings of the 25th IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)**, pages 5018–5025, Vilamoura, Portugal, October 7–12, 2012.
45. J. Nagi, H. Ngo, A. Giusti, L. Gambardella, J. Schmidhuber, and G. A. Di Caro. *Incremental learning using partial feedback for gesture-based human-swarm interaction*. In **Proceedings of the 21st IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN)**, pages 898–905, Paris, France, September 9–13, 2012.
46. M. Mojana, R. Montemanni, G. A. Di Caro, and L. M. Gambardella. *A branch and bound approach for the sequential ordering problem*. In **Proceedings of the 4th International Conference on Applied Operational Research (ICAOR), Bangkok, Thailand, July 25–27**, volume 4 of **Lecture Notes in Management Science**, pages 266–273, 2012.
47. G. A. Di Caro, F. Ducatelle, and L. Gambardella. *A fully distributed communication-based approach for spatial clustering in robotic swarms*. In **Proceedings of the 2nd Autonomous Robots and Multirobot Systems Workshop (ARMS), affiliated with the 11th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)**, pages 153–171, Valencia, Spain, June 5, 2012.
48. A. Giusti, J. Nagi, L. Gambardella, and G. A. Di Caro. *Distributed consensus for interaction between humans and mobile robot swarms*. In **Proceedings of the 11th International Conference on Autonomous Agents and Multiagent Systems (AAMAS), Demonstration track**, pages 1503–1504, Valencia, Spain, June 4–8, 2012.
49. F. Ducatelle, G. A. Di Caro, and L. Gambardella. *Spatial awareness in robotic swarms through local wireless communications* (Extended abstract). In **Proceedings of the 11th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)**, pages 1205–1206, Valencia, Spain, June 4–8, 2012.
50. A. Giusti, J. Nagi, L. Gambardella, S. Bonardi, and G. A. Di Caro. *Human-swarm interaction through distributed cooperative gesture recognition*. In **Proceedings of the 7th ACM/IEEE International Conference on Human-Robot Interaction (HRI) (Video Session)**, page 401, Boston, MA, USA, March 5-8, 2012.
51. N. E. Toklu, R. Montemanni, G. A. Di Caro, and L. M. Gambardella. *A shared incumbent environment for the minimum power broadcasting problem in wireless networks*. In **Proceedings of the International Conference on Information and Computer Networks (ICICN 2012)**, Singapore, February 26–28, 2012. IACSIT Press, Singapore.
52. E. Feo-Flushing, J. Nagi, and G.A. Di Caro. *A mobility-assisted protocol for supervised learning of link quality estimates in wireless networks*. In **Proceedings of the International Conference on Computing, Networking and Communications (ICNC), International Workshop on Mobility and Communication for Cooperation and Coordination (MC³)**, Maui Island, Hawaii, USA, January 30 – February 2, 2012.

53. M. Salani, A. Giusti, G. A. Di Caro, A. Rizzoli, and L. M. Gambardella. *Lexicographic multi-objective optimization for the unit commitment problem and economic dispatch in a microgrid*. In **Proceedings of the 2nd IEEE PES (Power & Energy Society) European Conference on Innovative Smart Grid Technologies (ISGT-EUROPE)**, pages 1–8, Manchester, UK, December 5–7, 2011.
54. M. Mojana, R. Montemanni, G. A. Di Caro, and L. M. Gambardella. *An algorithm combining linear programming and an ant system for the sequential ordering problem*. In **Proceedings of the Second Annual International Conference on Advanced Topics in Artificial Intelligence (ATAI)**, Singapore, November 24–25 2011. (**Best research paper award**).
55. J. Nagi, F. Ducatelle, G. A. Di Caro, D. Cireşan, U. Meier, A. Giusti, F. Nagi, J. Schmidhuber, and L. M. Gambardella. *Max-pooling convolutional neural networks for vision-based hand gesture recognition*. In **Proceedings of the 3rd IEEE International Conference on Signal & Image Processing and Applications (ICSIPA)**, pages 342–347, Kuala Lumpur, Malaysia, November 16–18, 2011.
56. R. Montemanni, R. Mojana, G. A. Di Caro, and L. M. Gambardella. *Matheuristic approach for the sequential ordering problem*. In **Abstract proceedings of the 42nd Annual Conference of the Italian Operational Research Society (AIRO)**, Brescia, Italy, September 6–9, 2011.
57. G.A. Di Caro and E. Feo. *Optimal relay node placement for throughput enhancement in wireless sensor networks*. In **Proceedings of the 50th FITCE International Congress – ICT: bridging an ever shifting digital divide**, Palermo, Italy, August 31–September 3, 2011.
58. F. Ducatelle, G.A. Di Caro, C. Pinciroli, F. Mondada, and L. Gambardella. *Communication assisted navigation in robotic swarms: self-organization and cooperation*. In **Proceedings of the 24th IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)**, pages 4981–4988, San Francisco, USA, September 25–30, 2011.
59. C. Pinciroli, V. Trianni, R. O’Grady, G. Pini, A. Brutschy, M. Brambilla, N. Mathews, E. Ferrante, G.A. Di Caro, F. Ducatelle, T. Stirling, A. Gutierrez, L. Gambardella, and M. Dorigo. *ARGoS: a modular, multi-engine simulator for heterogeneous swarm robotics*. In **Proceedings of the 24th IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)**, pages 5027–5034, San Francisco, USA, September 25–30, 2011.
60. A. Reina, G.A. Di Caro, F. Ducatelle, and L. M. Gambardella. *Distributed motion planning for ground objects using a network of robotic ceiling cameras*. In **Proceedings of the 12th Conference Towards Autonomous Robotic Systems (TAROS)**, volume 6856 of **Springer LNAI**, pages 140–151, Sheffield, UK, August 31–September 2, 2011. (**Conference Best Poster award**).
61. F. Ducatelle, G.A. Di Caro, A. Förster, and L. Gambardella. *Mobile stigmergic markers for navigation in a heterogeneous robotic swarm*. In M. Dorigo, M. Birattari, G.A. Di Caro, R. Doursat, A. Engelbrecht, D. Floreano, L. Gambardella, R. Groß, E. Sahin, H. Sayama, and T. Stützle, editors, **Swarm Intelligence, Proceedings of the 7th International ANTS Conference**, LNCS 6234. Springer, 2010.
62. F. Ducatelle, G.A. Di Caro, and L. M. Gambardella. *Cooperative stigmergic navigation in a heterogeneous robotic swarm*. In **Proceedings of the 11th International Conference on Simulation of Adaptive Behavior (SAB)**, Paris, France, August 24–28, 2010.
63. F. Ducatelle, G.A. Di Caro, and L. M. Gambardella. *Cooperative self-organization in a heterogeneous swarm robotic system*. In **Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2010)**, Portland, Oregon, USA, July 7–11, 2010.
64. A. Reina, G.A. Di Caro, F. Ducatelle, and L. M. Gambardella. *A distributed approach to holonomic path planning*. In **Proceedings of the Workshop on Motion Planning: From Theory to Practice, Robotics: Science and Systems (RSS) conference**, Zaragoza, Spain, June 27, 2010.
65. F. Ducatelle, G. A. Di Caro, A. Förster, and L. M. Gambardella. *Adaptive navigation in a heterogeneous swarm robotic system (Poster)*. In **Proceedings of the 4th International Conference on Cognitive Systems (CogSys)**, Zurich, Switzerland, January 27–28, 2010.
66. F. Ducatelle, A. Förster, G.A. Di Caro, and L. M. Gambardella. *Supporting navigation in multi-robot systems through delay tolerant network communication*. In **Proceedings of the IFAC Workshop on Networked Robotics (NetRob)**, Golden, Colorado, USA, October 6–8, 2009.

67. F. Ducatelle, A. Förster, G.A. Di Caro, and L. M. Gambardella. *New task allocation methods for robotic swarms*. In **Proceedings of the 9th IEEE/RAS Conference on Autonomous Robot Systems and Competitions (ROBOTICA)**, Castelo Branco, Portugal, May 8–9, 2009.
68. G.A. Di Caro, F. Ducatelle, and L. M. Gambardella. *Wireless communications for distributed navigation in robot swarms*. In **Proceedings of the 6th European Workshop on the Application of Nature-inspired Techniques for Telecommunication Networks and other Parallel and Distributed Systems (EvoCOMNET)**, volume 5484 of LNCS, Tübingen, Germany, April 15–17 2009. Springer.
69. F. Ducatelle, G.A. Di Caro, and L. M. Gambardella. *Robot navigation in a networked swarm*. In **Proceedings of the International Conference on Intelligent Robotics and Applications (ICIRA)**, volume 5314 of LNAI, pages 275–285. Springer, 2008.
70. F. Ducatelle, G.A. Di Caro, and L. M. Gambardella. *A new approach for integrating proactive and reactive routing in mobile ad hoc networks*. In **Proceedings of the 5th IEEE International Conference on Mobile Ad Hoc and Sensor Systems (MASS)**, 2008.
71. F. Ducatelle, G.A. Di Caro, and L. M. Gambardella. *An evaluation of two swarm intelligence MANET routing algorithms in an urban environment*. In **Proceedings of the 5th IEEE Swarm Intelligence Symposium (SIS)**, 2008.
72. G.A. Di Caro, F. Ducatelle, and L. M. Gambardella. *A simulation study of routing performance in realistic urban scenarios for MANETs*. In **Proceedings of ANTS 2008, 6th International Workshop on Ant Algorithms and Swarm Intelligence**, volume 4217 of LNCS. Springer, 2008.
73. F. Ducatelle, G.A. Di Caro, and L. M. Gambardella. *An analysis of the different components of the AntHocNet routing algorithm*. In **Proceedings of ANTS 2006, 6th International Workshop on Ant Algorithms and Swarm Intelligence**, volume 4150 of LNCS, pages 37–48. Springer, 2006.
74. G.A. Di Caro, L.M. Gambardella, and A. Rizzoli. *Tracing and modeling human mobility*. In **IPLnet Workshop 2006 (No published proceedings)**, Bellinzona, Switzerland, September 5–6, 2006.
75. G.A. Di Caro, F. Ducatelle, and L. M. Gambardella. *AI approaches for next generation telecommunication networks*. In **Poster at the 50th Anniversary Summit of Artificial Intelligence**, Monte Verità, Switzerland, July 9–14, 2006.
76. G.A. Di Caro, S. Giordano, M. Kulig, D. Lenzarini, A. Puiatti, and F. Schwitter. *A cross-layering approach to optimized seamless handover*. In **Proceedings of the Third Annual Conference on Wireless On demand Network Systems and Services (WONS)**, Les Ménuires, France, January 18–10, 2006.
77. O. Babaoglu, G. Canright, A. Deutsch, G.A. Di Caro, F. Ducatelle, L.M. Gambardella, N. Ganguly, M. Jelasity, R. Montemanni, and A. Montresor. *Design patterns from biology for distributed computing*. In **Proceedings of the European Conference on Complex Systems (ECCS)**, Paris, France, November 14–18, 2005.
78. L. Carrillo, C. Guadal, J.-L. Marzo, G.A. Di Caro, F. Ducatelle, and L.M. Gambardella. *Differentiated quality of service scheme based on the use of multiple classes of ant-like mobile agents*. In **Proceedings of the CoNEXT Conference**, Toulouse, France, October 24–27 2005. ACM Press.
79. G.A. Di Caro, F. Ducatelle, and L.M. Gambardella. *Swarm intelligence for routing in mobile ad hoc networks*. In **Proceedings of the IEEE Swarm Intelligence Symposium (SIS)**, Pasadena, USA, June 8–10, 2005.
80. F. Ducatelle, G.A. Di Caro, and L.M. Gambardella. *Ant agents for hybrid multipath routing in mobile ad hoc networks*. In **Proceedings of the Second Annual Conference on Wireless On demand Network Systems and Services (WONS)**, St. Moritz, Switzerland, January 18–19, 2005.
81. G.A. Di Caro, F. Ducatelle, and L.M. Gambardella. *AntHocNet: an ant-based hybrid routing algorithm for mobile ad hoc networks*. In **Proceedings of Parallel Problem Solving from Nature (PPSN) VIII**, volume 3242 of **Lecture Notes in Computer Science**, pages 461–470. Springer-Verlag, 2004. (Conference Best Paper award).

82. M. Birattari, G.A. Di Caro, and M. Dorigo. *Toward the formal foundation of ant programming.* In M. Dorigo, G.A. Di Caro, and M. Sampels, editors, **Ants Algorithms - Proceedings of ANTS 2002, Third International Workshop on Ant Algorithms, Brussels, Belgium, September 12–14, 2002**, volume 2463 of **Lecture Notes in Computer Science**, pages 188–201. Springer-Verlag, 2002.
83. G.A. Di Caro and T. Vasilakos. *Ant-SELA: Ant-agents and stochastic automata learn adaptive routing tables for QoS routing in ATM networks.* In **Internal conference proceedings of ANTS'2000 - From Ant Colonies to Artificial Ants: Second International Workshop on Ant Colony Optimization (No published proceedings)**, Brussels, Belgium, September 8–9, 2000.
84. S. Valensin and G.A. Di Caro. *A theoretical model for in machina experiments on immunosenescence.* In **Proceedings of the EMBO Workshop on Molecular and Cellular Gerontology**, Serpiano, Switzerland, 1999. Published on the *Annals of the New York Academy of Sciences*, Vol. 908:344–347 (2000).
85. S. Valensin, C. Franceschi, and G.A. Di Caro. *An agent-based model of the immune system.* In **Abstract proceedings of the Workshop on Design Principles for the Immune System and other Distributed Systems**, Santa Fe Institute, Santa Fe, USA, July 11–16, 1999.
86. S. Valensin, G.A. Di Caro, M. Bonafè, F. Luciani, and C. Franceschi. *A theoretical model for immunosenescence.* In **Poster at the International Workshop on Theory in Immunology**, Zentrum für Interdisziplinäre Forschung, University of Bielefeld, Germany, October 16–19, 1999.
87. M. Dorigo and G.A. Di Caro. *Ant colony optimization: A new meta-heuristic.* In **Proceedings of CEC99 - Congress on Evolutionary Computation**, Washington DC, July 6-9 1999.
88. G.A. Di Caro and M. Dorigo. *Extending AntNet for best-effort Quality-of-Service routing.* In **Internal conference proceedings of ANTS'98 - From Ant Colonies to Artificial Ants: First International Workshop on Ant Colony Optimization (No published proceedings)**, Brussels, Belgium, October 15–16, 1998.
89. G.A. Di Caro and M. Dorigo. *Two ant colony algorithms for best-effort routing in datagram networks.* In **Proceedings of the Tenth IASTED International Conference on Parallel and Distributed Computing and Systems (PDCS'98)**, pages 541–546. IASTED/ACTA Press, 1998.
90. G.A. Di Caro and M. Dorigo. *An adaptive multi-agent routing algorithm inspired by ants behavior.* In **Proceedings of PART98 - 5th Annual Australasian Conference on Parallel and Real-Time Systems**, pages 261–272. Springer-Verlag, 1998.
91. G.A. Di Caro and M. Dorigo. *Ant colonies for adaptive routing in packet-switched communications networks.* In A. E. Eiben, T. Back, M. Schoenauer, and H.-P. Schwefel, editors, **Proceedings of PPSN-V, 5th International Conf. on Parallel Problem Solving from Nature**, volume 1498 of **LNCS**, pages 673–682. Springer-Verlag, 1998.
92. G.A. Di Caro and M. Dorigo. *Ant colony routing.* In **PECTEL 2 Workshop on Parallel Evolutionary Computation in Telecommunications (No published proceedings)**, Reading, England, April 6–7, 1998.
93. G.A. Di Caro and M. Dorigo. *Mobile agents for adaptive routing.* In **Proceedings of the 31st International Conference on System Sciences (HICSS-31)**, volume 7, pages 74–83. IEEE Computer Society Press, 1998.
94. G.A. Di Caro and M. Dorigo. *Adaptive learning of routing tables in communication networks.* In **Proceedings of the Italian Workshop on Machine Learning**, Torino, Italy, December 9-10 1997.
95. G.A. Di Caro and M. Dorigo. *AntNet: A mobile agents approach to adaptive routing in communication networks.* In **Abstract at the Ninth Dutch Conference on Artificial Intelligence (NAIC '97)**, Antwerpen, Belgium, November 12–13, 1997.
96. G.A. Di Caro and M. Dorigo. *Distributed reinforcement agents for adaptive routing in communication networks.* In **Abstract proceedings of the Third European Workshop on Reinforcement Learning (EWRL-3) (No published proceedings)**, Rennes, France, October 13–14, 1997.

97. F. Valentinotti, G.A. Di Caro, and B. Crespi. *A parallel dsp system for real-time disparity and optical flow using phase difference*. In **Proceedings of 6th International Conference on Signal Processing Applications and Technology (ICSPAT-95)**, Boston, USA, October 24-26, 1995.
98. R. Cattoni, G.A. Di Caro, M. Aste, and B. Caprile. *Bridging the gap between planning and reactivity: a layered architecture for autonomous indoor navigation*. In **Proceedings of the 7th IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)**, pages 878–885, 1994.
99. R. Campanini, I. D’Antone, G.A. Di Caro, and G. Giusti. *Implementation strategies for a parallel expert diagnostic system*. In **Proceedings of the Conf. 2nd International Workshop on Software Engineering, Artificial Intelligence and Expert Systems for High Energy Physics**, L’Agelonde, France, January 13-18 1992.
100. R. Campanini, I. D’Antone, G.A. Di Caro, and G. Giusti. *Development of a real-time diagnostic system for data acquisition*. In **Atti del 6° Convegno sulla Programmazione Logica (GULP ‘91)**, Pisa, Italy, June 12-14 1991.
101. R. Campanini, I. D’Antone, G.A. Di Caro, and G. Giusti. *A transputer-based real-time acquisition and control system*. In **Poster at Transputing ’91, First World Transputer User Group Conference**, Sunnyvale, California, April 1991.

3.6 Unpublished Technical Reports

1. G.A. Di Caro and E. Feo. An analytical model for IEEE 802.15.4 non-beacon enabled CSMA/CA in multihop wireless sensor networks. Technical Report 05-11, IDSIA, Lugano (Switzerland), May 2011.
2. G.A. Di Caro, F. Ducatelle, and L.M. Gambardella. Ant colony optimization for routing in mobile ad hoc networks in urban environments. Technical Report 05-08, IDSIA, Lugano (Switzerland), May 2008.
3. F. Ducatelle, G.A. Di Caro, and L.M. Gambardella. A study on the use of MANETs in an urban environment. Technical Report 01-07, IDSIA, Lugano (Switzerland), January 2007.
4. G.A. Di Caro, F. Ducatelle, and L.M. Gambardella. Studies of routing performance in a city-like testbed for mobile ad hoc networks. Technical Report 07-06, IDSIA, Lugano (Switzerland), March 2006.
5. G.A. Di Caro. Analysis of simulation environments for mobile ad hoc networks. Technical Report 24-03, IDSIA, Lugano, (Switzerland), December 2003.
6. G.A. Di Caro. A society of ant-like agents for adaptive routing in networks. Technical Report 02-33, IRIDIA, Université Libre de Bruxelles, Brussels, Belgium, October 2002.
7. M. Birattari, G.A. Di Caro, and M. Dorigo. For a formal foundation of the Ant Programming approach to combinatorial optimization. Part 1: The problem, the representation, and the general solution strategy. Technical Report TR-H-301, Advanced Telecommunications Research Institute (ATR), Human Information Processing Laboratories, Kyoto, Japan, December 2000.
8. G.A. Di Caro and M. Dorigo. A study of distributed stigmergetic control for packet-switched communications networks. Technical Report 97-18, IRIDIA, Université Libre de Bruxelles, Brussels, Belgium, November 1997.
9. G.A. Di Caro and M. Dorigo. AntNet: A mobile agents approach to adaptive routing. Technical Report 97-12, IRIDIA, Université Libre de Bruxelles, Brussels, Belgium, June 1997.
10. G.A. Di Caro. ARCA: a software architecture to program robots. Internal Report IRST, Istituto per la Ricerca Scientifica e Tecnologica, Trento, Italy, January 1996.
11. G.A. Di Caro. Style and organization rules for the development of C programs. Technical Report UTM-462, Department of Mathematics, University of Trento, Trento, Italy, May 1995.

3.7 Refereed Video Productions

1. SWARMIX project team (www.swarmix.org). *Finding Linda - A Search and Rescue Mission by SWARMIX*. In **Proceedings of the 10th AAI Video Competition**, Phoenix, AR, USA, February 12–17, 2016. (Most Entertaining Video award, and Nominated for Best Video and Best Robot Video awards).
2. A. Giusti, J. Guzzi, D. Ciresan, F.-L. He, J. P. Rodriguez, G. A. Di Caro, J. Schmidhuber, L. M. Gambardella, F. Fontana, M. Faessler, C. Forster, and D. Scaramuzza. *Quadcopter navigation in the forest*. In **Proceedings of the 10th AAI Video Competition**, Phoenix, AR, USA, February 12–17, 2016. (Nominated for Best Robot Video award).
3. SWARMANOID project team (www.swarmanoid.org). *Swarmanoid, the movie*. In **Proceedings of the 5th AAI Video Competition**, San Francisco, CA, USA, August 7–11, 2011. (Best video award).

4 Evidence of External Reputation

4.1 Citations and Awards

- **Total citations:** 24,800 (Source: GoogleScholar)
- **H-index:** 33 (Source: GoogleScholar)
- **Most entertaining video award, and nomination for for best video and best robot video awards at the 10th AAAI Video Competition**, Phoenix, February 12–17, 2016. Awarded to the video: *Finding Linda - A Search and Rescue Mission by SWARMIX*, SWARMIX project team.
- **Nomination for best video award at the 10th AAAI Video Competition**, Phoenix, February 12–17, 2016. Awarded to the video: *Quadcopter Navigation in The Forest*, A. Giusti, J. Guzzi, D. Ciresan, F.-L. He, J. P. Rodriguez, G. A. Di Caro, J. Schmidhuber, L. M. Gambardella, F. Fontana, M. Faessler, C. Forster, D. Scaramuzza.
- **Nomination for best conference paper at the 11th IEEE Int. Symposium on Safety, Security, and Rescue Robotics (SSRR)**, Linköping, Sweden, Oct. 21–26, 2013. Awarded to paper: *Connectivity-aware planning of search and rescue missions*, E. Feo, M. Kudelski, L. Gambardella, G. A. Di Caro.
- **Best paper at the 7th Int. Conf. on Bio-Inspired Models of Network, Information, and Computing Systems (BIONETICS)**, Lugano, CH, Dec. 10–11, 2012. Awarded to paper: *Bioinspired obstacle avoidance algorithms for robot swarms*, J. Guzzi, A. Giusti, L. Gambardella, G. A. Di Caro.
- **Best research paper at the 2nd Annual International Conference on Advanced Topics in Artificial Intelligence (ATAI)**, Singapore, November 24–25, 2011. Awarded to paper: *An algorithm combining linear programming and an ant system for the sequential ordering problem*, M. Mojana, R. Montemanni, G.A. Di Caro and L.M. Gambardella.
- **Best video award at the 5th AAAI Video Competition**, San Francisco, August 7–11, 2011. Awarded to the video: *Swarmanoid, The Movie*, Swarmanoid project team.
- **Best conference poster at the 12th Conference Towards Autonomous Robotic Systems (TAROS)**, Sheffield, UK, August 31 – September 2, 2011. Awarded to paper: *Distributed motion planning for ground objects using a network of robotic ceiling cameras*, A. Reina, G.A. Di Caro, F. Ducatelle, L.M. Gambardella.
- **Best conference paper at the 8th International Conf. on Parallel Problem Solving from Nature (PPSN VIII)**, Birmingham, UK, 18–22 September 2004. Awarded to paper: *AntHocNet: an Ant-Based Hybrid Routing Algorithm for Mobile Ad Hoc Networks*, G. Di Caro, F. Ducatelle and L.M. Gambardella.

4.2 Invited Talks

- INVITED KEYNOTE TALK: *Robot Swarms: The human-in-the-loop*, at **Lakeside Labs Research Days 2017 on Self-organization and Swarm Intelligence in Cyber-Physical systems**, Klagenfurt, Austria July 10–12, 2017.
- INVITED TALK: *Interaction, communication, and control in mixed teams of robot swarms and human agents*, at the techno-managerial festival **Pragyan '16, National Institute of Technology Tiruchirappalli (NIT-T), India**, February 27, 2016.
- INVITED TALK: *Swarm intelligence in the physical world*, at the techno-managerial festival **Technex'16, Indian Institute of Technology (BHU) Varanasi, India**, March 4, 2016.

- INVITED TALK: *Adaptive mission planning in mixed swarms*, **Navigare Workshop: Cooperative and Swarm Navigation**, Thun, Switzerland, organized by Swiss Institute of Navigation & Armasuisse, May, 2015.
- INVITED TALKS: *Swarm intelligence and mixed (robot) teams: Interaction, communication, and control*, at the **Indian Institutes of Technology (IIT) of Delhi, Kharagpur, and Roorkee**, tour organized by Swissnex India and Swiss Embassy in India, January 30 – February 6, 2015.
- INVITED KEYNOTE TALK: *Collaborative mission planning and adaptive control in heterogeneous networked teams*, **2nd AETOS International Conference on “Research challenges for future RPAS/UAV systems”**, Bordeaux, France, September 9–10, 2014.
- INVITED TALK: *Human-swarm interaction*, **Towards a Swiss Robotics Rescue Team, Workshop at the IEEE International Conference on Robotics and Automation (ICRA)**, Karlsruhe, Germany, May 6–10, 2013.
- INVITED TALK: *Power of the Swarm, in Natural, Simulation, and Robotic Worlds*, at the **International exhibition “Think Art–Act Science”**, **San Francisco Art Institute**, September 23, 2011.
- Participation to the research presented in **Swarmanoid, The Movie**, winner of the AAI-2011 Best Video Award, September 8th, 2011.

4.3 Seminars and Colloquia

- Special guest at the **TV science show “Il Giardino di Albert”**, on RSI 1, the official Italian-speaking broadcast TV of Switzerland, to talk about robotics, February 20th, 2012.
- Interviewed by **The Economist** magazine, for the article *Riders on a swarm*, about swarm intelligence technologies, published on August 12th, 2010.
- Interviewed by the **Reflex magazine** (an EPFL-sponsored publication), for the 82-pages special issue on “Les secrets de l’intelligence”, published on May 2010.

5 External Professional Activities

5.1 Conferences and Workshops Committees: Chair

1. G. A. Di Caro, *BIONETICS: 7th International Conference on Bio-Inspired Models of Network, Information, and Computing Systems* Lugano, Switzerland, December 10–11, 2012.
2. E. Natalizio, T. Razafindralambo, G. A. Di Caro, *MC³ 2012: 1st International Workshop on Mobility and Communication for Cooperation and Coordination*, in conjunction with the “Int. Conference on Computing, Networking and Communications (ICNC 2012)”, Maui, Hawaii, USA, January 30 – February 2, 2012.
3. G. A. Di Caro, M. Farooq and E. Tarantino, *EvoCOMNET: 9th European Event on the Application of Nature-inspired Techniques to Telecommunication Networks and other Parallel and Distributed Systems*, Malaga, Spain, April 11–13, 2012.
4. G. A. Di Caro, M. Farooq and E. Tarantino, *EvoCOMNET: 8th European Event on the Application of Nature-inspired Techniques to Telecommunication Networks and other Parallel and Distributed Systems*, Turin, Italy, April 27–29, 2011.
5. M. Dorigo, G.A. Di Caro, A. Engelbrecht, L. Gambardella and E. Sahin, *ANTS 2010, 7th International Conference on Swarm Intelligence*, Brussels, Belgium, September 8–10, 2010.
6. G. A. Di Caro, M. Farooq and E. Tarantino, *EvoCOMNET: 7th European Event on the Application of Nature-inspired Techniques to Telecommunication Networks and other Parallel and Distributed Systems*, Istanbul, Turkey, April 7–9, 2010.
7. G. A. Di Caro, M. Farooq and E. Tarantino, *EvoCOMNET: 6th European Workshop on the Application of Nature-inspired Techniques to Telecommunication Networks and other Parallel and Distributed Systems*, Tübingen, Germany, April 15-17, 2009.
8. G. A. Di Caro, F. Ducatelle, A. Forster, G. Venayagamoorthy, *5th IEEE Symposium on Swarm Intelligence, Special Session on: Swarm Intelligence for Wireless Ad Hoc Networks*, St. Louis, Missouri, USA, September 21–23, 2008.
9. G. A. Di Caro and M. Farooq, *EvoCOMNET: 5th European Workshop on the Application of Nature-inspired Techniques to Telecommunication Networks and other Connected Systems*, Naples, Italy, March 26–28, 2008.
10. G. A. Di Caro and M. Farooq, *EvoCOMNET: 4th European Workshop on the Application of Nature-inspired Techniques to Telecomm. Networks and other Connected Systems*, Valencia, Spain, April 11-13, 2007.
11. M. Dorigo, G.A. Di Caro, N. Sampels, *ANTS’02, 3rd International Workshop on Ant Algorithms*, Brussels, Belgium, September 12–14, 2002.

5.2 Conference and Workshop Committees: Associate Editor, PC Member, or Reviewer

(Incomplete list) PPSN V-VII, IEEE SIS 2005–2008, IEEE ICC 2007, DSN 2007, Bio-ADIT, GP 1998, AAMAS 2004, GECCO 2005-2015, ANTS 1998–2014, BIONETICS 2011-2012, IROS 2011-2014, IEEE IoT-SoS 2012, PPSN 2012, ICRA 2013-14, MobiCASE 2013, ALIFE 2014, PPSN 2014, DroNet 2015, TPNC 2015, ICRA 2016 and 2017 (Associate editor), ANTS2016

5.3 Memberships in Professional Societies

- IEEE Robotics and Automation Society

5.4 Editorial Board Memberships

- *Swarm Intelligence*, Springer

5.5 Editor of Journal Special Issues

1. E. Natalizio, G. Di Caro, A. Sekercioglu, E. Yanmaz, Eds., “Special issue on Theory, Algorithms and Applications of Wireless Networked Robotics”, *Ad Hoc Networks*, Elsevier, Vol. 11, N. 7, 2013.
2. M. Dorigo, M. Birattari, G.A. Di Caro, R.Doursat, A. Engelbrecht, L.M. Gambardella, R. Groß, E. Sahin, T. Stützle, Eds., “Special issue of ANTS 2010”, *Swarm Intelligence*, Springer, Vol. 5, N. 3–4, 2011.
3. M. Dorigo, G. A. Di Caro, T. Stützle, Guest Eds. “Special Issue on Ant Algorithms”, *Future Generation Computer Systems (FGCS)*, Elsevier, Vol. 16, N. 8, 2000.

5.6 Journal Reviewer

(Incomplete list) IEEE Trans. on Systems, Man, and Cyb., Networks, Adaptive Behavior, IEEE Trans. on Evolutionary Comp., J. of Heuristics, Artificial Life, Swarm Intelligence J., Telecomm. Systems, European J. of Operational Research, J. of Networks, ACM Trans. on Internet Technology, J. of Systems Science, J. of System Architectures, J. of Computer Science, Computer Networks, ACM Trans. on Autonomous Adaptive Systems, Electronic and Telecomm. Research Institute J., Ad Hoc Networks, J. of Computational Intelligence and Applications, Sensors, European J. of Operations Research., IEEE Trans. on Robotics, Artificial Intelligence, Robotics and Autonomous Systems, Computational Intelligence.

5.7 External Expert for Research Projects

- Expert in swarm robotics in the External Stakeholders Group (ESG) for the EU-H2020 project *CPSwarm* (9 partners, 4.9M EUR funding, <https://www.cpswarm.eu/>)

6 Contract and Grant Support

6.1 Current

1. **Project:** *Teams of Aquatic / Aerial Robots for Marine Environmental Monitoring.*

Grant No: NPRP10-0213-170458

Role: *Lead PI.*

Funding agency: National Priority Research Program - Qatar National Research Foundation (QNRF).

Amount: 600,000 USD.

Duration: 3 years, from April 2018.

Affiliation: CMU-Q.

Partners: ISME (Integrated Systems for Marine Environment), Genova, Italy.

Description: The project aims to integrate multiple aerial and water surface autonomous robots (UAVs, USVs) for cooperative missions in marine environments. Research focus is on: distributed planning and coordination exploiting complementary sensory-motor skills; integration of network control with mission-based decision-making; resilience to failures and hostile conditions; use of surface robots as carriers of aerial robots to support long-running missions; dynamic schedule of meeting points and takeoff and landing between UAVs and USVs.

6.2 Past Grant Support

1. **Projects:** *(i) Symbiotic interaction between humans and multi-robot systems, (ii) Coalition-level team planning, (iii) Resilient path planning for ground robots.*

Role: *Projects' Co-PI with Luca Gambardella (IDSIA).*

Funding agency: Swiss National Science Foundation (SNSF) through the National Centre of Competence in Research (NCCR) Robotics, Phase 2.

Amount: 600,000 CHF.

Duration: 4 years, from 12/2014.

Affiliation: Dalle Molle Institute for Artificial Intelligence (IDSIA).

Description: The three projects are integral part of the nation-wide NCCR Robotics, Center of Excellence of Swiss NSF. In its Phase 2, the Center includes 18 research groups and is supported by a grant of more than 12M CHF (www.nccr-robotics.ch). IDSIA sub-projects address: multi-modal interaction and communication between humans and multiple robots; system-level planning in the space of the feasible coalitions that can be built in mixed human-robot teams; path planning models that are resilient to multiple local failures.

2. **Project:** *ALMA: Ageing without Losing Mobility and Autonomy [4/2013, 3.5 years].*

Role: *Project Coordinator and Principal Investigator (PI).*

Funding agency: Ambient Assisted Living (AAL) - Scientific Institutions of the European Community.

Amount: 1M CHF

Duration: 3.5 years, from 4/2013.

Affiliation: Dalle Molle Institute for Artificial Intelligence (IDSIA).

Description: A total grant of 3M EUR. The consortium has included 8 partners (academic, industrial, and care-giving ones). The project (www.alma-aal.org) has resulted in a set of ambient intelligence and robotic technologies and their integration into a modular system aimed to support autonomous mobility, navigation, and orientation of the mobility-impaired person through the realization. Validation and testing of the developed technologies have been performed at real end-user institutions.

3. **Project:** *Let's play together with robot swarms!*

Role: *Project Co-PI* with Luca Gambardella (IDSIA) and Francesco Mondada (EPFL).

Funding agency: Swiss National Science Foundation (SNF) through the National Centre of Competence in Research (NCCR) Robotics, Phase 1.

Amount: 100k CHF.

Duration: 1 year, from 7/2013.

Affiliation: Dalle Molle Institute for Artificial Intelligence (IDSIA).

Description: Design and implementation of game scenarios, both in simulation and using real robots, to study strategies and modalities to let humans and multi-robot systems effectively team up. A game with multiple pursuers and evaders, including both humans and robots, was setup and demonstrated.

4. **Project:** *SWARMIX: Synergistic Interactions in Swarms of Heterogeneous Agents.*

Role: *Co-PI* with Luca Gambardella for IDSIA's research activities in the project.

Funding agency: Swiss National Science Foundation (SNF), SINERGIA Program.

Amount: 250k CHF.

Duration: 3.5 years, from 2/2011.

Affiliation: Dalle Molle Institute for Artificial Intelligence (IDSIA).

Description: 1.1M CHF total grant funded by Swiss NSF, 4 research groups. IDSIA's research for the project addressed the study of adaptive planning and communication strategies for heterogeneous swarms, considering search and rescue scenarios and swarms composed of robots, humans, and dogs.

5. **Project:** *Symbiotic human-swarm interaction and cooperation.*

Role: *Co-PI* with Luca Gambardella for IDSIA's research activities in the project.

Funding agency: Swiss National Science Foundation (SNF) through the National Centre of Competence in Research (NCCR) Robotics, Phase 1.

Amount: 200k CHF.

Duration: 4 years, from 12/2010.

Affiliation: Dalle Molle Institute for Artificial Intelligence (IDSIA).

Description: The sub-project was integral part of the large nation-wide NCCR Robotics, Center of Excellence of Swiss NSF, including 26 research groups in its Phase 1 and supported by a total grant of 13.3M CHF (www.nccr-robotics.ch). IDSIA's sub-project resulted in robust and scalable methods for the interaction, control, and coordination of heterogeneous symbiotic teams of multiple robots and humans.

6. **Project:** *SWARMANOID: Towards Humanoid Robotic Swarms.*

Role: *Co-PI* with Luca Gambardella for IDSIA's research activities in the project.

Funding agency: FP6 FET Open programme - Scientific Institutions of the European Community.

Amount: 600k CHF.

Duration: 4 years, from 1/2006.

Affiliation: Dalle Molle Institute for Artificial Intelligence (IDSIA).

Description: 3.9M EUR total grant in the FP6 FET Open programme. Consortium of 5 partners. The project focused on the design, implementation, and distributed control of a novel swarm robotic system comprising heterogeneous, dynamically connected small autonomous robots in 3D: eye-bots (flying), hand-bots (grasping), and foot-bots (ground).

7. **Project:** *BISON: Biology-Inspired techniques for Self-Organization in dynamic Networks.*

Role: *Co-PI* with Luca Gambardella for IDSIA's research activities in the project (Note: I did not contribute to project writing).

Funding agency: FP5 FET Open programme - Scientific Institutions of the European Community.

Duration: 3 years, from 5/2003.

Amount: 400k CHF.

Affiliation: Dalle Molle Institute for Artificial Intelligence (IDSIA).

Description: 1.7M EUR total grant funded in the FP5 FET Open programme. Consortium of 5 partners. The project focused on developing bio-inspired approaches for adaptive routing and control in dynamic networks, such as mobile ad hoc and P2P networks.

6.3 Past Individual Project Grants and Fellowship Support

1. **Marie Curie post-doc fellowship for project *Ant and learning agents for adaptive routing and distributed control in communication networks.***

Individual research grant of about 100k EUR awarded by the Marie Curie program of the scientific institutions of the European Community.

Host institution: IRIDIA, Université Libre de Bruxelles, Belgium.

Duration: 2.5 years, from 11/2001.

2. **Science & Technology in Japan post-doc fellowship for project *Mobile stigmergetic agents for control of network systems.***

Individual research grant of about 130k EUR awarded by the scientific institutions of the European Union.

Host institution: Advanced Telecommunications Research International (ATR), Kyoto, Japan.

Duration: 2 years, from 2/1999.

3. **Training and Mobility of Researchers (TMR) post-doc fellowship for project *Multi-agent based techniques for distributed adaptive routing.***

Individual research grant of about 100k EUR awarded by the Marie Curie program of the scientific institutions of the European Community.

Host institution: Université Libre de Bruxelles, Belgium (Note: the grant was not exploited since at the same time I obtained the S&T Fellowship for Japan, which I opted for).

Duration: 2.5 years, from 2/1999.

4. **Training and Mobility of Researchers (TMR) post-grad fellowship for project *Autonomous reinforcement learning agents for Partially Observable Markov Decision environments.***

Individual research grant of about 100k EUR awarded by the Marie Curie program of the scientific institutions of the European Union.

Host institution: IRIDIA, Université Libre de Bruxelles, Belgium.

Duration: 2.5 years, from 8/1996.

5. **Post-grad fellowship for studies on *Artificial Intelligence and Robotics.***

Individual research grant of about 21k EUR awarded by the municipality of Trento (Italy).

Host institution: Istituto per la Ricerca Scientifica e Tecnologica (IRST), Trento, Italy.

Duration: 1 year, from 1/1994.

6. **Post-grad fellowship for studies on *Pattern Recognition.***

Individual research grant 11k EUR awarded by the municipality of Trento (Italy).

Host institution: Istituto per la Ricerca Scientifica e Tecnologica (IRST), Trento, Italy.

Duration: 0.5 years, from 7/1993.

7 Evidence of Teaching Performance

7.1 Courses Taught at Carnegie Mellon

1. **15-781 Artificial Intelligence: Representation and Problem Solving**

- Fall'16, in Pittsburgh, 9 units
- Class of 15 students
- Average of course evaluation: 4.64/5

2. **15-381 Artificial Intelligence: Representation and Problem Solving**

- Spring'17, in Doha, 9 units
- Class of 5 students
- Average of course evaluation: 3.65/5

3. **15-381 Artificial Intelligence: Representation and Problem Solving**

- Fall'17, in Doha, 9 units
- Class of 2 students
- Average of course evaluation: 5/5

4. **16-311 Introduction to Robotics**

- Fall'17, in Doha, 12 units
- Class of 2 students
- Average of course evaluation: NA

5. **15-382 Collective Intelligence**

- Spring'18 in Doha, 9 units
- Class of 4 students
- Average of course evaluation: Running course

7.2 Courses Planned for Next Semester at Carnegie Mellon

1. **16-311 Introduction to Robotics**

- Fall'18, in Doha, 12 units

2. **16-401 Machine Learning**

- Fall'18, in Doha, 12 units

7.3 Courses Taught Outside Carnegie Mellon

1. Robotics

- Institution: *University of Lugano (USI), Switzerland*
- School: Master in Informatics, Department of Computer Science
- When: Spring'16, Spring'15, Spring'14
- Classes: From 5 to of 25 students
- Average of course evaluation: 4/5

2. Operations Research

- Institution: *University of Applied Science of Southern Switzerland (SUPSI)*
- School: Management Engineering
- When: Fall'15, Fall'14, Fall'13, Fall'12
- Classes: From 12 to of 24 students
- Average of course evaluation: 4/5 (Awarded as one of the best SUPSI teachers in Fall'13)

3. Lab of Algorithms and Data Structures

- Institution: *University of Applied Science of Southern Switzerland (SUPSI)*
- School: Computer Engineering
- When: Fall'14
- Classe: 28 students
- Average of course evaluation: 4.1/5

4. Heuristic & Heuristics Lab

- Institution: *University of Lugano (USI), Switzerland*
- School: Master in Intelligent Systems, Department of Computer Science
- When: Fall'08, Fall'09, Fall'10, Fall'11, Fall'12
- Classes: From 5 to of 20 students
- Average of course evaluation: 3.85/5

5. Optimization and Process Evaluation

- Institution: *University of Applied Science of Southern Switzerland (SUPSI)*
- School: Management Engineering
- When: Spring'08
- Class: 8 students
- Average of course evaluation: NA

7.4 Short Courses and Conference Tutorials

1. *Ant Colony Optimization: theory and hands-on* (Master of Science in Informatics) - Short course, *Bicocca University*, Milan, Italy, 2013, 8 hours.
2. *Swarm and collective intelligence* (Master of Science in Intelligent Systems) - Short course, *University of Lugano (USI)*, Lugano, Switzerland, from 2007 to 2013, 8 hours.

3. *Ant Colony Optimization and its application to routing in telecommunication networks* (Conference Tutorial) - “ANTS’06, 5th International Workshop on Ant Algorithms and Swarm Intelligence, Brussels, Belgium, September 4–7, 2006, 6 hours.
4. *Ant Colony Optimization: from innovative research to successful industrial applications* (Post-grad Summer School) - “1st Summer School on Aspects of Complexity”, University of Bologna, Bertinoro, Italy, July 18–28, 2005, 12 hours
5. *Swarm intelligence, nature’s way to system engineering* (PhD in Informatics) - Department of Electronics, Computer Science and Automation, *University of Girona*, Spain, April 26–27, 2005, 12 hours
6. *Swarm intelligence and metaheuristics for combinatorial optimization* (Post-grad course on Spatial Intelligence) - Department of Geoinformatics, *Helsinki University of Technology (TKK)*, Finland, August 30 - September 3, 2004, 12 hours.

7.5 Outreach Courses

1. **Computer Science and Robotics Lab @Winter Institute: Discover computer science**
 - CMU-Q, Doha, Jan 28 - Feb 1, 2018, 10 hours.
 - Description: Introduction course for high school students to learn how to program in Python; application to programming a mobile ground robot: safely navigate through a track only using short-range sensors.
2. **Robotics Workshop @MindCraft**
 - CMU-Q, Doha, October 14, 2017, 3+3 hours.
 - Description: How to program a mobile robot in Python; create a simple navigation map; use of visual input for moving through a track.
3. **Computer Science and Robotics Lab @Winter Institute: Discover computer science**
 - CMU-Q, Doha, Jan 29 - Feb 2, 2017, 10 hours.
 - Description: Introduction course for high school students to learn how to program in Python; application to programming a mobile ground robot: safely navigate through a track only using a built map or short-range sensors.

8 Student Advising

8.1 Completed Ph.D. Students

1. Eduardo Feo-Flushing
 - **Cooperative missions with heterogeneous networked teams**, Dec. 2017
 - Institution: *University of Lugano (USI), Switzerland*
 - Co-advisor: Prof. Luca Gambardella
 - Employed at IDSIA, Switzerland
2. Jawad Nagi
 - **Human-swarm symbiotic interaction**, Aug. 2016
 - Institution: *University of Lugano (USI), Switzerland*
 - Co-advisor: Prof. Luca Gambardella
 - Moving from NYC to a Swiss ICT company

8.2 Undergraduate Senior Thesis and Research Projects

1. **Senior Thesis, Advisor:** School of Computer Science, CMU-Q, Doha. Academic year 2017-18. Subject: *A mixed initiative system for multi-robot navigation in unknown cluttered environments*. Student: Rohith Pillai.
2. **Senior Thesis, Co-Advisor:** School of Computer Science, CMU-Q, Doha. Academic year 2017-18. Subject: *Autonomous coarse localization in industry*, Student: Aisha Mohammed.
3. **Senior Thesis, Co-Advisor:** School of Computer Science, CMU-Q, Doha. Academic year 2017-18. Subject: *Water channels inspection using unmanned aerial vehicles*. Student: Fatma Tlili.
4. **QSIURP project, Advisor:** Computer Science, CMU-Q, Doha. Summer 2017. Subject: *A distributed approach to multi-robot collision-free vehicle routing in dynamic environments*. Students: Zan Naeem, Mohamed Zakzok.
5. **Independent Study, Co-Advisor:** School of Computer Science, CMU-Q, Doha. Spring semester 2017. Subject: *Developing modern Web applications with best practices*. Student: Yasser Mahmoud Elsayed.
6. **BSc. Thesis in Management Engineering, Co-Advisor:** *Models and algorithms for lot-sizing problems*, 2009. Institution: University of Applied Science of Southern Switzerland, Lugano, Switzerland. Student: Franjo Majstorovic.
7. **Research Internship in Networking, 6 months, Advisor:** *Adaptive routing in networks on-chip*, 2005. Workplace: IDSIA. Student: Neha Bhargava.
8. **BEng. thesis in Electronics Engineering, Co-Advisor:** *Adaptive load balancing in telecommunications networks*, 1998. Institution: Politecnico of Milano, Italy. Workplace: IRIDIA, Belgium. Student: Emanuele Persico.

8.3 M.S. Thesis or M.S. / Ph.D. Research Projects

1. **Student Internship in Robotics, Advisor:** *Decentralized position control of data collectors for multicenter data storage in mobile robotic networks*, 6 months, 2016. Funding Institution: NCCR Robotics, Switzerland. Workplace: IDSIA. Student: Kaviya Dhanabalachandran.
2. **Ph.D. in Informatics, Research Advisor:** *Multi-modal human multi-robot interaction*, starting in 2015, running. Institution: University of Lugano, Switzerland. Work in context of the NCCR Robotics project “Symbiotic interaction between humans and multi-robot systems” (funded by Swiss NSF). Ph.D. student: Boris Gromov.
3. **Research Internship in Mobile Networking, Advisor:** *Dynamic node placement in robotic MANETs*, 4 months, 2014. Funding Institution: University of Granada, Spain. Workplace: IDSIA. Ph.D. Student: Roberto Magán Carrión. Current occupation: Post-doc researcher at Granada University, Spain.
4. **Research Internship in Robotics, Advisor:** *Cooperative monitoring of disaster areas with UAVs teams*, 6 months, 2014. Funding Institution: NCCR Robotics, Switzerland. Workplace: IDSIA. Researcher: Fatemeh Mohseni. Current occupation: Ph.D. student at Linköping University, Sweden.
5. **MSc. thesis in Computer Engineering, Co-Advisor:** *Multi-robot fair target tracking with uncertain observations and mobility prediction*, 2013. Institution: Politecnico of Milan, Italy. Workplace: IDSIA. Student: Jacopo Banfi. Current occupation: Ph.D. student at Politecnico of Milan, Italy.
6. **Ph.D. in Informatics, Research Advisor:** *Resilient path planning for multi-robot systems*, started in 2013, running. Institution: University of Lugano, Switzerland. Work in context of the NCCR Robotics project “Resilient path planning for ground robots” (funded by Swiss NSF). Ph.D. student: Jérôme Guzzi.
7. **MSc. thesis in Informatics, Advisor:** *A cooperative distributed protocol for link quality learning in wireless networks*, 2012. Institution: University of Lugano, Switzerland. Student: Imran Ahmed.
8. **MSc. thesis in Informatics, Advisor:** *Optimal relay node placement for throughput enhancement in wireless sensor networks*, 2010. Institution: joint programme of the Universities of Trento and Aachen. Workplace: IDSIA. Student: Eduardo Feo.
9. **MSc. thesis in Computer Science Engineering, Co-Advisor:** *Swarms of flying robots performing distributed path planning for objects on the ground*, 2010. Institution: Politecnico of Milano, Italy. Workplace: IDSIA. Student: Andreagiovanni Reina. Current occupation: Post-doc researcher at Sheffield University, UK.
10. **MSc. thesis in Bioinformatics, Co-Advisor:** *A computational model for the immune system and its aging*, 1999. Institution: Dept. of Biology, Manchester University, UK. Student: Silvana Valensin.
11. **MSc. thesis in Physics, Co-Advisor:** *Study of the diversity of antibodies using genetic algorithms*, 1994. Institution: University of Bologna, Italy. Student: Silvana Valensin.

8.4 Ph.D. Thesis Committee Service

1. Pedro Veloso
 - *School of Architecture, CMU, Pittsburgh*
 - **designLOOP: A multi-agent system for architectural composition**
 - Started in 12/2016, admitted to dissertation phase in Dec. 2017
 - Advisor: Prof. Ramesh Krishnamurti

2. Zhiang Zhang

- *School of Architecture, CMU, Pittsburgh*
- **Building energy model based optimal control of HVAC Systems: a deep reinforcement learning approach**
- Started in 12/2016, qualifier exam in April 2018
- Advisor: Prof. Khee Poh Lam

8.5 External Examiner for M.S. or Ph.D. Thesis

- Ph.D. thesis, Angelo Trotta: *Next-generation public safety systems based on autonomous vehicles and opportunistic communications*, Università di Bologna, Computer Science and Eng., Italy, April, 2017
- Ph.D. thesis, Milan Erdelj: *Mobile wireless sensor network architecture: Applications to mobile sensor deployment*, Université des Sciences et Technologies de Lille, INRIA Lille, France, Octobre 11, 2013
- M.Sc. thesis, Giuseppe Cuccu: *Variable Size Populations for Dynamic Optimization with Genetic Programming*, Computer Science Department, Università Bicocca, Milan, Italy, February 2008
- Ph.D. thesis, Samih Tadrus: *Generic Multi-Pheromone Quality of Service Routing*, School of Computer Science, University of Nottingham, England, July 2007
- Ph.D. thesis, Luc Hogue: *Delay Tolerant Networks: Modelling, Simulation and Broadcast-based Applications*, Computer Science institute, University of Luxembourg, April 2007