



David FOLIO

Associate Professor (tenured)

*Robotic and Micro/Nano-robotic for
biomedical and health-care application*

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SUMMARY

David FOLIO received his Ph.D. in robotics and control in 2007. His works were held in the Robotics, Action, and Perception (RAP) group of the Laboratory for Analysis and Architecture of Systems (LAAS) under the supervision of Dr. Viviane Cadenat, associate professor at University of Toulouse. Between 2007 and 2008, he joined the Lagadic team from Inria Rennes-Bretagne Atlantique center as a post-doctoral fellow. Since 2008, he is associate professor at INSA Centre Val de Loire¹ where he is teaching control and electrical science. His research activities are with the IRAuS group in PRISME laboratory on modeling, control and navigation of micro/nano-robotics, mainly devoted to health and biomedical applications. Since 2008, David FOLIO has published 43 scientific publications, including 13 articles in well known ISI journals, and 20 international conferences papers.

Keywords: Robot Navigation&Control; Micro/Nano-robotics; Magnetic microrobots; Medical robotics

CURRENT POSITION AND RESPONSIBILITIES

- Sept. 2008 Associate Professor (with tenure) – Maître de Conférence
present **Affiliation** INSA¹ Centre Val de Loire, Université d'Orléans, PRISME EA 4229
Teaching member of the teaching team of the Industrial Risk Control (MRI), of the Energy, Risks, and Environment (ERE), and of the Sciences and Techniques for Engineers (STPI) departments.
Research member of the Robotic team of the Images, Robotics, Automatic control and Signal (IRAuS) unit of the PRISME Laboratory.
Topics modeling, control and navigation of magnetic micro/nano-robotics, mainly devoted to health and biomedical applications.
- Since 2014 in charge of the Nuclear Energy option of the 5th year (engineer's degree) of the Industrial Risk Control (MRI) department
- Since 2017
 - o elected member of the council of the Energy, Risks and Environment (ERE) department.
 - o referent of "racism and antisemitism".

EXPERIENCES AND GRADUATE EDUCATIONS

- Oct. 2007 Post-Doctorate
Aug. 2008 Inria de Rennes Bretagne Atlantique, Rennes, France
Topics: sensor fusion for unmanned aerial vehicles, directed by Francois CHAUMETTE.
- Feb. 2004 PhD. Thesis, Robots Control
Jul. 2007 University of Toulouse, Toulouse, France
Topics: multi-sensor-based control, collision/occlusion avoidance and visual feature estimation, directed by Viviane CADENAT.
- 2003–2004 MS, DESS Systèmes Intelligents
University of Toulouse, Toulouse, France
- 2002–2003 MD, DEA Systèmes Informatiques
University of Toulouse, Toulouse, France

1. The INSA Centre Val de Loire was founded in 2014 by merging ENSI Bourges and ENIVL (Blois).

TEACHING GRADUATE COURSES

- Electrical engineering** electrical engineering, electronic circuits, electric power, sensors (from the 1st semester to the 6th semester)
- Control** Signal processing, Control and observer design
- Robotics** Robotic and vision

RESEARCH AREAS

- Modeling, control and navigation strategies for micro/nano-robotics:
 - Magnetic micro/nano-robot;
 - Catalytic micro/nano-robot;
 - Micro-manipulation;
- Robotized tele-echography.

PROFESSIONAL ACTIVITIES

- Since 2015** Member of the program committee of the International Conference on Robotics, Manipulation, and Automation at Small Scales (MARSS)
- Since 2013** Editorial Board member of the International Journal of Advanced Robotic Systems (IJARS).
- Since 2005** IEEE member (SM'05, AM'08, M'12)
- Regular Reviewer**
- IEEE Transactions on Robotics (TRO);
 - IEEE Transactions on Biomedical Engineering (TBME);
 - IEEE/ASME Transactions on Mechatronics (TMECH);
 - IEEE Transactions on Automation Science and Engineering (TASE);
 - International Journal of Advanced Robotic Systems (IJARS);
 - IEEE International Conference on Robotics and Automation (ICRA);
 - IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS);
 - IEEE/RAS&EMBS International Conference on Biomedical Robotics and Biomechatronics (BioRob);
- Session Chairman** IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'12)
- Awards** Outstanding research award (PEDR 2014-2018)

REFERENCES

Academic Journals

- [1] Sarkis, B., Folio, D. and Antoine Ferreira. Catalytic Tubular Microjet Navigating in Confined Microfluidic Channels: Modeling and Optimization. *IEEE/ASME Journal of Microelectromechanical Systems*, 99(9):pp. 1–11, 2018. doi>10.1109/JMEMS.2018.2803803
- [2] Folio, D. and Ferreira, A. (2017). 2D robust magnetic resonance navigation of a ferromagnetic microrobot using pareto optimality. *IEEE Transactions on Robotics*, 33(3): 583-593.
- [3] Jang, B., Wang, W., Wiget, S., Petruska, A., Chen, X., Hu, C., Hong, A., Folio, D., Ferreira, A., Pané, S., and Nelson, B. (2016). Catalytic locomotion of core-shell nanowire motors. *ACS Nano*, doi>10(11):9983–9991.
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- [10] Cadenat, V., Folio, D., and Durand, A. (2012). A comparison of two sequencing techniques to perform a vision-based navigation task in a cluttered environment. *Advanced Robotics*, 26(5-6):487–514. doi>10.1163/156855311X617470
- [11] Kim, J., Ladjal, H., Folio, D., Ferreira, A., and Kim, J. (2012). Evaluation of telerobotic shared control strategy for efficient single-cell manipulation. *IEEE Transactions on Automation Science and Engineering*, 9(2):402–406. doi>10.1109/TASE.2011.2174357
- [12] Belharet, K., Folio, D., and Ferreira, A. (2011). Three-dimensional controlled motion of a micro-robot using magnetic gradients. *Advanced Robotics*, 25(8):1069–1083. doi>10.1163/016918611X568657
- [13] Belharet, K., Folio, D., and Ferreira, A. (2010). MRI-based microrobotic system for the propulsion and navigation of ferromagnetic microcapsules. *Minimally Invasive Therapy & Allied Technologies*, 19(3):157–169. doi>10.3109/13645706.2010.481402

Book Chapter

- [14] Amari, N., Folio, D., and Ferreira, A. (2016). *Encyclopedia of Nanotechnology*, chapter Nanorobotics for Synchrotron Radiation Applications, pages 1–19. Springer Netherlands, Dordrecht, 2nd edition.
- [15] Belharet, K., Folio, D., and Ferreira, A. (2012). *Real-time software platform for in vivo navigation of magnetic micro-carriers using MRI system*, chapter 11. Number 51 in Biomaterials. Woodhead Publishing, Cambridge.

International Conference

- [16] Mellal, L., Folio, D., Belharet, K., and Ferreira, A. (2016a). Estimation of interaction forces between two magnetic bolus-like microrobots. In *International Conference on Manipulation, Automation and Robotics at Small Scales (MARSS'2016)*, pages 1–6, Paris, France. IEEE.
- [17] Mellal, L., Folio, D., Belharet, K., and Ferreira, A. (2016c). Optimal control of multiple magnetic microbeads navigating in microfluidic channels. In *IEEE International Conference on Robotics and Automation (ICRA '2016)*, pages 1921–1926, Stockholm, Sweden. IEEE.

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- [20] Amari, N., Folio, D., and Ferreira, A. (2014). Robust nanomanipulation control based on laser beam feedback. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'2014)*, pages 4674-4679, Chicago, IL, USA. IEEE.
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