

Patrick ROUGEOT

Ingénieur de Recherche Ensmm

Institut *Femto-st*, Département *As2m*
Equipe *Minarob et Nanorobotics*
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PROFESSIONAL EXPERIENCE

- 2017-... **Research Engineer, (HC) – FEMTO-ST Institute, AS2M Dep., ENSMM School, Besancon.**
- Research activities: equipments concept and design for **biomedical applications**, design and developments of platforms for sequences of micromanipulations ;
 - Research interests: microrobotic and **micro-mechatronic** systems for medical application, **micro-manipulation**, micro-assembly ;
 - Team: Minarob and Nanorobotics.
- 2011-2015 **Research Engineer, (HC) – FEMTO-ST Institute, AS2M Dep., ENSMM School, Besancon.**
- Research activities: developments and exploitations of **measurement chains at micro- and nanoscopic scales**, design and developments of **tools** and sequences of **micromanipulations**;
 - Research interests: Micromanipulation, Micromechatronics and Microrobotic Research Group in the field of Micro/Nanoforce measurement, an atomic force microscope (AFM) for the characterization of the **effects of surfaces**, **adhesion** force measurement on **structured** and/or **functionalized** surfaces and **polymer films** ;
 - Team: Specimen.
- 2008-2011 **Research Engineer, (1^{ière}C) – FEMTO-ST Institute, AS2M Dep., ENSMM School, Besancon.**
- Research activities: developments and exploitations of measurement chains at micro- and nanoscopic scales, design and developments of tools and sequences of micromanipulations ;
 - Research interests: Micromanipulation, Micromechatronics, Microrobotic, **Micro/Nanoforce measurement**, an atomic force microscope (AFM) for the characterization of the **effects of surfaces**, adhesion force measurement on structured and/or functionalized surfaces and polymer films ;
 - Team: Sammi.
- 2000-2008 **Research Engineer, (2^{ème}C) – FEMTO-ST Institute, AS2M Dep., ENSMM School, Besancon.**
- Research activities: developments and exploitations of measurement chains at micro- and nanoscopic scales, design and developments of tools and sequences of **micromanipulations** ;
 - Research interests: Micromanipulation, Micromechatronics, Microrobotic, Micro/Nanoforce measurement, an atomic force microscope (AFM) for the characterization of the effects of surfaces, adhesion force measurement on structured and/or functionalized surfaces and polymer films ;
 - Team: Sammi ;
 - Responsibilities: **Technical team** (8 engineers, 2 technicians).
- 1996-2000 **Study Engineer, (2^{ème}C) – FEMTO-ST Institute, AS2M Dep., ENSMM School, Besancon .**
- Research activities: developments and exploitations of measurement chains at micro- and nanoscopic scales, design and developments of tools and sequences of micromanipulations ;
 - Research interests: Micromanipulation, Micromechatronics, Microrobotic, Micro/Nanoforce measurement, an atomic force microscope (AFM) for the characterization of the effects of surfaces, adhesion force measurement on structured and/or functionalized surfaces and polymer films ;
 - Team: Sammi ;
 - Responsibilities: manager of platform development projects in the field of health assessment, diagnostic and prognostic, in particular robotic platforms.

1990-1996 **Research and Development Engineer – Society FABRICOM, Besançon.**

1985-1988 **Senior technician – Society FABRICOM/SORMEL, Besançon.**

1983-1984 **Senior technician – Society RECOMAT, Paris.**

1981-1982 **Senior technician – Society SECAUTO, Marseille.**

COMPETENCES

- Microscopy **AFM** and **SEM** ;
- **Laser** cutting ;
- **3D** printing ;
- Specific cards **programmation** (Matlab/Simulink, C++, Visp, ...) ;
- Chemical functionalization and electropolymerisation.

SUPERVISION

2000-2011 **Technical team Responsible:**

8 engineers and 2 technicians.

2011-2017 **PHD students, master students, PFE students:**

4 or 5 per year.

EDUCATION

1988-1990 **Engineer's degree – ENSMM, Besançon.**

Mechanical and Microtechnical Engineering School – option automatic and robotic.

1985-1988 **DEST - IUFC center CNAM, in-service training, Besançon.**

Electronic option Automatic.

1979-1981 **BTS, Jules Haag high school, Besançon.**

Industrial Control and Automatic Regulation.

SCIENTIFIC COLLABORATIONS

International scientific collaborations

2014-2020 **Project CITHadel: Interreg France-Suisse, Cellule Intégrée de mesure de micro-force par Technologie HybriDE.**

Responsible: Platform and demonstrators.

2012-2015 **Project EU PF7 μ RALP, Micro-technologies and Systems for Robot-Assisted Laser Phonomicrosurgery.**

Responsible: Platform and demonstrators.

2010-2013 **Project FAB2ASM: European project (STREP-FP7), Efficient and Precise 3D Integration of Heterogeneous Microsystems from Fabrication to Assembly.**

Responsible: WP5

2007-2010 **Project HYDROMEL: European Integrated project, on hybrid ultra-precision manufacturing process based on positional- and self-assembly for complex micro-products.**

Responsible: Platform and demonstrators.

National scientific collaborations

2017-2021 **Project ANR μ RoCS, MicroRobot-assisted Cholesteatoma Surgery.**

Responsible: Platform and demonstrators.

2017-2021 **Project ANR Greenshield, Pesticide Free Robotized Pest Control in Agriculture.**

Responsible: Platform and demonstrators.

2017-2018 **Project COSMIC, FLI (France Life Imaging) - WP3 - Imagerie Interventionnelle, in collaboration with ICube-AVR.**

Responsible: Platform and demonstrators.

- 2015-2019 **Project ANR NEMRO**, *Microrobotic nasal endoscopy by OCT: impact of smell deficiency on neurodegenerative diseases.*
Responsible: Platform and demonstrators.
- 2014-2017 **Project ANR CHEMICROMAN: French national project**, *Chemical functionalization of surface for the micromanipulation.*
Responsible: Platform and demonstrators.
- 2013-2017 **Project NANOROL: French national project**, *Microworld modelling and measurement on interaction between micro-objects.*
Responsible: Platform and demonstrators.
- 2005-2008 **Project PRONOMIA: French national project**, *Robotic micro-assembly in a liquid medium.*
Responsible: Platform and demonstrators.
- Regional scientific collaborations**
- 2017-2019 **Project Regional CoErCIve**, *Bourgogne Franche-Comté, Chirurgie du cholestéatome par une approche microbotique guidée par vision.*
Responsible: Platform and demonstrators.
- 2013-2017 **Project Regional FRANCHIR**, *Franche-Comté.*
Responsible: Platform and demonstrators.
- 2013-2017 **Project BQR (Bonus Quality Research)-UFC**, *the study of energy harvesting for mesoscale robot power.*
Responsible: Platform and demonstrators.

PUBLICATIONS

Publications 2018 (4)

- M. T. Chikhaoui, A. Benouhiba, **P. Rougeot**, K. Rabenoroso, M. Ouisse, and N. Andreff. *Developments and Control of Biocompatible Conducting Polymer for Intracorporeal Continuum Robots* Annals of Biomedical Engineering (Volume 1, jun. 2018, Pages :1 - 11).
- J-Y.Rauch, O. Lehmann, **P. Rougeot**, J. Abadie, J. Agnus, and M. A. Suarez. *Smallest microhouse in the world, assembled on the facet of an optical fiber by origami and welded in the μ Robotex nanofactory.* Journal of Vacuum Science & Technology A: Vacuum, Surfaces, and Films (JVSTA) (Volume 36, Issue (4), may 2018, Pages : 41601).
- A. Kudryavtsev, A. Liadov, M. T. Chikhaoui, **P. Rougeot**, F. Spindler, K. Rabenoroso, N. Andreff, and B. Tamadazte. *Eye-in-hand visual servoing of concentric tube robots.* international conference on robotics and automation (ICRA), IEEE Robotics and automation letters.
- A. Kudryavtsev, A. Liadov, M. T. Chikhaoui, **P. Rougeot**, F. Spindler, K. Rabenoroso, N. Andreff, and B. Tamadazte. *Eye-in-hand visual servoing of concentric tube robots.* IEEE Robotics and automation letters (Volume 3, Issue (3), feb. 2018, Pages :2315 - 2321)

Publications 2017

- C. Girerd, K. Rabenoroso, **P. Rougeot**, and P. Renaud. *Towards Optical Biopsy of Olfactory Cells using Concentric Tube Robots with Follow-the-Leader Deployment* IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2017), Vancouver, Canada, 09/2017.
- Y. Baran, K. Rabenoroso, G. J. Laurent, **P. Rougeot**, N. Andreff, and B. Tamadazte. *Preliminary Results on OCT-based Position Control of a Concentric Tube Robot* IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2017), Vancouver, Canada, 09/2017.
- M. T. Chikhaoui, A. Cot, K. Rabenoroso, **P. Rougeot**, and N. Andreff. *Towards Biocompatible Conducting Polymer Actuated Tubes for Intracorporeal Laser Steering* Hamlyn Symposium on Medical Robotics, London, 2017.

Publications 2016

- M. Taha Chikhaoui, A. Cot, K. Rabenoroso, **P. Rougeot**, and N. Andreff. *Design and Closed-loop Control of a Tri-layer Polypyrrole based Telescopic Soft Robot* IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2016), Daejeon, Korea, 10/2016.
- A. Cot, M. Taha Chikhaoui, K. Rabenoroso, **P. Rougeot**, and N. Andreff. *Encapsulation, and Performance Analysis of Large Deformation Tri-layer Polypyrrole Actuator* IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM 2016), Banff (CA); 07/2016.
- T. Vrlinic, C.C. Buron, S. Lakard, J. Husson, **P. Rougeot**, M. Gauthier, and B. Lakard. *Evaluation*

of adhesion forces for the manipulation of micro-objects in submerged environment through deposition of pH responsive polyelectrolyte layers. Langmuir, 32 (2016) 102-111.

- A. Mohand Ousaid, M. Rakotondrabe, D. Gendreau, and **P. Rougeot**. *Design, static modeling and simulation of a 5-DOF precise piezoelectric positioner.* SPIE Sensing Technologies / Sensors for Next-Generation Robotics, Baltimore MA USA, April 2016.
- **P. Rougeot**, A. Mohand Ousaid, D. Gendreau, and M. Rakotondrabe. *Design, modeling and simulation of a three-layers piezoelectric cantilevered actuator with collocated sensor.* SPIE - Sensing Technology+Applications; Sensors for Next Generation Robots conference, Baltimore MA USA, April 2016.
- D. Gendreau, A. Mohand Ousaid, **P. Rougeot**, P. Lutz, and M. Rakotondrabe. *Additive manufacturing: design of a basic pivot articulation actuated with SMA wire.* Texas, USA (2016, pages 14 - 18).
- D. Gendreau, A. Mohand Ousaid, **P. Rougeot**, and M. Rakotondrabe. *3D-Printing: a promising technology to design three-dimensional microsystems.* Paris, France Issue 50, 2016, pages 1 – 5.

Publications 2015

- T. Vrlinic, C.C. Buron, S. Lakard, J. Husson, **P. Rougeot**, M. Gauthier, and B. Lakard. *Evaluation of adhesion forces for the manipulation of micro-objects in submerged environment through deposition of pH responsive polyelectrolyte layers.* Langmuir, 32 (2015) 102-111.
- K. Rabenoroso, B. Tasca, A. Zerbib, T. E. Pengwang, **P. Rougeot**, and N. Andreff. *SQUIPABOT: a Mesoscale Parallel Robot for a Laser Phonosurgery.* International Journal of Optomechatronics June 2015, Pages pp 1-33.
- K. Rabenoroso, B. Tasca, A. Zerbib, T. E. Pengwang, **P. Rougeot**, and N. Andreff. *SQUIPABOT: a Mesoscale Parallel Robot for a Laser Phonosurgery.* , International Journal of Optomechatronics, 2015, vol. 9, no 4, p. 310-324, DOI 10.1080/15599612.2015.1059534.
- L. Barrand, M.T. Chikhaoui, A. Cot, K. Rabenoroso, **P. Rougeot**, B. Lakard, S. Lakard, and N. Andreff. *Towards polypyrrole actuated flexible endomicroscope: Synthesis.* French Symposium on Emerging Technologies for micro-nanofabrication, November 18-20, 2015, Ecully, France.

Publications 2014

- K. Rabenoroso, B. Tasca, A. Zerbib, T. E. Pengwang, **P. Rougeot**, and N. Andreff. *SQUIPABOT: a Mesoscale Parallel Robot for a Laser Phonosurgery.* International Symposium on Optomechatronic Technologies, November 5-7, 2014, Seattle USA.

Publications 2013 = 4

Publications 2012 = 4

Publications 2011 = 3

Publications 2010 = 4