

Gabriel Gattaux Goulon

PhD Candidate in Bio-inspired Robotics
Aix-Marseille University – CNRS



CONTACT INFORMATION

Ph.D. Student
Bio-Inspired System Team
Institut des Sciences du Mouvement
Aix-Marseille University, CNRS
Marseille, 13008

Email: gabriel.gattaux@univ-amu.fr
Linkedin: gabriel-gattaux
Github: Gaby-253
Scholar: Gabriel Gattaux

RESEARCH INTEREST

Understanding by building. My research seeks to uncover the neuronal and dynamical principles underlying adaptive behavior in biological and robotic systems. I investigate how perception, neural computation, body dynamics, and sensorimotor coordination interact to generate robust behavior, from locomotion and navigation to spatial cognition and embodied decision-making. By combining computational neuroscience, neuromorphic, control, and robotics, I develop biologically grounded models of intelligence and validate them on embodied robotic platforms.

EDUCATION

Aix-Marseille University, CNRS, Marseille, France

2022–2026 Ph.D. in Biorobotics
Advisors: Franck Ruffier, Julien Serres and Antoine Wystrach
Research focus: Insect-Inspired Neurorobotics
Thesis title: *Insect Neuroethology For and Through Robotic Navigation*

ENSIL-ENSCI, University of Limoges, France

2019–2022 Engineering Degree (MSc) in Mechatronics
Final project: *Coordinated Control of a TurtleBot Swarm with UWB sensors*

Wrocław University of Science and Technology, Wrocław, Poland

2021 Erasmus Exchange Program in Computer Science

IUT Nancy-Brabois, University of Lorraine, Nancy, France

2017–2019 University Diploma (DUT) in Mechanical Engineering
Double curriculum: Polytech Nancy (integrated preparatory program)

PUBLICATIONS

Journal Publications **Gattaux, G.**, Wystrach, A., Serres, J. R., and Ruffier, F. (2025), Route-centric ant-inspired memories enable panoramic route-following in a car-like robot, *Nature Communications*, (**IF 15.7**), doi:10.1038/s41467-025-62327-3.

Gattaux, G., Diallo, H., Serres, J. R., Wystrach, A., and Ruffier, F. (2026), AntFlie: Frugal Visual Teach and Repeat on Narrow FoV Micro-Drones, *IEEE Robotics and Automation Letters*, (**IF 5.3**), doi:10.1109/LRA.2026.3667486.

Conference
Proceedings

Gattaux, G., Wystrach, A., Ruffier, F., and Serres, J. (2025), Enhancing Ant-Inspired Visual Compass with Focused Visual Scan in a Compact Robot, *IEEE 7th International Conference on Artificial Intelligence Circuits and Systems (AICAS)*, doi:10.1109/AICAS64808.2025.11173128.

Gattaux, G., Serres, J. R., Ruffier, F., and Wystrach, A. (2025), Visual Homing in Outdoor Robots Using Mushroom Body Circuits and Learning Walks, *Biomimetic and Biohybrid Systems: 14th International Conference, Living Machines 2025 Proceedings*, doi:10.1007/978-3-032-07448-5_38.

Gattaux, G., Vimbert, R., Wystrach, A., Serres, J.R., Ruffier, F. (2023), Antcar: Simple Route Following Task with Ants-Inspired Vision and Neural Model. hal-04060451 (Preprint).

PATENTS

Gattaux, G., Serres, J., Wystrach, A., Ruffier, F., (2023 FR, 2024 WO), Method of guiding to a destination, *FR No. FR3151085A1, WO No. WO202501224A1*.

Gattaux, G., Serres, J., Wystrach, A., Ruffier, F., (2026), Visual Estimation of Relative and Absolute Heading, *submitted to SATT-SE, under review*.

AWARDS &
FUNDING

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| 2025 | Biomim'Expo Best Prize Award. |
| 2025 | Travel Grant, Grounding Cognition in Mechanistic Insight. |
| 2024–2025 | CNRS IEA Travel Grant. |
| 2022–2025 | Doctoral Fellowship (AMU / AID). |
| 2024 | Doctoral School Poster Award. |

RESEARCH
COLLABORATIONS
National

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| 2022–present | Insect-inspired robotic navigation, spatial cognition, and computational models of insect behavior. Collaboration between Aix-Marseille University, CNRS, Research Center on Animal Cognition, ENSTA Bretagne, and DGA-AID. |
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| 2024–present | Development of swarm coordination methods based on visual sensing and insect-inspired navigation principles. Collaboration with GIPSA-Lab, INSA Strasbourg, and ENSTA Bretagne. |
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International

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| 2024–present | Humanoid robot navigation and visual cognition on the HRP-5P platform through the CNRS-AIST Joint Robotics Laboratory (Tsukuba, Japan). |
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| 2024 | Neuromorphic perception and navigation using event-based vision and spiking neural networks in collaboration with researchers from the University of Sussex. |
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PRESENTATIONS

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| Conference Presentations | 2026 | IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Pittsburgh, USA (Oral Presentation). | |
| | 2026 | Embodied Intelligence Conference (Oral Presentation). | |
| | 2026 | XIII European Congress of Entomology (ECE2026), France (Poster Presentation). | |
| | 2025 | Grounding Cognition in Mechanistic Insight Conference, Janelia Research Campus, USA (Poster Presentation). | |
| | 2025 | Living Machines 2025, Sheffield Hallam University, UK (Oral Presentation). | |
| | 2025 | IEEE AICAS, ENSEIRB-MATMECA, France (Oral Presentation). | |
| | 2025 | Biomim'Expo, Marseille, France (Oral Presentation). | |
| | 2024 | CapoCaccia Workshops toward Neuromorphic Intelligence, Sardinia, Italy (Oral Presentation and Robotic Demonstration). | |
| | 2023 | French National Robotics Research Days (JNRR), France (Oral Presentation). | |
| | 2023 | SCIoI & ISAB Summer School on Embodied Intelligence, TU Berlin, Germany (Poster Presentation). | |
| | Seminars and Workshops | 2026 | LAAS Robotics Team Seminar, University of Toulouse, France (Seminar Talk). |
| | | 2026 | Submeeting Workshop, ENSTA Bretagne, France (Oral Presentation and Poster). |
| | | 2025 | Workshop on Neuromorphic Perception and Computation in Autonomous Systems (NPCAS), Sheffield Hallam University, UK (Workshop Talk). |
| 2025 | | Forum Innovation Defense, Paris, France (Invited Presentation). | |
| 2024 | | CNRS-AIST Joint Robotics Laboratory Seminar, AIST, Japan (Seminar Talk). | |
| 2024 | | Humanoid Demonstration for CNRS Informatique, AIST, Japan (Demonstration). | |
| 2024 | | GT8 School on Learning and Neuroscience for Robotics, Sorbonne University, France (Oral Presentation). | |
| 2023–2024 | | Human Movement Science Doctoral School Day, Aix-Marseille University (Poster Presentation x2). | |
| MEDIA COVERAGE | 2025 | Gattaux et al. (<i>Nature Communications</i> , 2025) received national and international media coverage, including <i>Le Monde</i> , <i>Les Echos</i> , <i>France Culture</i> , <i>France Inter</i> , <i>CNRS INS2I</i> , and <i>Navigation News</i> . | |
| | 2025 | Recipient of the Biomim'Expo Award, featured in national media outlets. | |
| MENTORING EXPERIENCE | 2024–2025 | Supervised 4 MSc and engineering students in bio-inspired robotics, neural modeling, and autonomous systems; contributions supported ongoing research projects, including results reported in Gattaux et al., RAL (2026). | |

TEACHING EXPERIENCE

155 hours of teaching and tutoring at BSc and MSc levels

ENSTA Bretagne, Institut Polytechnique de Paris, Brest, France

2025 *Teaching Assistant*
 Subjects: Designed and taught an introductory lecture and practical sessions on visual familiarity for robotic navigation (MSc level), spanning ethology, computational neuroscience, computer vision, and robotics.

Aix-Marseille University, Faculty of Science, Marseille, France

2022–2024 *Teaching Assistant*
 Subjects: Taught lectures and practical sessions in Logic, Project Management, Python Programming, Relational Databases (SQL), Excel, and C++ for BSc and MSc students.

ENSIL-ENSCI, University of Limoges, France

2022–2024 *Invited Tutor*
 Subjects: Taught tutorials in calculus, linear algebra, and applied mathematics for BSc engineering students.

PROFESSIONAL SERVICE

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| 2026 | Peer Reviewer, IEEE Transactions on Robotics. |
| 2025 | Peer Reviewer, PLoS Computational Biology. |
| 2025–present | Member, IEEE Robotics and Automation Society (RAS) Technical Committee on BioRobotics. |
| 2024 | Organizer, Human Movement Science Doctoral School Day. |
| 2023 | Peer Reviewer, IROS. |
| 2023 | Organizer and Session Chair, JCRR (Day for Early Career Researchers), French National Robotics Research Days (JNRR). |
| 2018 | National Student Entrepreneur Status (SNEE), IUT Nancy-Brabois. |

TECHNICAL SKILLS

Programming: Python, MATLAB, C++, C

Robotics: ROS, MC-RTC, humanoid robots, UAVs, UGVs

Control & Estimation: Control theory, state estimation, sensor fusion, SLAM

Computational Neuroscience: Dynamical systems, spiking neural networks, neuro-morphic models

Computer Vision: Visual navigation, visual place recognition, optic flow, event-based vision, object detection

Embedded Systems: STM32, FPGA, ARM platforms (Jetson, Raspberry Pi, NUC)

Simulation: MuJoCo, Gazebo

REFERENCES

F. Ruffier, CNRS / ENSTA Bretagne : franck.ruffier@ensta-bretagne.fr

A. Wystrach, CNRS / University of Toulouse : antoine.wystrach@univ-tlse3.fr

J. Serres, Aix-Marseille University / IUF : julien.serres@univ-amu.fr