

Raphaël Rème

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Education

PhD	Institut Pasteur , Computer Vision, Tracking Topic: Biological object tracking. Application to Hydra Vulgaris neurons. Supervisors: Thibault Lagache (Institut Pasteur, Paris), Jean-Christophe Olivo-Marin (Institut Pasteur, Paris), Alasdair Newson (Telecom Paris), Elsa Angelini (Telecom Paris).	Paris, France Apr 2022 – Dec 2025
MSc	Institut Polytechnique de Paris (MVA) , Mathematics, Vision, Learning Applied Mathematics, Machine Learning, Computer Vision. Graduated with Highest Honors.	Paris, France Sept 2020 – Sept 2021
MSc	Télécom Paris , Engineering, Embedded Systems and Data Science One of France's top engineering schools. Double major in Embedded Systems and Data Science.	Paris, France Sept 2017 – Sept 2021
	Lycée Berthollet (CPGE) , Preparatory Classes (Mathematics, Physics, Computer Science) Two-year intensive program preparing for competitive entrance exams to engineering schools.	Annecy, France Sept 2015 – Aug 2017

Professional Experience

Navee , Research Intern (Computer vision) Computer vision for fraud classification.	Paris, France Apr 2021 – Sept 2021
- Image classification with unbalanced, noisy, unlabeled data. - Semi-/Self-supervised learning: FixMatch, SimCLR, SimSiam. - Multiple Instance Learning with attention mechanisms. - Supervisors: Vladyslav Sydorov (EFEO, Paris), Hugues Talbot (CentraleSupélec, Paris)	
Modjo , Data Scientist Intern (Audio/NLP) Started the data science team to automatize sales speech analysis.	Paris, France Mar 2020 – Sept 2020
- Speech-to-text, speaker identification, diarization, NLP on phone calls. - Designed production-ready pipelines (Python, AWS, Docker, Serverless).	
Polyconseil , Embedded Systems Developer Intern Added a biometric driver identification system in vehicles (AutoLib).	Paris, France Sept 2019 – Feb 2020
Asynchronous Python/C for embedded systems.	

Teaching and Supervision

Institut Pasteur , Intern supervision Supervised younger students in the lab	Paris, France 2022 – present
- Tristan Manneville (PhD student since November 2024) - Video object segmentation (U-Net, Optical flow) - Anja Matic (AMGEN Summer Internship program, 2 months, 2024) - Video object segmentation (U-Net) - Carla Rodriguez (AMGEN Summer Internship program, 2 months, 2024) - Segmentation (Wavelet, U-Net)	

- Yaël Gossec (ENSTA 2nd year student, 4 months, 2023) - Clustering and registration (TPS-RPM, CPD)
- Evanne Martin (AMGEN Summer Internship program, 2 months, 2022) - Behavioral classification (LSTM)

Télécom Paris, Practical session supervision

Paris, France

Co-supervised computer vision practical session at MSc level

2023 – 2026

- ~30 hours distributed over different computer vision courses (IMA20x)

Projects

ByoTrack

2023 – present

Biological Object Tracking in Python

- Classic Detection/Segmentation approaches.
- SOTA biological tracking methods.
- Ranked 1st in the CTC [Cell Linking Benchmark](#) (PAST-FR).
- Open source and deployed on PyPi: [ByoTrack](#)

Torch-KF

2024

PyTorch implementation of Kalman filters (KF)

- Batch processing of KF.
- CPU/GPU parallelization thanks to PyTorch.
- Supports filtering and smoothing.
- Open source and deployed on PyPi: [Torch-KF](#)

Pylapy

2023

Pythonic & fast linear assignment problem (LAP) solver

- Wraps different libraries to solve LAP, with automatic selection of the fastest one.
- Support sparse LAP problems.
- Extension to non-square problems and to non maximum cardinal assignments.
- Open source and deployed on PyPi: [Pylapy](#)

Tps, Torch-Tps

2022

Fast Thin Plate Spline implementation based on NumPy or PyTorch

- Scikit-Learn like API (fit / transform).
- CPU/GPU parallelization thanks to PyTorch.
- Open source and deployed on PyPi: [Tps](#), [Torch-Tps](#)

Expyrun

2022

Handling research experiments in Python

- Offline management of reproducible experiments from yaml configuration files.
- Isolate the source code and dependencies.
- Open source and deployed on PyPi: [Expyrun](#)

Hand Prosthesis Piloting

2021

Non-intrusive prosthesis control from surface electromyographic (sEMG) signals

- LSTM-based regression of hand motion.

Hardware Neural Network

2018

Hardware neural network for fast information decoding

- Learned a neural network with small precision digits.
- Hardware implementation with electronic components (Operational amplifiers, resistors).

Publications Submitted or in Preparation

Integrating Visual Features in Multiple Hypothesis Tracking through Self-Supervised Learning 2026

Raphael Reme*, Alasdair Newson, Elsa Angelini, Jean-Christophe Olivo-Marin, Thibault Lagache
Accepted to 2026 IEEE International Symposium on Biomedical Imaging (ISBI)

An arbitrarily high order total generalized variation deblurring algorithm against optical aberrations in microscopy imaging 2026

Yekta Kesenci*, Raphael Reme*, Alasdair Newson, Thibault Lagache, Loic Le Folgoc, Elsa Angelini, Jean-Christophe Olivo-Marin
Submitted to IEEE International Conference on Image Processing (ICIP) 2026

Using Optical Flow as a Velocity Sensor for Kalman-Based Tracking of Biological Objects 2025

Raphael Reme*, Alasdair Newson, Elsa Angelini, Jean-Christophe Olivo-Marin, Thibault Lagache
Submitted to IEEE Transaction on Image Processing

Journal Publications

Automatic Monitoring of Neural Activity with Single-Cell Resolution in Behaving Hydra 2024

Alison Hanson*, Raphael Reme*, Noah Telerman*, Wataru Yamamoto, Jean-Christophe Olivo-Marin, Thibault Lagache, Rafael Yuste
Scientific Reports ([10.1038/s41598-024-55608-2](https://doi.org/10.1038/s41598-024-55608-2))

Conference Publications

SINETRA: A Versatile Framework for Evaluating Single Neuron Tracking in Behaving Animals 2025

Raphael Reme*, Alasdair Newson, Elsa Angelini, Jean-Christophe Olivo-Marin, Thibault Lagache
2025 IEEE 22nd International Symposium on Biomedical Imaging (ISBI) ([10.1109/ISBI60581.2025.10981111](https://doi.org/10.1109/ISBI60581.2025.10981111))

Particle Tracking in Biological Images with Optical-Flow Enhanced Kalman Filtering 2024

Raphael Reme*, Alasdair Newson, Elsa Angelini, Jean-Christophe Olivo-Marin, Thibault Lagache
2024 IEEE International Symposium on Biomedical Imaging (ISBI) ([10.1109/ISBI56570.2024.10635656](https://doi.org/10.1109/ISBI56570.2024.10635656))

Tracking Intermittent Particles with Self-Learned Visual Features 2023

Raphael Reme*, Victor Piriou, Alison Hanson, Rafael Yuste, Alasdair Newson, Elsa Angelini, Jean-Christophe Olivo-Marin, Thibault Lagache
2023 IEEE 20th International Symposium on Biomedical Imaging (ISBI) ([10.1109/ISBI53787.2023.10230664](https://doi.org/10.1109/ISBI53787.2023.10230664))