

# TS5: Data and Models

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# TS5 Scientific scope (1/2)

**TS5 covers research questions on Data and Models in robotics**

Transversal to robotics fields: physical system modelling, perception, control, decision making

Large applicative domain: autonomous robotics, medical robotics, social robotics, industrial robotics, etc.

- **Data:** Production and (re)usage
  - new sensing modalities
  - robot simulation
  - datasets and benchmarks for robotics
  - multimodal perception and data fusion
- **Models: Physics-based** and **data driven** approaches
  - modelisation, identification, perception, control
  - machine learning for robotics

# TS5 Scientific scope (2/2)

*The rise of data-driven approaches put forwards some research axes:*

- **Frugality of robotics approaches** in terms of **data** and annotation, **models** and computations
  - Transfer, continuous learning, self supervised/few shot learning, sparse representations....
- **Hybridization of physics-based and data-driven methods:** how to get the best of both worlds.
- **Foundation models** in robotics
- **Reliability, safety and explainability** for robotics applications using data-driven approaches
  
- Connections with other AP/TS
  - AP1 (frugality), AP2 (explainability for social acceptability), AP3 (education)
  - TS1: eg. sensorimotor learning, TS3: eg. multimodality and data fusion, TS4: eg. bio-inspired cognitive models
- Connections with other GDR: **GdR IASIS**, **GdR RADIA**, **GdR MACS**, GDR Socs, MaDICs, Sécurité informatique, GAIA...

# Review of activities in 2024

3 Scientific meetings:

- ***Hybridization of model-based and data-based approaches in robotics (31/5/2024 in Paris)***
  - Invited speakers: Nicolas Marchand (GIPSA-Lab), Eric Lucet (CEA), Madiha Nadri (LAGEPP)
  - 30 attendees
- ***Emerging visual sensors and robotics applications (4/7/2024 in Paris)***
  - Co-organized with GDR IASIS
  - Invited speakers: Nathan Crombez (UTBM), Stéphane Bazeille (UHA), Julien Moreau (UTC), Antoine Rouxel (LAAS)
  - 58 attendees
- ***Multimodality and fusion in Robotics (11/12/2024, online)***
  - Invited speakers : to be announced

# Planned actions

- **Cartography of the research forces and activities** in the community
- **Next scientific meetings** projections:
  - *Model-based approaches in robotics* (February/Mars 2025 in Lille)
  - *Foundation models in robotics* (TBD)
  - ... *Feel free to contact us for suggesting scientific meeting themes!*
- Organizing more scientific days **jointly with other GDR/GTs**

# TS5 talk: Sylvain Calinon



## *Frugal learning of manipulation skills in robotics*

- Senior Research Scientist at the Idiap Research Institute and a Lecturer at the Ecole Polytechnique Fédérale de Lausanne (EPFL).
- Head of the Robot Learning & Interaction group at Idiap, with expertise in human-robot collaboration, robot learning from demonstration and model-based optimization.
- The approaches developed in his group can be applied to a wide range of applications requiring manipulation skills, with robots that are either close to us (assistive and industrial robots), parts of us (prosthetics and exoskeletons), or far away from us (shared control and teleoperation).

Keywords: learning from demonstration, frugal learning, data structure, model-based optimization, manipulation