InterCoML
Control Theory & Machine Learning

Cost Action 24136

Interactions between Control Theory and Machine Learning

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EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

Working Group 3:
Hybrid and Data-driven modelling

Kick-Off Workshop

Topics

- Introduction to Cost Action InterCoML
- Scientific talks
  - Markus Abel (Ambrosys)
  - Boumediene Hamzi (Imperial College, Caltech)
- Future Activities of WG 3

Dec 12th

11 – 14 CET

via MS Teams

Kathrin Flaßkamp &
Lars Grüne (WG3 Leaders)

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IN SCIENCE & TECHNOLOGY

InterCoML
Control Theory & Machine Learning

Kick-Off Workshop WG 3: Hybrid and Data-driven Modeling

Kathrin Flaßkamp & Lars Grüne

Funded by
the European Union

Agenda

11:00 - 11:30	Welcome, Information on the cost action and on WG 3, getting to know each other
11:30 - 12:15	Scientific Talk Boumediene Hamzi (Imperial College, Caltech)
12:30 - 13:15	Scientific Talk Markus Abel (Ambrosys)
13:15 - 14:00	Discussion on future working group activities and conclusion

Welcome

Working group leaders

Kathrin Flaßkamp

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Interactions between Control Theory and Machine Learning (InterCoML)

- COST (European Cooperation in Science and Technology): funding organisation for research and innovation networks
- connect research initiatives across Europe and beyond
- COST Actions are bottom-up networks with a duration of four years that boost research, innovation and careers.[1]

[1] www.cost.eu

- start date 10/10/2025
- end date 09/10/2029

Organization

- action chair:

  Martin Lazar
  Professor of Applied Mathematics,
  University of Dubrovnik, Croatia
- Management Committee: representatives from countries
- Core group: handling every-day business
- Working groups
- Coordinators for Science communication, Grant Awarding, and Equal Opportunities

InterCoML: Objectives

Aim

Foster synergy between Control Theory (CT) and Machine Learning (ML)

- Strengthen control-theoretic foundations of ML
- Apply ML tools to complex, high-dimensional CT problems
- Develop hybrid and data-driven models for real-world applications from, e.g., energy systems, healthcare, robotics, and smart infrastructure
- Transform theoretical results into practical solutions
- Transfer of knowledge and ideas between academia and industry
- Disseminate insights and findings to the research community and the general public

for details, see our Memorandum of Understanding[2]

[2] https://e-services.cost.eu/files/domain_files/CA/Action_CA24136/mou/CA24136-e.pdf

InterCoML: Capacity Building

- Reduce fragmentation and communication barriers between the ML and CT
- Create common language between CT and ML communities
- Organize seminars, workshops, and training schools
- Empower young researchers through STSMs (short-term scientific missions) and internships
- Promote gender and geographical balance

Working Groups and Structure

- WG1: Control Theory for Machine Learning
- WG2: Machine Learning for Control Theory
- WG3: Hybrid and data-driven modeling
- WG4: Transformation into practical solutions
- WG5: Dissemination and outreach

Working Groups and Structure

- WG1: Control Theory for Machine Learning
- WG2: Machine Learning for Control Theory
- WG3: Hybrid and data-driven modeling
- WG4: Transformation into practical solutions
- WG5: Dissemination and outreach

Working group 3: Hybrid and data-driven modeling

WG 3: Hybrid and data driven modelling

Aims:

1. addessing control problems with observed pairs of input-output data
2. considering unidentified or partial knowledge of underlying model
3. developing efficient and reliable methods for designing controllers
4. focusing on application in control of power systems

   (solar, wind, smart houses) and construction of digital twins in healthcare and personalised medicine
   $\rightarrow$ connection with industry partners

Getting to know each other
Short questionnaire

https://forms.cloud.microsoft/e/pq0tPv0zMP

Scientific Talk

On Kernel-Based LMI Approaches to Solving the Hamilton-Jacobi Equation and Nonlinear Optimal Control

Boumediene Hamzi

- Senior Scientist at Caltech's Department of Computing and Mathematical Sciences
- Affiliate Fellow of the Data Science Institute at Imperial College London
- External Researcher at the Alan Turing Institute (London, UK)
- Research areas
  - dynamical system theory
  - machine learning
  - algorithmic information theory
- member of the management committee of InterCoML

Scientific Talk

Traffic control by machine learning - a subjective perspective

Markus Abel

- Principal CEO at ambrosys
- Private Senior Lecturer at University of Potsdam, Germany
- Expertises
  - intelligent transportation systems
  - energy systems
  - autonomous vehicles
  - technical solution design
  - agile coaching
- member of the management committee of InterCoML

Future working group activities

Future working group activities

1. general InterCoML Conference in Prague, Czech Republic, on April 27-30, 2026
   - plenaries, contributed talks and poster sessions
   - round table discussions
   - details will be announced in early 2026 via the Cost Action channels (= email, slack)
2. Scientific Workshop
   - control of/ML for energy systems
   - in-person event, venue: Saarbrücken, Germany
   - planned for September 2026
   - Who would like to join the organizing committee?
3. initiating a Special Issue
   - topic: learning control to state operators
   - initiating planned for 2026, submissions approx. in the following year

How to actively participate

- join us at the first InterCoML conference (Prague, April 27-30, 2026), submit a contribution
- apply for WG membership (if you haven't done, yet). If your country is not represented in the management committee, you might volunteer as a national representative.

- join the organizing committee for the Energy Systems Workshop of Working Group 3 now → send an email to Kathrin or Lars
- share ideas for invited speakers, subtopics or alike for the Energy Systems Workshop
- (for young researchers, in particular,) apply for short term scientific missions (STSM) on WG 3 topics and later report your results within the group

- share further ideas for future activities of Working Group 3 :-)

Thank you for your attendance!

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