# Robotics 2019-2020 Agenda

Nicolas Mansard

# Agenda 2019-2020

1. Geometry and inverse geometry
2. Kinematics and inverse kinematics
3. Dynamics and control
4. Optimal control and reinforcement learning

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| 7/11 | Introduction |
| 8/11 | Inverse geometry (1) -- pract.work #0 |
| 28/11 | Inverse geometry (2) – pract.work #1 |
| 5/12 | Experimental work: with Tiago -- by Olivier Stasse @ AIP |
| 6/12 | Inverse kinematics (1) |
| 12/12 | Inverse kinematics (2) -- pract.work #2 |
| 13/12 | Dynamics: simulation and control (1) |
| 20/12 | Experimental work: with Tiago – by Olivier Stasse @AIP |
| 10/1 | Dynamics: simulation and control (2) – pract.work #3 |
| 17/1 | Dynamics: actuation and control – by Thomas Flayols |
| 24/1 | Experimental work: with Open Dynamic Robot Initiative – by Thomas Flayols @ LAAS |
| 31/1 | Optimal control – pract.work #4 |
| 6/2 | Reinforcement learning – pract.work #5 |

# Paper presentation

- Geometry (28/11) ---Hanoune Hervier Bernard
  Learning the problem-optimum map: Analysis and application to global optimization in robotics, by Kris Hauser (TRO 2016)
- Kinematics (12/12) – Corderes Bhada Vachon
  Visual servo control, Part I: Basic approaches, by François Chaumette, S. Hutchinson (RAM 2016)
- Dynamics (10/1) – Debeunne Noel
  Feature-Based Locomotion Controllers, by Martin de Lasa
  Igor Mordatch, Aaron Hertzmann (TOG 2010)
- Simulation (17/1) – Niu Sun
  Staggered Projections for Frictional Contact in Multibody Systems, by D. Kaufman et al (TOG 2008)
  Interactive Simulation of Rigid Body Dynamics in Computer Graphics, by Jan Bender, Kenny Erleben , Jeff Trinkle and Erwin Coumans (STAR 2011)
- Actuation (24/1) – Creuse Arlaud Valette
  MIT Cheetah Proprioceptive Actuator Design in the MIT Cheetah: Impact Mitigation and High-Bandwidth Physical Interaction for Dynamic Legged Robots, by Patrick Wensing et al (TRO 2016)
- Trajectory optimization (31/1) – Zerah Herlmer
  A tutorial on Newton methods for constrained trajectory optimization and relations to SLAM, Gaussian Process smoothing, optimal control, and probabilistic inference, by Marac Toussaint (Book 2017)
  Multi-contact Locomotion of Legged Robots by Justin Carpentier, Nicolas Mansard (TRO 2018)
  Control-Limited Differential Dynamic Programming, by Yuval Tassa, Nicolas Mansard and Emo Todorov (ICRA 2014)
- Reinforcement learning (6/2) – Vidal Consiglieri Templier
  End-to-End Training of Deep Visuomotor Policies, by Levine, Finn, Abeel (JMLR 2017)
  Using a Memory of Motion to Efficiently Warm-Start a Nonlinear Predictive Controller by Nicolas Mansard, Andrea del Prete, Mathieu Geisert, Steve Tonneau, Olivier Stasse (ICRA 2016)
  Interactive Control of Diverse Complex Characters with Neural Networks by Igor Mordatch, Kendall Lowrey, Galen Andrew, Zoran Popovic, Emanuel Todorov (NeurIPS 2016)

# Web page of the class

- https://gepettoweb.laas.fr/index.php/Teach/Supaero2020
- Alias: https://frama.link/supaero2020
- Chat room for the class

  https://frama.link/supaero2020chat