SEMINAR ON FRONTIERS OF ROBOTICS/COMPUTER_SCIENCE RESEARCH

SPEAKER: Sylvain Calinon

TIME AND PLACE: Thursday 21 February 2019, 13:00-14:00 in INB1102.

TITLE: Robot learning from few demonstrations by exploiting the structure and geometry of data

ABSTRACT: Many human-centered robotics applications would benefit from the development of robots that can acquire new skills by interaction with humans. Such learning and adaptation challenges require the development of intuitive interfaces to acquire meaningful demonstrations, the development of movement representations that can exploit the structure and geometry of the acquired data in an efficient way, and the development of control techniques that can exploit the possible variations and coordinations in movements. Moreover, the developed models need to serve several purposes (recognition, prediction, generation), and be compatible with different learning strategies (imitation, exploration). For the reproduction of skills, these models need to be enriched with force and impedance information to enable human-robot collaboration and to generate safe and natural movements.

I will present an approach combining control, learning and Riemannian geometry to pursue such goal. I will illustrate these challenges with various applications, including robots that are close to us (human-robot collaboration, robot for dressing assistance), part of us (prosthetic hand control from EMG and tactile sensing), or far from us (teleoperation with haptic feedback of bimanual robot in deep water).

BIO: Dr Sylvain Calinon is a Senior Researcher at the Idiap Research Institute (http://idiap.ch) and a Lecturer at the Ecole Polytechnique Federale de Lausanne (EPFL). From 2009 to 2014, he was a Team Leader at the Department of Advanced Robotics, Italian Institute of Technology. From 2007 to 2009, he was a Postdoc in the Learning Algorithms and Systems Laboratory, EPFL, where he obtained his PhD in 2007. He is the author of 100+ publications and a book in the fields of robot learning and human-robot interaction, with recognition including Best Paper Awards in the journal of Intelligent Service Robotics (2017) and at IEEE Ro-Man'2007, as well as Best Paper Award Finalist at ICRA'2016, ICIRA'2015, IROS'2013 and Humanoids'2009. He currently serves as Associate Editor in IEEE Transactions on Robotics (T-RO) and IEEE Robotics and Automation Letters (RA-L). Webpage: http://calinon.ch

READINGS:

Calinon, S. and Lee, D. (2019). Learning Control. Vadakkepat, P. and Goswami, A. (eds.). Humanoid Robotics: a Reference. Springer.
http://calinon.ch/papers/Calinon-Lee-learningControl.pdf

Calinon, S. (2016). A Tutorial on Task-Parameterized Movement Learning and Retrieval. Intelligent Service Robotics (Springer), 9:1, 1-29.
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