LCIS Seminar

Wednesday, 26 January 2022 at 16:00

Rooms: D011 and Zoom

https://grenoble-inp.zoom.us/j/6496005771

Meeting ID: 649 600 5771

Passcode: 637606

16:00 - 16:15

Title: Developmental mechanisms through multi-agent interactions

Simon Gay, LCIS-Grenoble INP, CO4SYS team

16:15 - 16:30

Title: Insights on non-reciprocal antennas design

Nicolas Barbot, LCIS-Grenoble INP, ORSYS team

16:30 - 16:45

Title: Benefits of differential flatness for optimal profile generation and tracking

Huu Thinh DO, Ionela Prodan, LCIS-Grenoble INP, CO4SYS team

16:45 - 17:00

Discussions on the positioning within each team of the presented research works

See the abstracts and short bio of the presenters in the following.

Title: Developmental mechanisms through multi-agent interactions

Developmental learning is a domain that studies learning mechanisms allowing artificial agent to autonomously construct internal models and behaviors by interacting with initially unknown environments. The IDEMAS project (Implementing DEvelopmental learning in Multi-Agent Systems) is an extension of these researches and addresses the problems of collaborative behavior and language emergence by studying developmental mechanisms through multi-agent interactions. In this context, our intern conducted a preliminary study of developmental agents interacting with other agents. His work allowed to identify the limits of our current models and technical obstacles preventing the emergence of collaborative behaviors, and thus, to define the scientific challenges of first stages of the IDEMAS project.

Simon Gay is Assoc. Prof. at the Univ. Grenoble Alpes in Valence and LCIS laboratory since 2020. He obtained his Master degree in computer science in 2010 from ENSEEIHT engineering school (Toulouse). He received his PhD in Computer Science from Claude Bernard Univ. (Lyon) in 2014, in the domain of developmental learning. He was ATER from 2014 to 2016 in INSA de Lyon and IUT de Lyon. From 2017 to 2020, he was post-doctoral fellow In the LITIS at Univ. of Rouen Normandy, where he developed assistive devices for visually impaired peoples through haptic interfaces and bio-inspired navigation systems. His research interests include developmental learning, emergence of knowledge and behavior through interaction with the environment and bio-inspired navigation. His current researches include developing his learning and navigation mechanisms in multi-agent contexts.

Title: Insights on non-reciprocal antennas design

The objective of this work is to design non-reciprocal antennas based on simple RF diodes and by exploiting the difference of electromagnetic power between emission and reception. The principle relies on the presence of an RF switch driven by the power delivered to the antenna. In reception, electromagnetic field is usually weak, and is lower than the one required to activate the diodes present in the switch. In emission, the power transmitted to the antenna generates an important field which can activate the diodes and modify the state of the switch. The described antenna should be characterized by different properties in emission and reception which break the reciprocity theorem.

Nicolas Barbot received the M.Sc. degree and Ph.D. degree from the Univ. de Limoges, France. His Ph.D. work in Xlim Laboratory was focused on error-correcting codes for the optical wireless channel. He also realized a post-doctoral work in joint source-channel decoding at L2S Laboratory, Gif-sur-Yvette, France. Since Sep. 2014, he has been an Assoc. Prof. at the Univ. Grenoble Alpes - Grenoble INP, in Valence, France. His scientific background at LCIS covers wireless communications systems based on backscattering principle which include classical RFID and chipless RFID. His research interest include transponders which cannot be described by linear time-invariant systems. This gathers harmonic transponders which are based on the use of a non-linear component (Schottky diode) or linear time-variant transponders which are based on the modification of their response in the time domain. He also places special interests on antenna design and instrumentation based on these phenomenons.

Title: Benefits of differential flatness for optimal profile generation and tracking

Motion planning problems benefit greatly from the properties of differential flatness, which are widely employed for trajectory generation and controller design. This work aims to highlight the fact that various flat representations of a system can have different implications in the trajectory generation and tracking objectives. In particular, we consider a fixed-wing UAV (Unmanned Aerial Vehicle) and analyze various flat

representations. We reformulate the trajectory generation and tracking problem in terms of different flat outputs and analyze the optimal cost, constraints satisfaction, tracking error and computational complexity. Insights on the future work complete the analysis. The research shows promising directions, especially in the area of disturbance rejection and robust control.

Huu Thinh DO received the Mechatronics Engineering degree from Ho-Chi-Minh City University of Technology, Vietnam in 2021 as a top ranked student in the Mechatronics specialization. He has prepared his diploma project at LCIS-Grenoble INP. He is currently a PhD candidate within LCIS, Grenoble - INP, Valence, France. His research interests include differentially flat systems, optimization-based control and robotic systems.