Université d'Ottawa
Faculté de génie

Département de
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University of Ottawa
Faculty of Engineering

Department of
Mechanical Engineering

ELG7113/MCG5470: Machine Learning for Adaptive and Intelligent Control Systems

Project and Group Work

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Group work

- A typical group includes 4 members, with exceptions to be discussed with the course instructor.
- Students can form groups independently; the instructor will form groups with students not assigned to one.
- Group members are responsible to assign a coordinator.
- Each group is required to submit two brief summary reports and final documentation. The project documents (formatted report, source code, brief reports, any meeting minutes, etc.) are submitted electronically by using the dedicated assignment in Brightspace.
- The instructor/TA will meet with each group to guide and assess the ongoing project work.
- All group members are going to receive the same grade after evaluating their project work.
- Students are required to clearly state the authorship order (in case of any submission to publication venues). If there is any disagreement about the authorship, the instructor will meet with the group members and discuss the contributions of each member and the instructor retains the right to decide the authorship order.
- The instructor preserves the right to decide to submit the project work and any related documentations to any scientific venue and thereby handles the communications with such venues.

Project

The project focuses on a specific structured dynamical system that each group need to discuss with the instructor. A preliminary, brief description of the selected system has to be submitted separately in pdf format at the beginning of the semester.

The project submission should be formatted either as a standard report, or as a journal article using your preferred template (i.e. IEEE Transactions, ASME, SIAM, etc.). It should be structured as follows:

- State the course title, authors in appropriate order (see above), and a title for the project. Alphabetic order for authorship is acceptable if all members contributed equally.

- Description of the system and eventual contextualization into an engineering and/or technological framework.
- Modeling assumptions and derivations. Include sufficient equations to make the derivations clear, and define all the symbols that you introduce. You can use a symbolic manipulation software to carry out some of the calculations, in which case you should attach the relevant material as Appendix or as additional material.
- Derivations should involve a system identification process (i.e., using RLS, ...), a mix of control loops (i.e., feedback control laws for stability, tracking control laws), derivation of stability using Lyapunov's framework, Reinforcement Learning implementation of the underlying Bellman or Hamiltonian functions. Not all elements just listed need to be part of the project; however, the structure needs to be coherent and involve some or all the topics, appropriately applied to the system chosen by the group.
- Results and related discussion.
- Conclusion.

Extra credit

Extra credit (up to 15%) will be given for exceptional project work. Exceptional signifies, publishable well-written and organized article, solid theoretical derivations, if any, complex simulation test scenarios, informative analysis of the simulation results, use of robotics or advanced simulation tools, etc.

Sufficiently novel results not related to students' thesis work may be submitted for publication.