Multi-Agent Reinforcement Learning for Unmanned Aerial Vehicles (UAVs)

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Master’s thesis

Goal of the Thesis: We propose a Master’s thesis topic at the intersection of multi-agent reinforcement learning (MARL) and unmanned aerial vehicles (UAVs) with applications to wireless communication networks. Multi-agent systems are in general complicated to deal with. Recent studies in deep reinforcement learning (DRL) have shown promise in tackling these difficulties. However, DRL-based solutions usually suffer from long training times and lack of sample efficiency, which are still open problems. This Master’s thesis specifically targets multi-agent UAV systems in wireless networks for different applications ranging from collaborative path planning to sensing and localization. During this thesis, the student will have the opportunity to work on machine learning and reinforcement learning and their applications in robotics and wireless communications.

Practical Conditions: The work for this thesis will be carried out at EURECOM (https://www.eurecom.fr/en), a partner research institute of TUM in the French Riviera, near Antibes and Nice. Successful applicants will be offered an intern position at EURECOM for the duration of the thesis (6 months) as part of an industry-funded research project. The student will have a team of PhD students and researchers providing interactions and a motivating work atmosphere. The starting date is flexible and can be discussed. A financial compensation will be provided to the student. The work will be supervised by Omid Esrafilian and Prof. David Gesbert on the EURECOM side, and Harald Bayerlein and Prof. Marco Caccamo on the TUM side.

Technical Context: The involved research groups at TUM and EURECOM already have an established track record in related research projects, see e.g.

This position is at the crossroad of several areas such that the position is open to different profiles of high-achieving students. Technical expertise should include some of the following domains:
Computer science, electrical engineering, robotics, machine learning, wireless communications, or similar fields.

Mandatory:
- Some familiarity with deep reinforcement learning
- Programming experience (e.g. Python, Matlab, …)

Helpful:
- Some experience with TensorFlow or PyTorch

Application documents:
- CV
- TUM grade report
- Short cover letter/email highlighting relevant previous experience (especially research projects, practical experience related to skills mentioned above)

Please send your application to omid.esrafilian@eurecom.fr and h.bayerlein@tum.de with the subject [MSc thesis TUM/EURECOM]. Feel free to contact us in case you have questions.

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https://rtsl.cps.mw.tum.de/theses