

# Multi Agent Reinforcement Learning Framework

**Description** Recent successes in Reinforcement Learning have shown the potential of the underlying principles for the learning of behavioral policies. Multi-Agent Reinforcement Learning (MARL) additionally considers the cooperation or competition between multiple agents acting simultaneously while sharing some information about their environment (e.g. for cooperative autonomous driving).

In scenarios where an agent is part of a complex system and is not able to recognize and observe all interactions, multiple agents may profit from each other in an emergent way. Furthermore, in scenarios where multiple agents naturally occur, MARL is more robust than communication with a central decision-making entity. On the other hand, decentralized decision-making usually cannot reach a global optimum in the joint decisions. Reducing this gap is the subject of a very active research community.

This "Praxis der Forschung" project firstly aims to develop a software framework with reusable components to quickly implement, benchmark and iterate Multi Agent Reinforcement Learning algorithms. Furthermore the framework makes benchmark scenarios from the literature available with a common interface. Secondly the project aims at the development of a novel MARL algorithm based on the principle of Utility Propagation that was recently published in a different context.

## Requirements

- Strong analytic capabilities
- Background in Computer Science or related fields
- Interest in the subject of Multi-Agent Reinforcement Learning
- Experience in scientific programming (e.g. Matlab or Julia) is a plus

**Contact** Vision and Fusion Laboratory (IES)

Dr.-Ing. Julius Pfrommer (julius.pfrommer2@kit.edu,

Prof. Dr.-Ing. habil. Jürgen Beyerer (juergen.beyerer@iosb.fraunhofer.de)