NANYANG TECHNOLOGICAL UNIVERSITY
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School of Computer Science and Engineering
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Multi-Agent Deep Deterministic Policy Gradient Algorithm

For Swarm Systems

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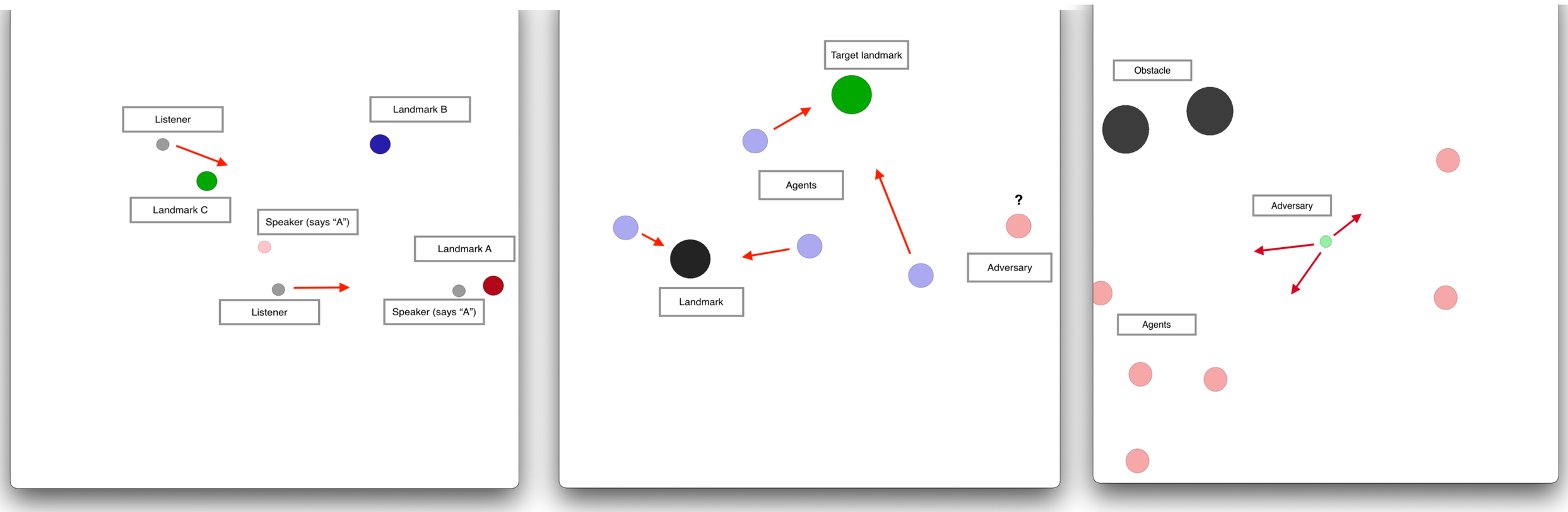
Project Objectives:

Reinforcement Learning (RL) is currently one of the most researched topics all around the globe. However, most of its success lies in single agent domains, which is why we are still far from developing artificial agents capable of demonstrating human-like adaptive behavior, and open-ended learning as numerous essential applications involve multiple agents and swarm systems. This is mainly due to traditional reinforcement learning approaches such as Q-learning or policy gradient being poorly suited to multi-agent environments. Thus, this paper puts forward an existing general-purpose multi-agent learning algorithm, known as the Multi-Agent Deep Deterministic Policy Gradient Algorithm (MADDPG), and further extends it to swarm systems via parameter tuning. The feasibility of the said algorithm is tested throughout the implementation of the algorithm for swarm systems for various environments such as: *Cooperative communication, Cooperative navigation, Keep-away, Physical deception, Predator prey, and Covert communication.*



Swarm systems implementation of MADDPG for various environments (From left to right: cooperative communication, physical deception, and pr4editor prey)