1. K. Zhu, B. Li, W. Zhe and T. Zhang, "Collision Avoidance Among Dense Heterogeneous Agents Using Deep Reinforcement Learning," in IEEE Robotics and Automation Letters, vol. 8, no. 1, pp. 57-64, Jan. 2023, doi: 10.1109/LRA.2022.3222989.

The paper uses Deep Reinforcement Learning (DRL) to achieve collision avoidance among dense heterogeneous agents. The authors propose a new reward function that considers the velocity-related collision risk to shape the behavior of the robot. They also use Oriented Bounding Capsules (OBC) to model the agents and transform their interactive state space. The proposed method is general and can be used to enhance nearly all agent-level DRL-based navigation algorithms.

1. L. Kästner et al., "Connecting Deep-Reinforcement-Learning-based Obstacle Avoidance with Conventional Global Planners using Waypoint Generators," 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Prague, Czech Republic, 2021, pp. 1213-1220, doi: 10.1109/IROS51168.2021.9636039.

This paper proposes a method to connect Deep-Reinforcement-Learning-based obstacle avoidance with conventional global planners using waypoint generators. The Deep Reinforcement Learning approach is used to train an agent to navigate in unknown environments based solely on sensor observations. By integrating different waypoint generators into existing navigation systems, the proposed method achieves collision avoidance in highly dynamic environments.

1. H. -C. Wang et al., "Curriculum Reinforcement Learning From Avoiding Collisions to Navigating Among Movable Obstacles in Diverse Environments," in IEEE Robotics and Automation Letters, vol. 8, no. 5, pp. 2740-2747, May 2023, doi: 10.1109/LRA.2023.3251193.

In this paper, the authors use reinforcement learning to train agents to navigate through environments while avoiding collisions with static, dynamic, and movable obstacles. They define a dense reward function that encourages the agent to move towards the goal while avoiding collisions simultaneously. The reward function includes terms for heading towards the goal, reaching the goal, maintaining movement, and avoiding collisions with both static and dynamic obstacles. The authors also propose a curriculum learning approach to train the agents in a sequence of sub-tasks, starting from simple tasks and gradually increasing the difficulty level. By using this approach, the agents can learn to avoid collisions in a variety of environments, including those with movable obstacles.

1. Y. Liu, Z. Cao, H. Xiong, J. Du, H. Cao and L. Zhang, "Dynamic Obstacle Avoidance for Cable-Driven Parallel Robots With Mobile Bases via Sim-to-Real Reinforcement Learning," in IEEE Robotics and Automation Letters, vol. 8, no. 3, pp. 1683-1690, March 2023, doi: 10.1109/LRA.2023.3241801.

In this paper, the authors propose a Reinforcement Learning (RL)-based dynamic obstacle avoidance method for a Cable-Driven Parallel Robot (CDPR) with Mobile Bases (MBs) to deal with dynamic obstacles in real time . They develop an RL-based Obstacle Avoidance Controller (OAC) and integrate it into a trajectory tracking controller to address the dynamic obstacle avoidance problem of a CDPR with MBs tracking a target trajectory. The RL-based OAC is trained in a Mujoco simulator and transferred to a CDPR with four fixed-length cables connected to four MBs in the real world .

1. C. Bai, P. Yan, W. Pan and J. Guo, "Learning-Based Multi-Robot Formation Control With Obstacle Avoidance," in IEEE Transactions on Intelligent Transportation Systems, vol. 23, no. 8, pp. 11811-11822, Aug. 2022, doi: 10.1109/TITS.2021.3107336.

This paper proposes a framework with two layers based on deep reinforcement learning (DRL) to enable multi-robot systems to independently change formation and avoid collisions with obstacles . The execution layer enables the robot to approach its target position and avoid collision with other robots and obstacles through a deep network trained by a reinforcement learning method. The decision-making layer organizes all robots into a formation through a new leader–follower configuration and provides target positions to the leader and followers.The proposed framework is evaluated through simulations and experiments, and the results show that it can effectively enable multi-robot systems to avoid collisions with obstacles and change formation in different environments .

1. T. Zhang, Z. Liu, Z. Pu and J. Yi, "Multi-Target Encirclement with Collision Avoidance via Deep Reinforcement Learning using Relational Graphs," 2022 International Conference on Robotics and Automation (ICRA), Philadelphia, PA, USA, 2022, pp. 8794-8800, doi: 10.1109/ICRA46639.2022.9812151.

This paper proposes a novel decentralized method based on deep reinforcement learning using robot-level and target-level relational graphs to solve the problem of multi-target encirclement with collision avoidance (MECA) . The proposed method uses a knowledge-embedded compound reward function to guide policy learning and solve the multi-objective problem in MECA. The reinforcement learning algorithm used in this approach is the actor-critic training algorithm, which is a popular method for solving continuous control problems .