Multi-Agent Naval Traffic Planning

Realistic-looking multi-agent ship navigation is an unsolved problem affecting many computer games. Using simple path-finding techniques on ships with realistic movement constraints often lead to inefficient and unrealistic movement where ships often get stuck. That’s why, in most games, the ship’s movement restrictions are lifted to an unsatisfying level, where the impression of mass and kinetic energy is completely lost. While in open water, agents can move efficiently by only following simple evasion rules, the problem becomes complex when navigation in limited space is required. In these situations the movement of multiple agents needs to be coordinated.

The main goal of this thesis is to implement an open source library for ship traffic planning. The task is to find, implement, test and compare different approaches to efficiently compute approximately optimal multi-agent ship navigation. Given nothing but a height map and set of ships with individual targets, hundreds of agents should be able to move in limited space and be able to reach their destination efficiently. The library will be integrated with the game engine of the video game *Transport Fever* for visualization purposes.

**Requirements:** Creativity and knowledge of path-finding techniques. The student(s) should be able to work independently on this topic!