In this thesis, the landing site detection system of a novel lander concept for asteroid exploration is considered. The primary design features of the lander are multiple relocations on the target body’s surface via powered flight. The reliability of the overall system is to be increased by developing an emergency landing system for scenarios in which e.g. the navigation solution fails to converge to a reliable solution. Therefore, a guidance system based on the direct measurements of the Flash LiDAR sensors is desirable, since they are available even if the navigation solution is lost and do not accumulate uncertainties.

Goals of the thesis:
- Literature review of applicable RL algorithms and state of the art approaches for sensor-based landing
- Creation of a simulation environment with the interface of Open AI gym environments in Python
  - Implementation of system dynamics in Matlab/Simulink
  - Integration of dedicated flash LiDAR sensor in the simulation
  - Definition of interfaces for states and commanded actions
- Implementation of selected RL algorithms and training of respective RL agents in the developed simulation environment
- Critical reflection on the selected approaches

Requirements:
- Excellent performance in Master lectures
- Experience in machine learning / neural networks / reinforcement learning / sensor-based planning is beneficial
- Programming experience with Python, PyTorch, and Matlab/Simulink is beneficial

The publication of the results is envisaged.

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