The thesis concerns with the implementation of a 3D environment editor with path-planning functionality and Parrot AR.Drone quadrocopter control, named Drone3D. It explores the principles of creating real-time applications and drawing 3D graphics in DirectX, followed by the implementation of 3D graphics and user interface of the editor. Then multiple path-planning solutions are examined — algorithms and environment representation options. It is determined that the best approach is to represent the environment as a grid of cubes and use the *Lazy Theta** path-planning algorithm. This system is then implemented as a part of the editor. Finally, experiments with the Parrot AR.Drone follow and a basic method of navigating the aircraft using a given or algorithmically found path is created. The method is implemented as apart of the editor and multiple tests are performed to verify and review the solution.