Autonomous Drone for Surveillance

Davit Mirzoyan

Supervisor: Julier Simon
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Abstract

The main purpose of this project is to develop algorithms that will help the drone to automatically identify and track objects without human interaction. Algorithms were tested inside the simulation in two different environments, to check how well they perform. The first environment contains only moving objects, while the second environment also contains obstacles. We developed path planning and obstacle avoidance algorithms to avoid the drone's collision with barriers while flying to the specified position. Furthermore, this project uses two different methods to identify moving objects. In the environment where there are only moving objects, we use the Edge detection technique to determine the object's edges in the drone's camera data. For the second environment, a deep learning model was created which differentiates between obstacles and moving objects, so the drone will know which direction to fly in. Finally, the Kmeans Clustering Algorithm was used to identify the moving objects' color, which allows to differentiate between the objects based on their color.

This project provided an opportunity to understand Robotics and Artificial Intelligence more in depth. Toward the end of the project, the drone was able to differentiate between moving objects, choose the required target and track them and at the same time plan its movement to a certain position by keeping a strict distance from obstacles.