Dronedash 2023

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GOAL

The objective of Drone Dash is to design an obstacle avoidance algorithm for a drone. There is an onboard colour and depth camera which can be used for this task. You may use any algorithm you like. The goal is to reach the end of the track in the shortest time possible with as few collisions as possible.

The drone should land once it detects an Aruco marker below it (present at the end of the obstacle course).

TOOLS

Dev Environment

We will be developing the algorithm for use with the PX4 Autopilot Stack in ROS. The PX4 Autopilot is a flight control software stack for drones. ROS is a robotics middleware that provides a set of tools and libraries for developing robot applications.

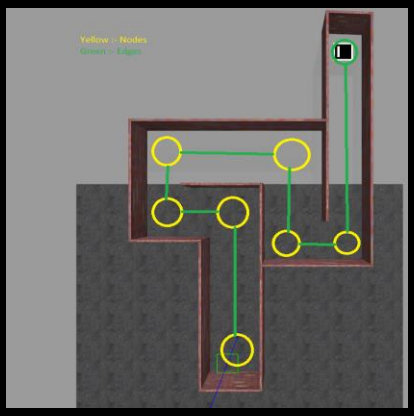
You will be using the Gazebo simulator to test your algorithm. Gazebo is a 3D robotics simulator that provides a physics engine, high-quality graphics, and convenient programmatic and graphical interfaces.

Drone

Model drone used in simulation is Iris drone provided by gazebo which is equipped with a depth camera

APPROACH

A graph data structure will be used by the drone to store the grid with node indicating intersections with the location data of the intersection and weighted edges will be used to connect those nodes. Graph will be updated as drone explore the grid



Drone will first start with an empty graph then after take off it will rotate 90-degree four time and finding paths using its depth camera and insert them in to the graph

Then it will choose one of path and explore the maze using depth first search and right first approach to traverse the maze using its depth camera to find intersections and dead ends

IMPLEMENTATION

The code is written in python using rospy library and depth detection is implemented using cv2 library

Graph is implements using adjacency list