Parking Space Search and Vehicle Guidance Technology in Parking Lots with Quadrotor Unmanned Aerial Vehicle

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The scale of a parking lot is huge in urban areas nowadays, so it’s getting harder to find a vacant parking place and to get back to your car after parking. The current intelligent parking system involves complex construction, and is not widely applied due to high costs. My solution to this problem includes the following steps. 1. Place the parking lot (regular and irregular) into a planar coordinate system with grids and pack adjacent parking places into standardized units. 2. Use the Connective Map Algorithm on the principle of minimum turns to plan the cruise route of the UAV. Employ the ultrasonic sensors on the Quadrotor UAV to detect the status of each parking place. 3. Find the shortest path for each request from the entering user based on Breadth-First Search. Then the UAV will fly ahead of the vehicle to lead it to the intended parking place. 4. Guide the leaving user to his vehicle and lead the vehicle to the exit with the same method described in Step 3. I have designed, built and tested four generations of UAVs. The latest generation with folding structure is able to satisfy the task requirements. Compared with the traditional intelligent parking system, this UAV solution is able to cut the cost by approximately 95%. Compared with the traditional way of unassisted parking, this UAV solution saves at most 83% of the time and energy consumed. Through further research, it will be able to develop into the new type of “Air Police”, which can be widely applicable.

Awards Won:
Fourth Award of $500