

BACHELOR PROJECT ASSIGNMENT

Student: Matěj Račinský

Study programme: Cybernetics and Robotics

Specialisation: Robotics

Title of Bachelor Project: RRT-Path Method Used for Cooperative Surveillance by Group of Helicopters

Guidelines:

The aim of the thesis is to design, develop and experimentally verified a motion planning algorithm for simultaneous solving the problems of optimal coverage and deployment (defined in [3]) in autonomous surveillance by a team of Micro Aerial Vehicles (MAVs).

Work plan:

- To implement the motion planning algorithm RRT-path [1,2] and to extend it for solving the problem of autonomous cooperative surveillance by MAVs relatively localized using the onboard system [5].
- To integrate method in [4] for straightening out trajectories obtained by the RRT-path based algorithm.
- To verify the implemented system in V-REP robotic simulator.
- To adapt the system for using with platforms of Multi-Robot Systems group at CTU and to prepare a set of trajectories for experimental evaluation of their feasibility by real MAVs.

Bibliography/Sources:

- [1] V. Vonasek, J. Faigl, T. Krajník and L. Preucil. A Sampling Schema for Rapidly Exploring Random Trees Using a Guiding Path. In Proceedings of the 5th European Conference on Mobile Robots. 2011.
- [2] V. Vonasek, J. Faigl, T. Krajník and L. Preucil. RRT-Path: a guided Rapidly exploring Random Tree. In Robot Motion and Control. 2009.
- [3] M. Saska, J. Chudoba, L. Preucil, J. Thomas, G. Loianno, A. Tresnak, V. Vonasek and V. Kumar. Autonomous Deployment of Swarms of Micro-Aerial Vehicles in Cooperative Surveillance. In Proceedings of International Conference on Unmanned Aircraft Systems (ICUAS). 2014.
- [4] L. Dubins. On curves of minimal length with a constraint on average curvature, and with prescribed initial and terminal positions and tangents. American Journal of Mathematics, 79(3):497–516, July 1957.
- [5] T. Krajník, M. Nitsche, J. Faigl, P. Vanek, M. Saska, L. Preucil, T. Duckett and M. Mejail. A Practical Multirobot Localization System. Journal of Intelligent & Robotic Systems 76(3-4):539-562, 2014.

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