MPC-MAP Assignment No. 4 - Report

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Task 1 – Preparation

Figure 1 - Designed trajectory

Discussion: The trajectory between the starting pose [2,2,π/2] and the goal location [16,2] was implemented. Also in the student_workspace function was implemented an initialization procedure to determine the initial position (average) and the covariance matrix of the GNSS.

Task 2 – EKF implementation

Discussion: Functions ekf_predict and kf_correct were implemented.

Task 3 – Filter tuning with a known initial pose

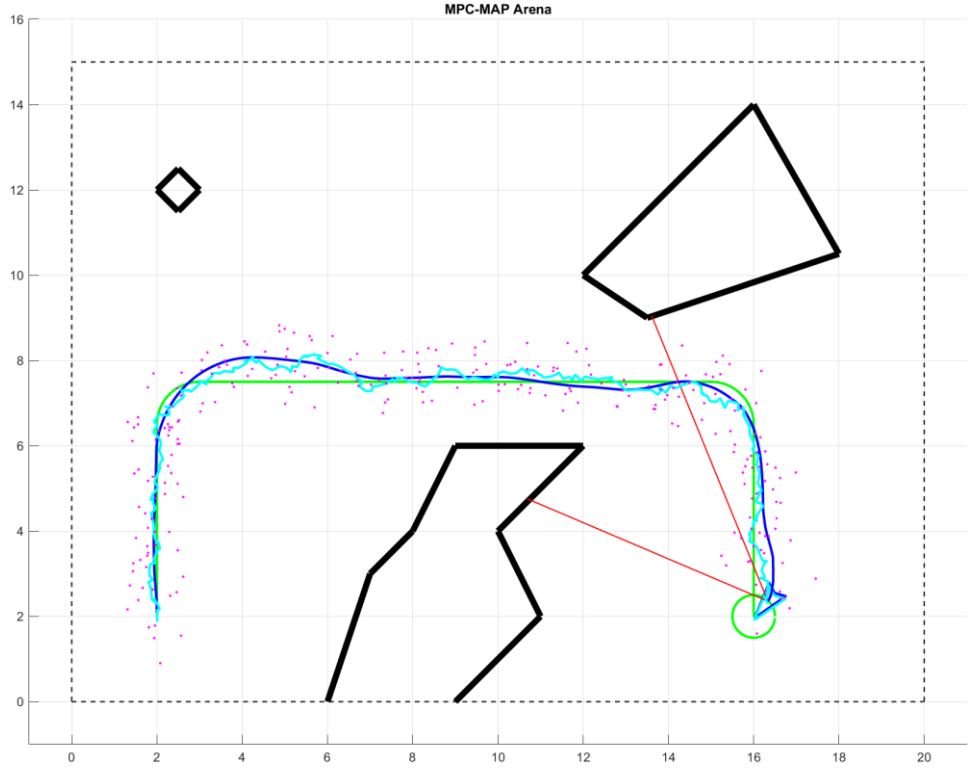

Figure 2 - Navigating the robot to the goal position with tuned R matrix

Discussion: The initial pose was set to x = [2,2,π/2] and used, along with Σ initialized to zeros. Only the EKF-based estimated pose was utilized for control. The matrix R was tuned to the parameters [0.005, 0.005, 0.005].

Task 4 – Algorithm deployment

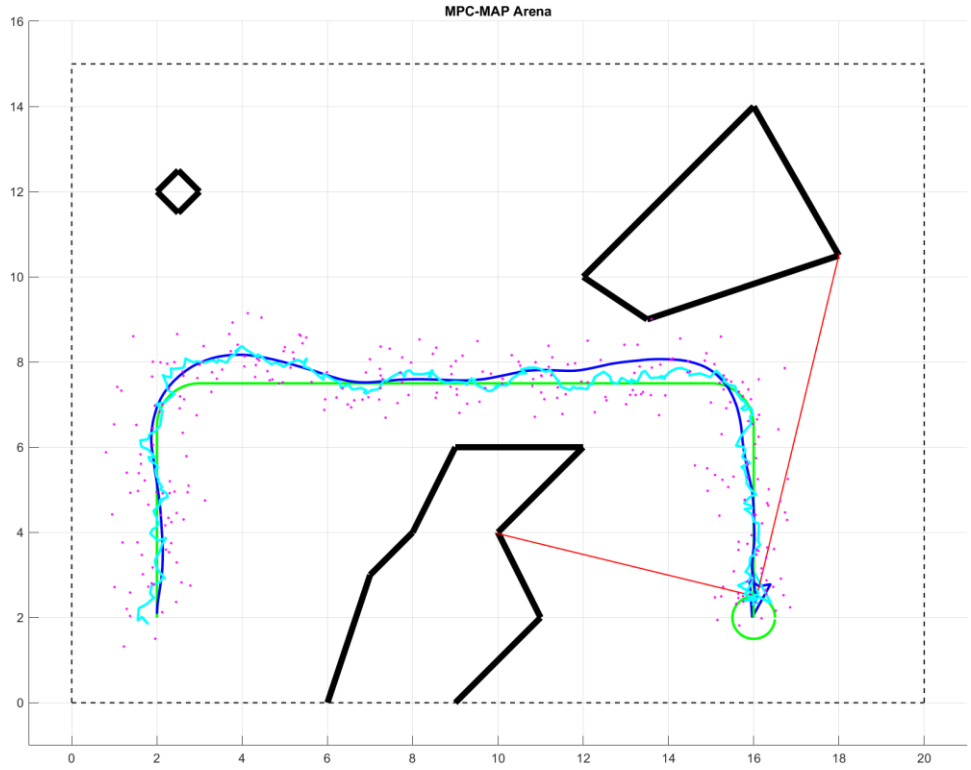

Figure 3 - Navigating the robot to the goal position with tuned R matrix, for orientation was set high variance

Discussion: To determine the initial belief for the EKF, the initialization procedure from Task 1 was utilized. Within the initial belief, a high variance of 2 was specified for the orientation.