11.4 Design Project

The objective of this assignment is to implement algorithms 5 and 6 for following a set of waypoints denoted as W, and algorithms 7 and 8 for following a set of configurations denoted as P. The input to the path manager is either W or P, and the output is the path definition.

$$y_{manager} = \begin{pmatrix} flag \\ V_a^d \\ \underrightarrow{r} \\ q \\ c \\ \rho \\ \lambda \end{pmatrix}$$

11.1. Modify `path_manager_line.m` to implement algorithm 5 to follow the waypoint path defined in `path_planner_chap11.m`. Test and debug the algorithm on the guidance model given in equation (9.18). When the algorithm is working well on the guidance model, verify that it performs adequately for the full six-DOF model.

11.2. Modify `path_manager_fillet.m` and implement algorithm 6 to follow the waypoint path defined in `path_planner_chap11.m`. Test and debug the algorithm on the guidance model given in equation (9.18). When the algorithm is working well on the guidance model, verify that it performs adequately for the full six-DOF model.

11.3. Modify `path_manager_dubins.m` and implement algorithms 7 and 8 to follow the path configuration defined in `path_planner_chap11.m`. Test and debug the algorithm on the guidance model given in equation (9.18). When the algorithm is working well on the guidance model, verify that it performs adequately for the full six-DOF model.

Tip

- $R_z(\theta) = \begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$ and $\langle\theta\rangle = \mathrm{mod}(\theta, 2\pi)$