\<Car kinematic model\>

$$\dot{\xi} = V\cos(\varphi)$$

$$\dot{\eta} = V\sin(\varphi)$$

$$\dot{\varphi} = \frac{V}{L}\tan(\delta_{cmd})$$

$$\dot{V} = a_{cmd}$$

- **Input constraints**

$$-25° < \delta_{cmd} < 25°$$

$$-3 < a_{cmd} < 3$$

$$-25°/sec < \Delta\delta_{cmd} < 25°/sec$$

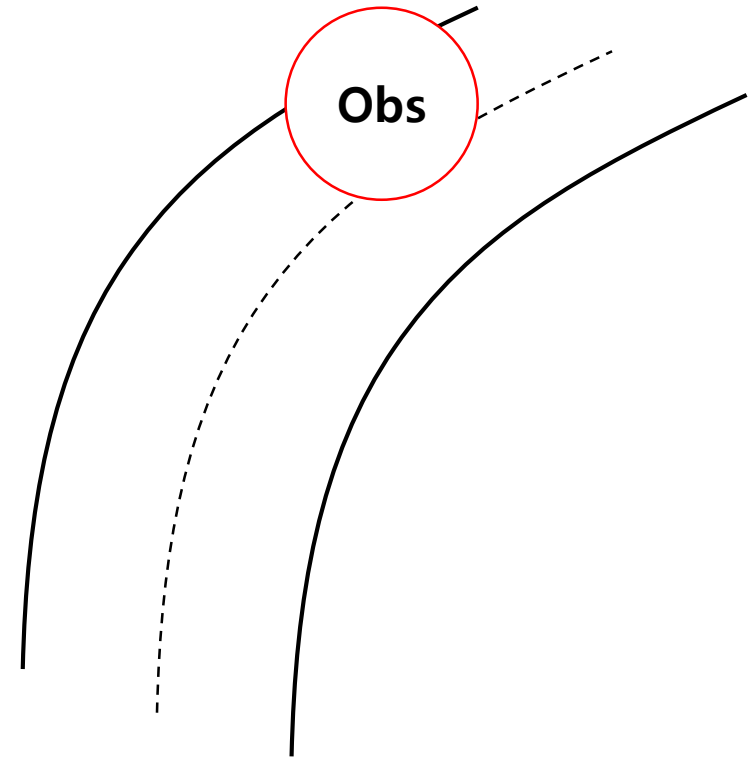$$-3/sec < \Delta a_{cmd} < 3/sec$$

(ξ, η) : *position in Cartesian coordinate*

φ : *yaw angle of vehicle*

V : *velocity of vehicle*

δ_{cmd} : *wheel steering angle*

a_{cmd} : *longitudinal acceleration*

Obs

- Lane tracking and obstacle avoidance with Model Predictive Control

- Solver is generated by ACADO toolkit

  https://acado.github.io/