

# Time-Optimal Trajectory Generation for Dynamic Vehicles: A Bilevel Optimization Approach

- Goal: Find minimum-time trajectories for cars/drones in piecewise convex safe corridor.

- Method

- Decision variables:

- $c$ : Piecewise Bézier curve (spatial part)
- $T$ : Traversal time (temporal part)

- Bilevel Optimization Formulation  
minimize  $T$

subject to  $c \in X_{\text{free}}$  Linear constraint on  $c$ .

$T \in \text{TOPP}(c)$  Time-optimal Path Parameterization: a convex optimization.

- TOPP is solved by a custom nonlinear convex solver (sparsity pattern exploited)

- Results

- Less constraint violation than IPOPT
- Lower cost than SNOPT

