

Task Space Diffusion Prior



Grasp Prediction
(Sec. 5.1)



Visuomotor Control
(Sec. 5.2)

Kinematic Grounding

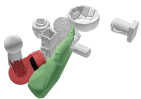


7 DoF



6 DoF

Task Objectives



Collision
Avoidance



Dynamic
Feasibility

DDIM Sampling



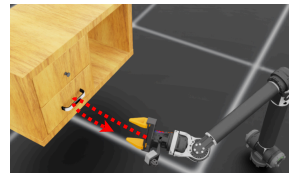
$$x_K \rightarrow x_{K-1} \rightarrow \dots \rightarrow x_1 \rightarrow x_0$$

$$x_{k-1} = \mu_{\theta}(x_k, k) + \delta_k$$

Optimization Guided Perturbation

Compute minimal perturbation δ_k such that task costs $J(x_k)$ are minimized and problem is feasible $x_0 \in \mathcal{X}_{\text{target}}$

$$\begin{aligned} \min_{x_K, \{\delta_k\}_{k=1}^K} \quad & \sum_{k=1}^K \frac{1}{2} \|\delta_k\|_2^2 + \sum_{k=0}^K \beta_k J(x_k) \\ \text{s.t.} \quad & x_{k-1} = \mu_{\theta}(x_k, k) + \sigma_k \delta_k, \quad k = K, \dots, 1 \\ & x_0 \in \mathcal{X}_{\text{target}} \\ & x_K \in \mathcal{X}_{\text{init}} \end{aligned}$$



Visuomotor Control



Dexterous Grasping