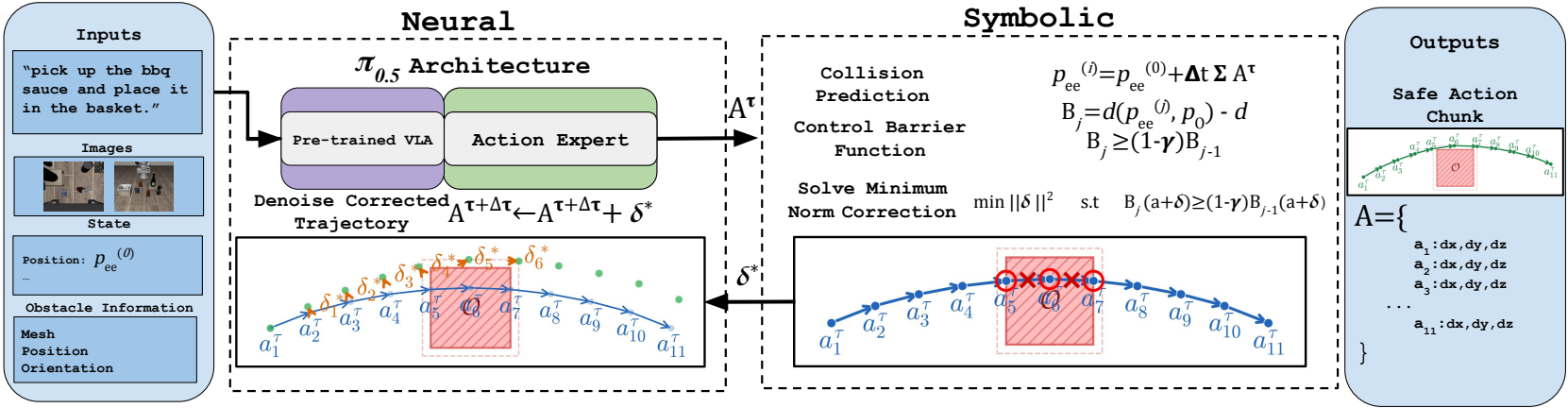
Inputs
"pick up the bbq sauce and place it in the basket."
Images
State
Position: $p_{ee}^{(t)}$
Obstacle Information
Mesh
Position
Orientation
Neural
$\pi_{0.5}$ Architecture
Pre-trained VLA
Action Expert
A^{τ}
Denoise Corrected Trajectory
$A^{\tau+\Delta\tau} \leftarrow A^{\tau+\Delta\tau} + \delta^*$
δ_1^* δ_2^* δ_3^* δ_4^* δ_5^* δ_6^*
a_1^{τ} a_2^{τ} a_3^{τ} a_4^{τ} a_5^{τ} a_6^{τ} a_7^{τ} a_8^{τ} a_9^{τ} a_{10}^{τ} a_{11}^{τ}
δ^*
Symbolic
Collision Prediction
$p_{ee}^{(j)} = p_{ee}^{(0)} + \Delta t \, \Sigma \, A^{\tau}$
Control Barrier Function
$B_j = d(p_{ee}^{(j)}, p_0) - d$
$B_j \geq (1-\gamma) B_{j-1}$
Solve Minimum Norm Correction
$\min ||\delta||^2$ s.t $B_j(a+\delta) \geq (1-\gamma) B_{j-1}(a+\delta)$
Outputs
Safe Action Chunk
$A = \{$
a_1:dx,dy,dz
a_2:dx,dy,dz
a_3:dx,dy,dz
...
a_{11}:dx,dy,dz
$\}$