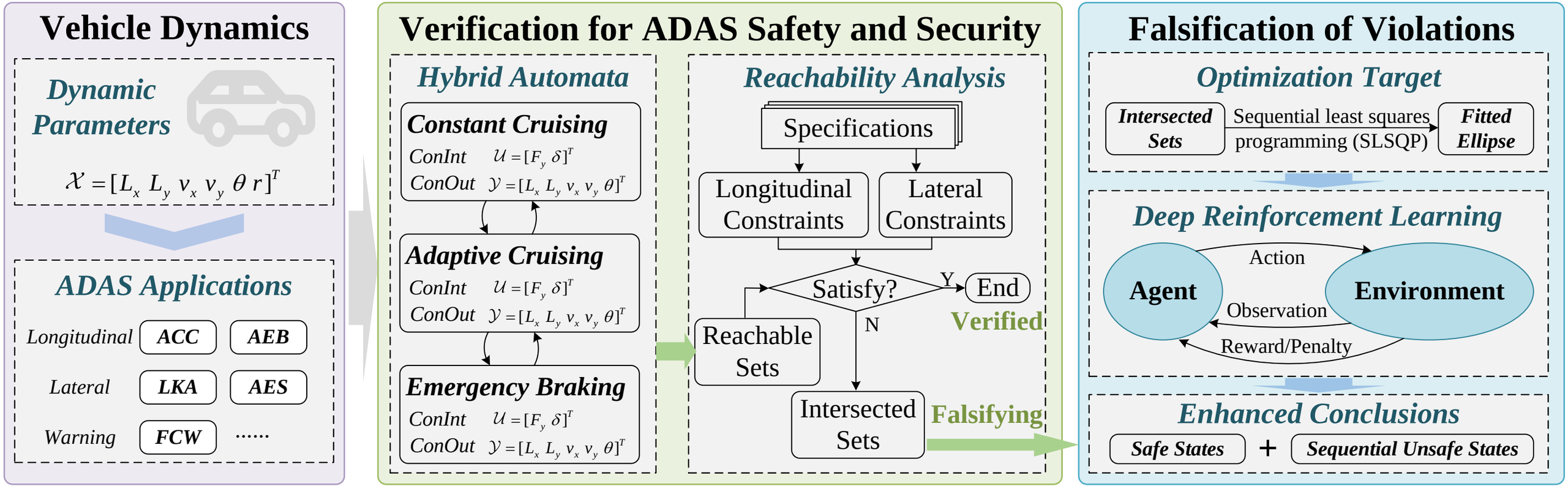
Vehicle Dynamics
Dynamic Parameters
$\mathcal{X} = [L_x\ L_y\ v_x\ v_y\ \theta\ r]^T$
ADAS Applications
Longitudinal
ACC
AEB
Lateral
LKA
AES
Warning
FCW
.....
Verification for ADAS Safety and Security
Hybrid Automata
Constant Cruising
ConInt $\mathcal{U} = [F_y\ \delta]^T$
ConOut $\mathcal{Y} = [L_x\ L_y\ v_x\ v_y\ \theta]^T$
Adaptive Cruising
ConInt $\mathcal{U} = [F_y\ \delta]^T$
ConOut $\mathcal{Y} = [L_x\ L_y\ v_x\ v_y\ \theta]^T$
Emergency Braking
ConInt $\mathcal{U} = [F_y\ \delta]^T$
ConOut $\mathcal{Y} = [L_x\ L_y\ v_x\ v_y\ \theta]^T$
Reachability Analysis
Specifications
Longitudinal Constraints
Lateral Constraints
Satisfy?
Y
End
Verified
N
Reachable Sets
Intersected Sets
Falsifying
Falsification of Violations
Optimization Target
Intersected Sets
Sequential least squares programming (SLSQP)
Fitted Ellipse
Deep Reinforcement Learning
Agent
Action
Environment
Observation
Reward/Penalty
Enhanced Conclusions
Safe States
+
Sequential Unsafe States