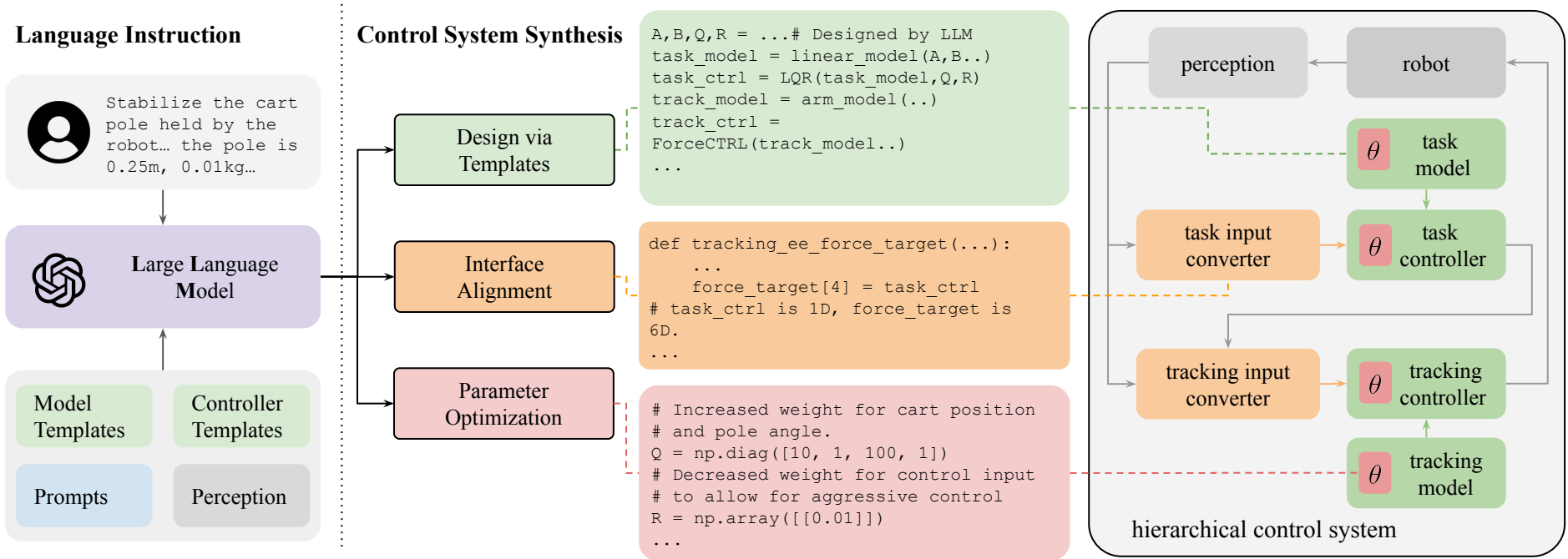
Language Instruction
Stabilize the cart pole held by the robot… the pole is 0.25m, 0.01kg…
Large Language Model
Model Templates
Controller Templates
Prompts
Perception
Control System Synthesis
Design via Templates
Interface Alignment
Parameter Optimization
A,B,Q,R = ...# Designed by LLM
task_model = linear_model(A,B..)
task_ctrl = LQR(task_model,Q,R)
track_model = arm_model(..)
track_ctrl = ForceCTRL(track_model..)
...
def tracking_ee_force_target(...):
...
force_target[4] = task_ctrl
# task_ctrl is 1D, force_target is 6D.
...
# Increased weight for cart position
# and pole angle.
Q = np.diag([10, 1, 100, 1])
# Decreased weight for control input
# to allow for aggressive control
R = np.array([[0.01]])
...
perception
robot
θ
task model
task input converter
θ
task controller
tracking input converter
θ
tracking controller
θ
tracking model
hierarchical control system