Past week

- Re-implmented LQR with Matrix Q=0 rather than Identity Matrix, since we want to follow the trajectory x* rather than the action u*.

- Implemented (A*-based)LQR closed-loop control for Reacher (3 goal locs)

LQR Ext5: Trajectory Following for Non-Linear Systems

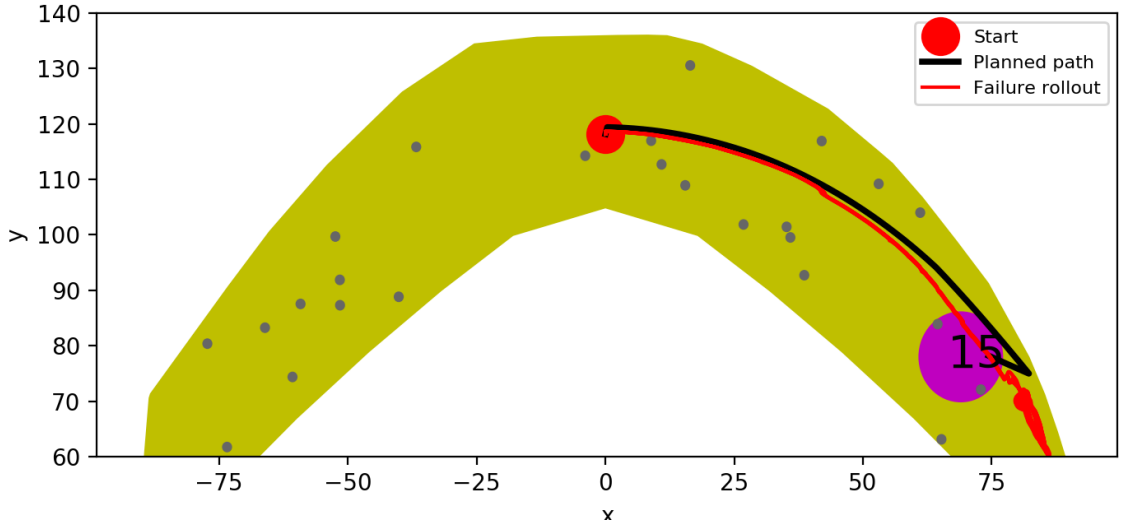
- Transformed into linear time varying case (LTV):

$$\min_{u_0,u_1,\ldots,u_{H-1}} \sum_{t=0}^{H-1} (x_t - x_t^*)^\top Q (x_t - x_t^*) + (u_t - u_t^*)^\top R (u_t - u_t^*)$$

$$\text{s.t. } x_{t+1} - x_{t+1}^* = A_t (x_t - x_t^*) + B_t (u_t - u_t^*)$$

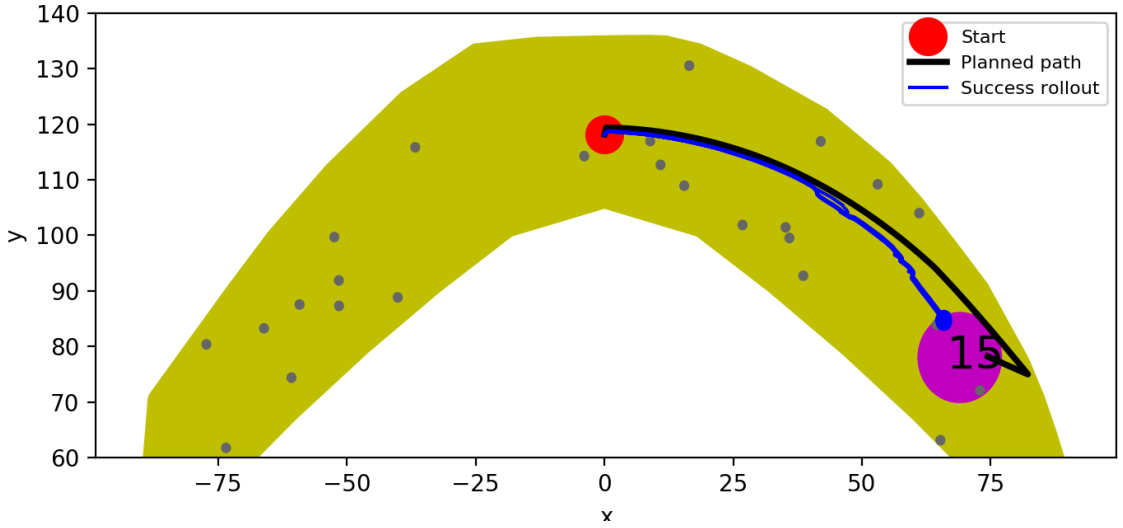
Gazebo Hand: Goal Reach Rate

Goal Location	0	2	7	8	15
A*	0%	100%	100%	0%	0%
LQR(Q=E)	0%	100%	100%	100%	100%
LQR(Q=0)	100%	100%	100%	100%	100%

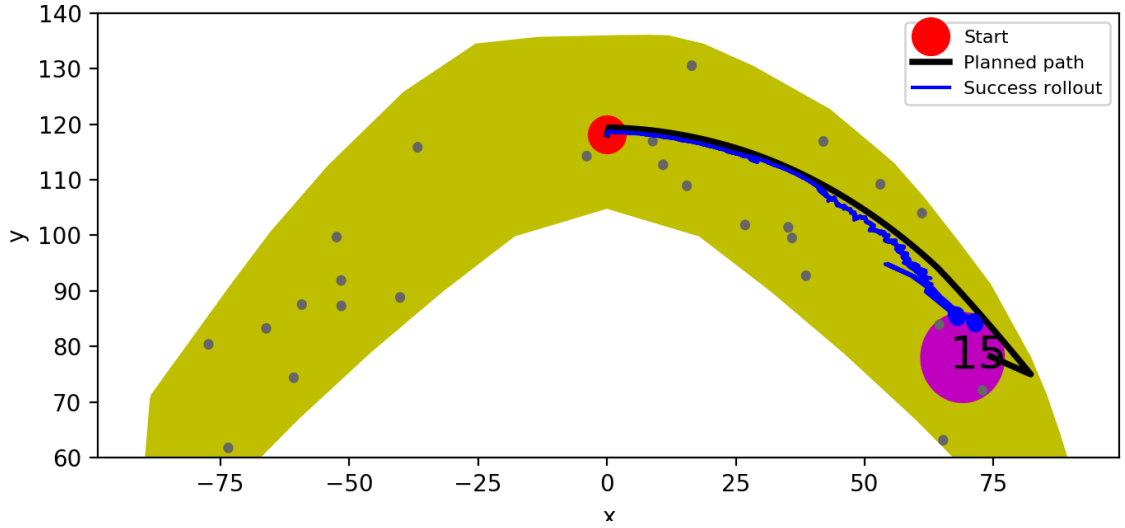


Goal Location 15

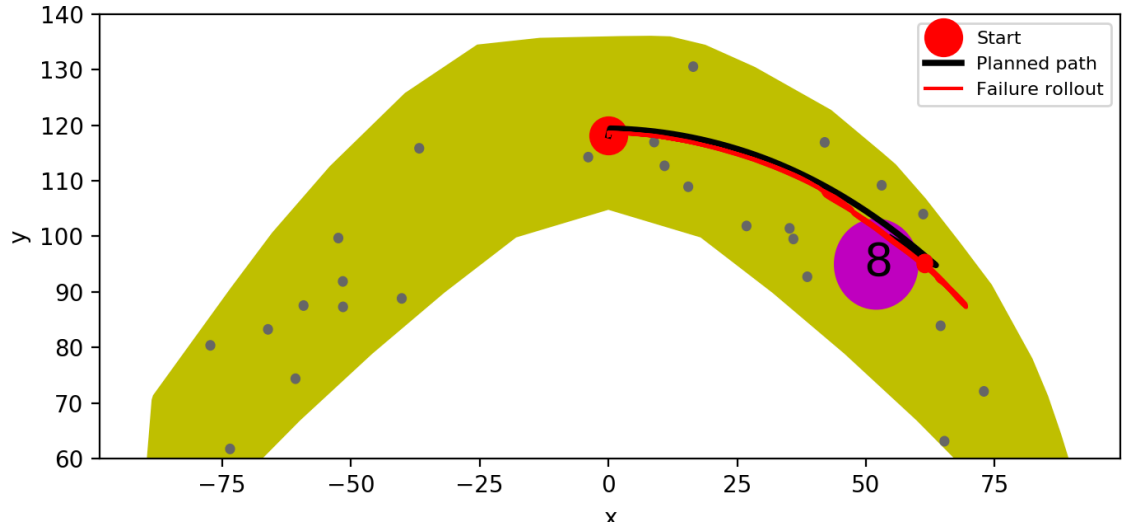
A*



LQR (Q=E)

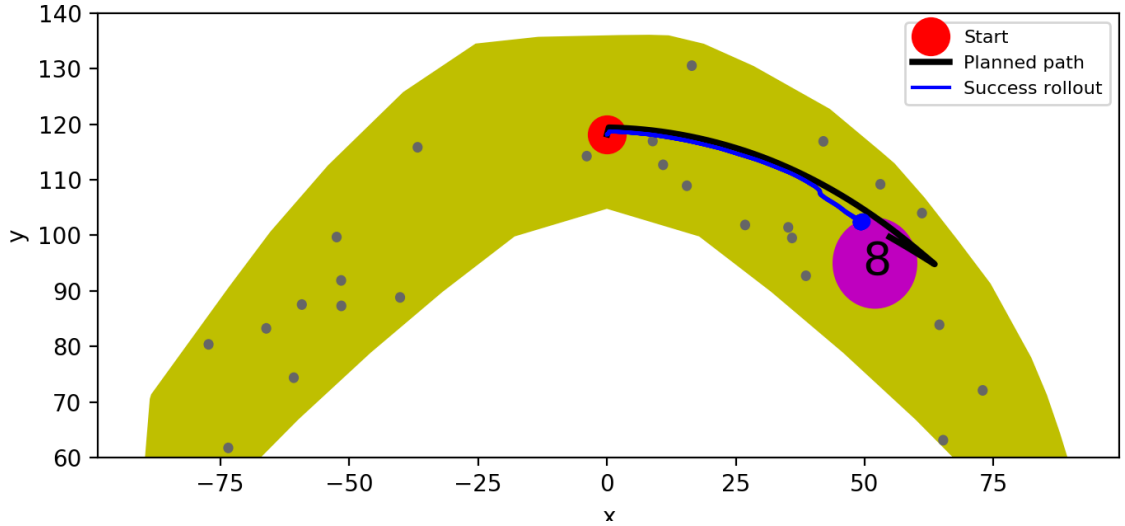


LQR (Q=0)

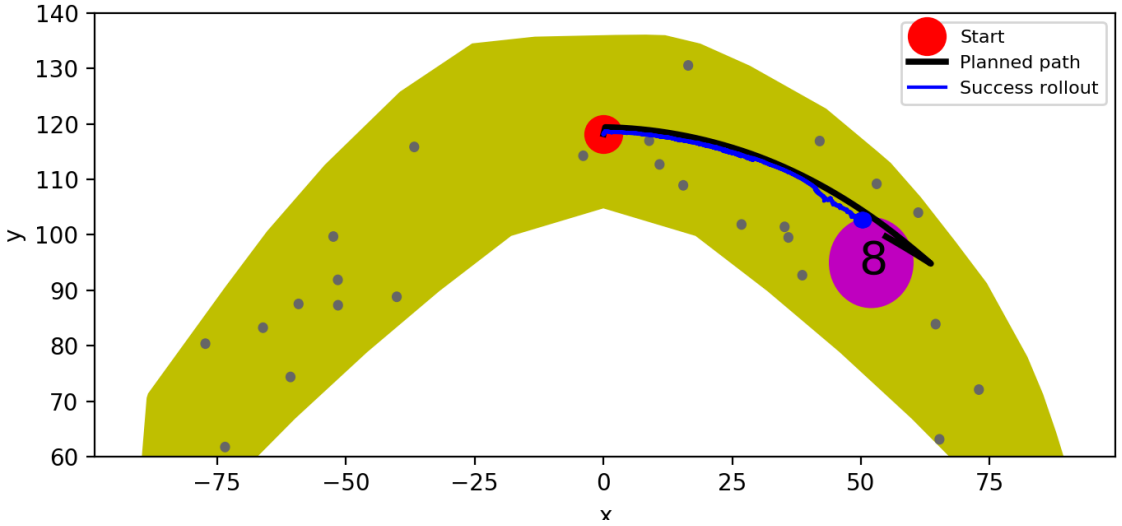


A*

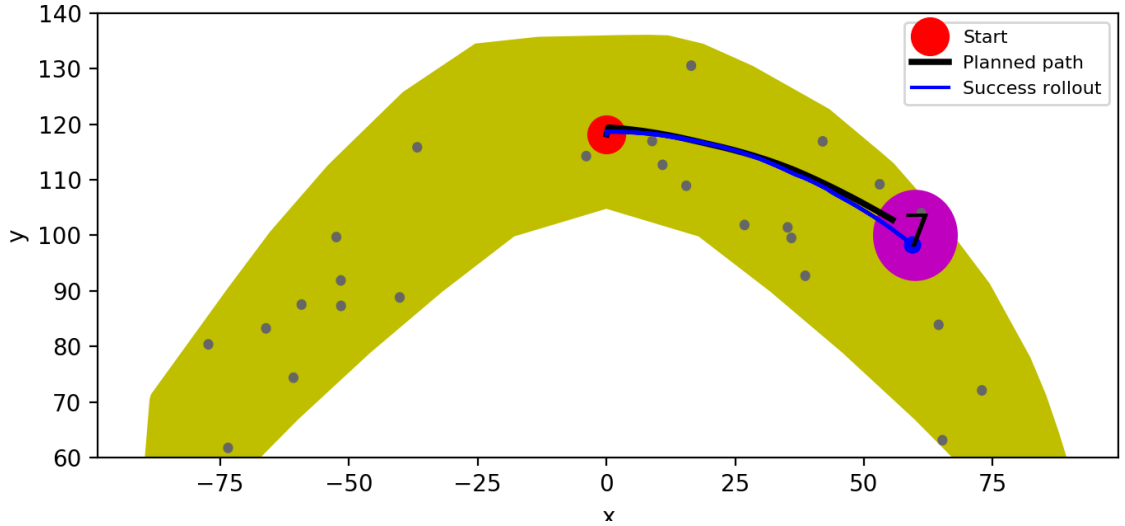
Goal Location 8



LQR (Q=E)

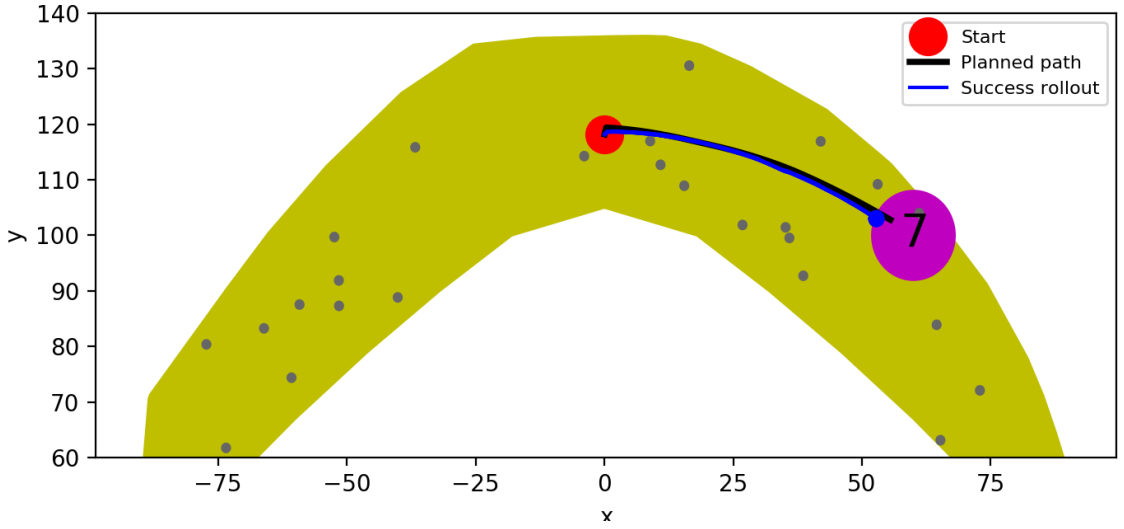


LQR (Q=0)

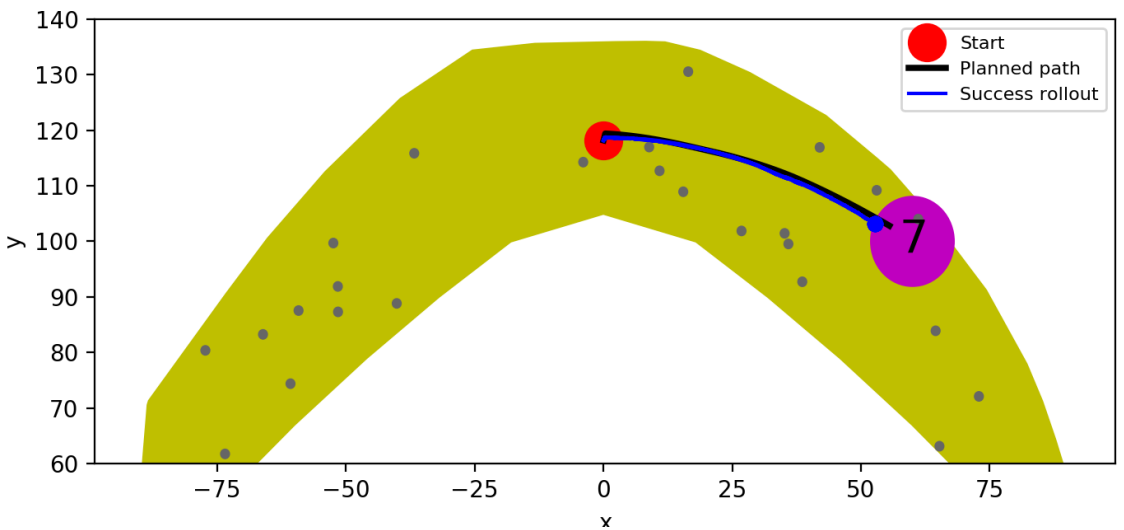


A*

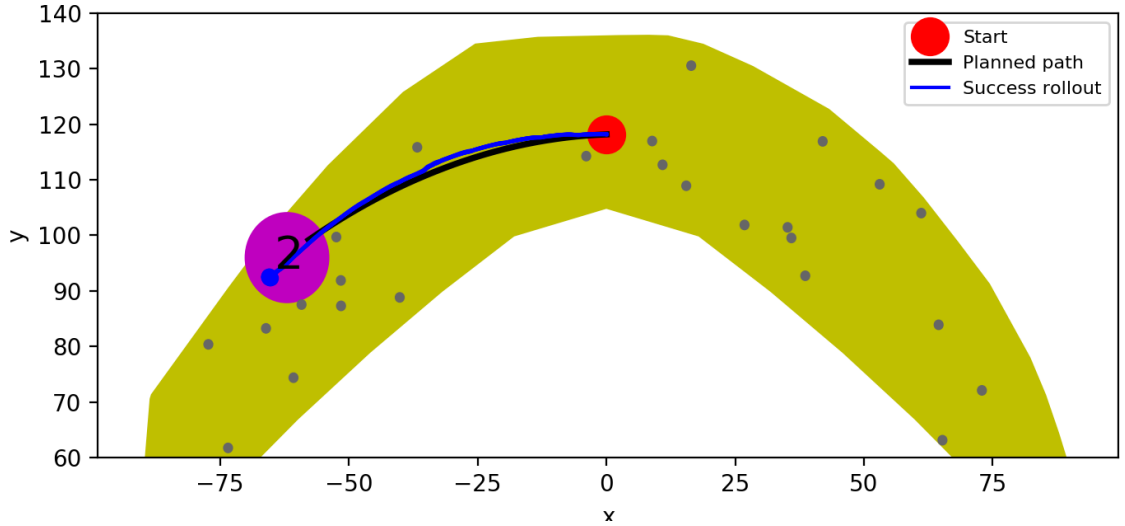
Goal Location 7



LQR (Q=E)

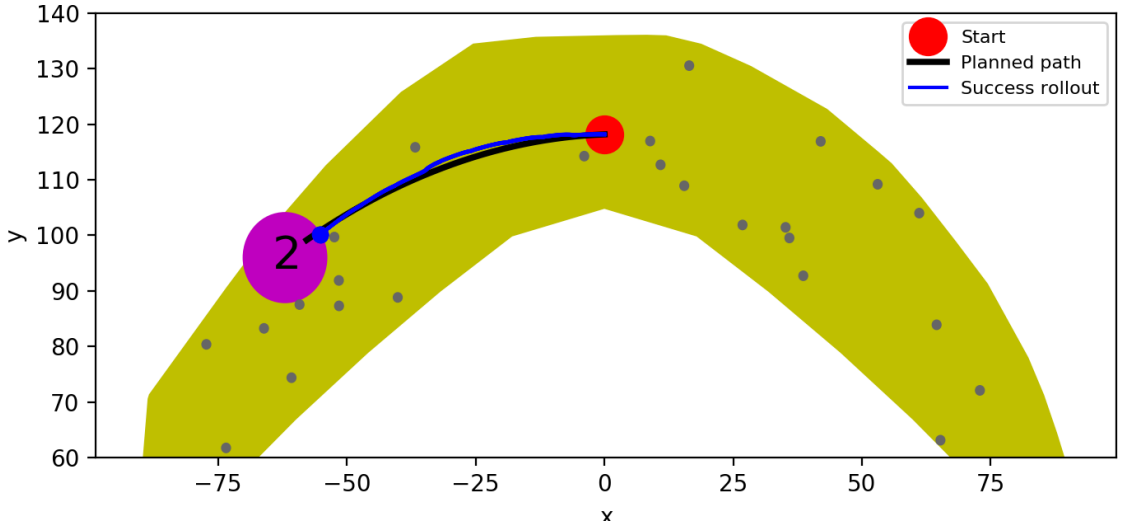


LQR (Q=0)

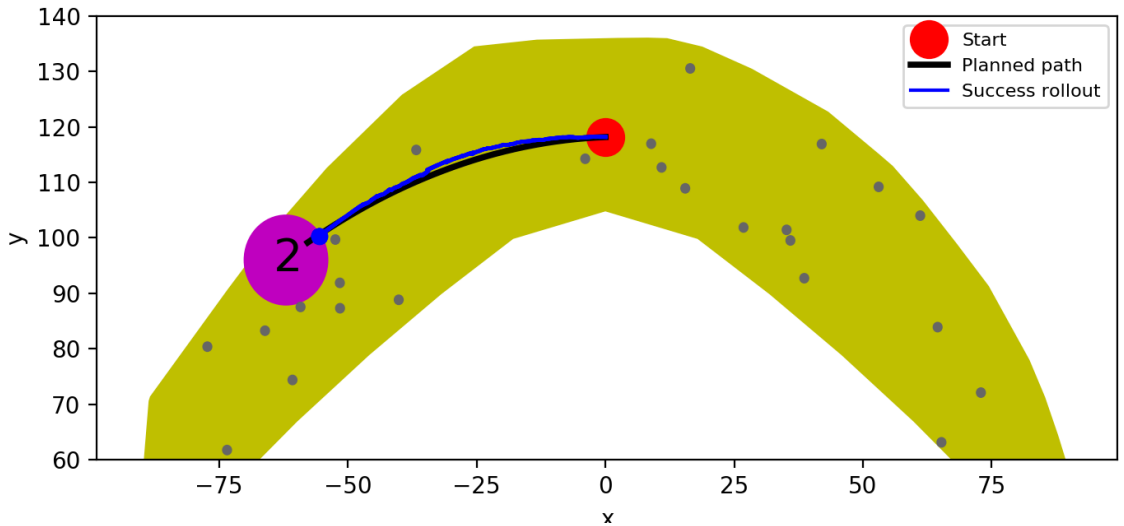


A*

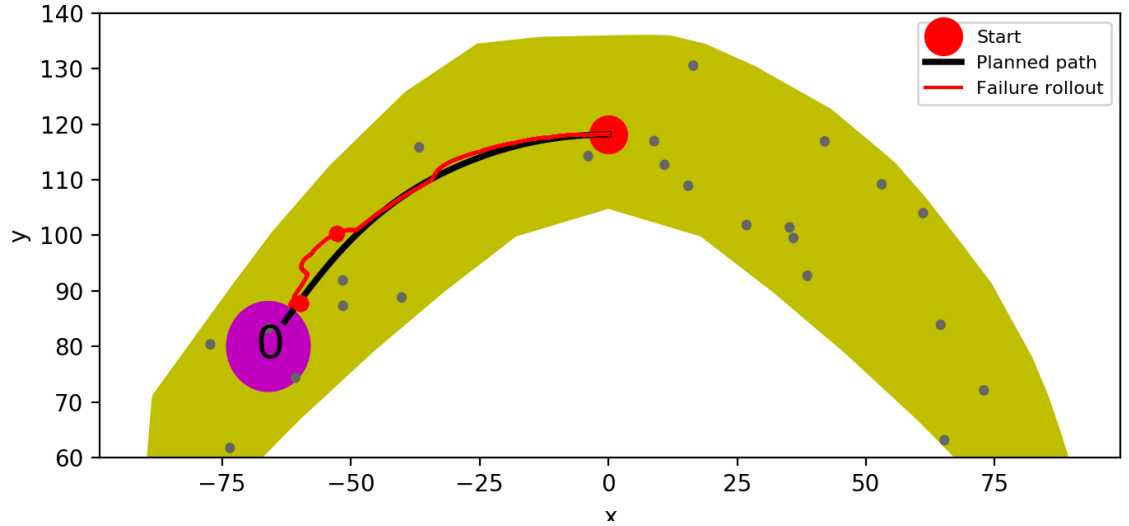
Goal Location 2



LQR (Q=E)

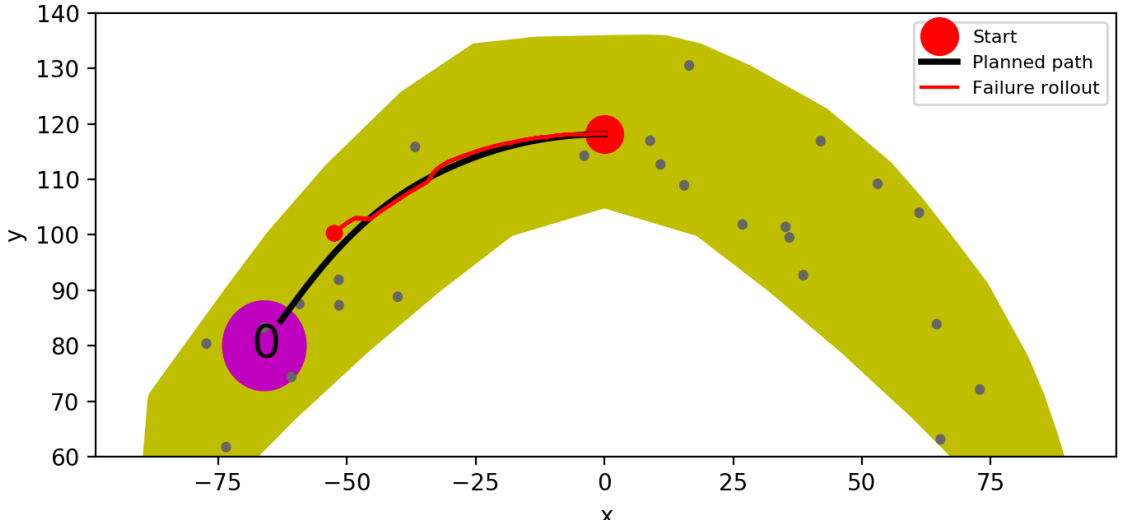


LQR (Q=0)

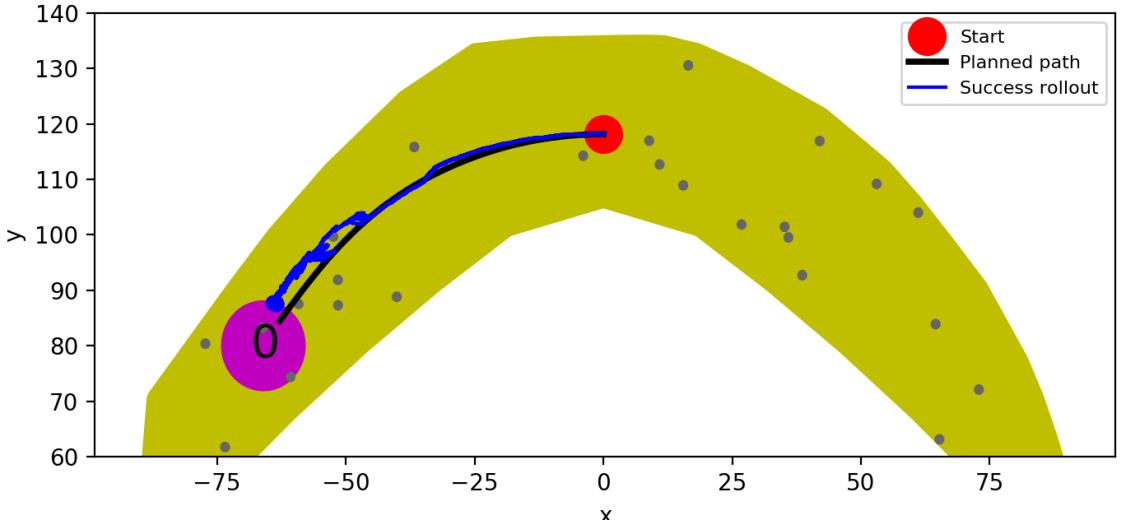


A*

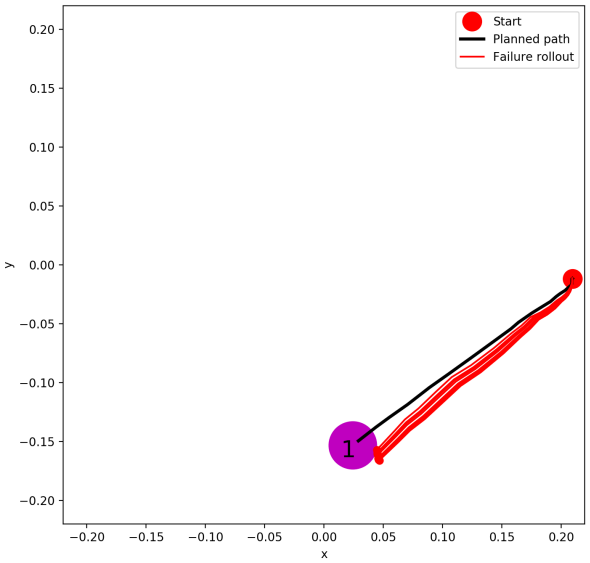
Goal Location 0

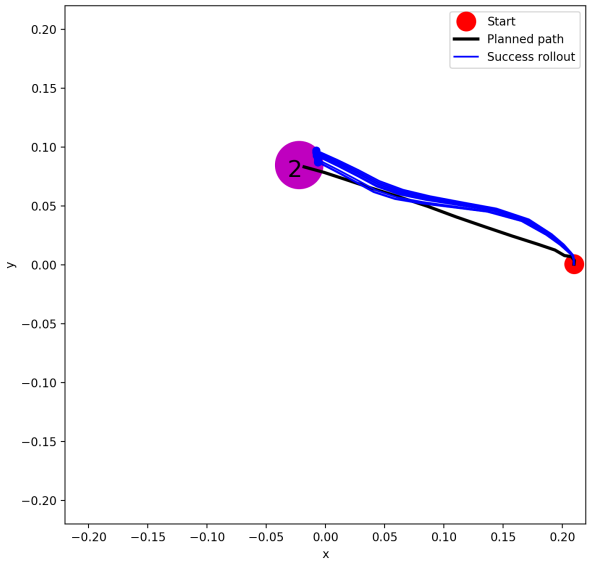


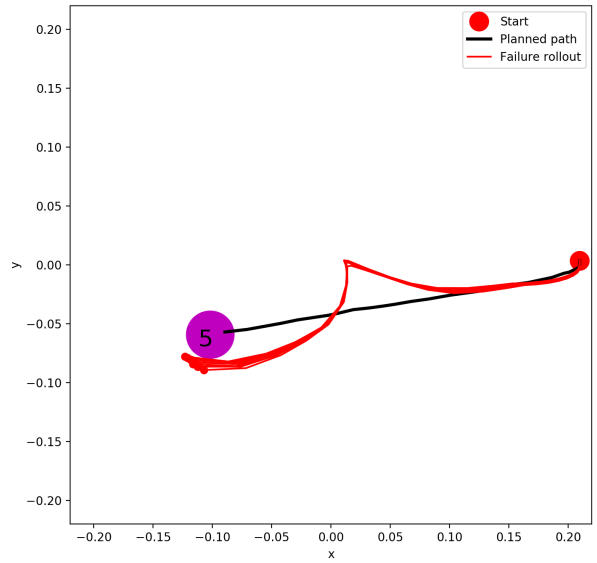
LQR (Q=E)



LQR (Q=0)

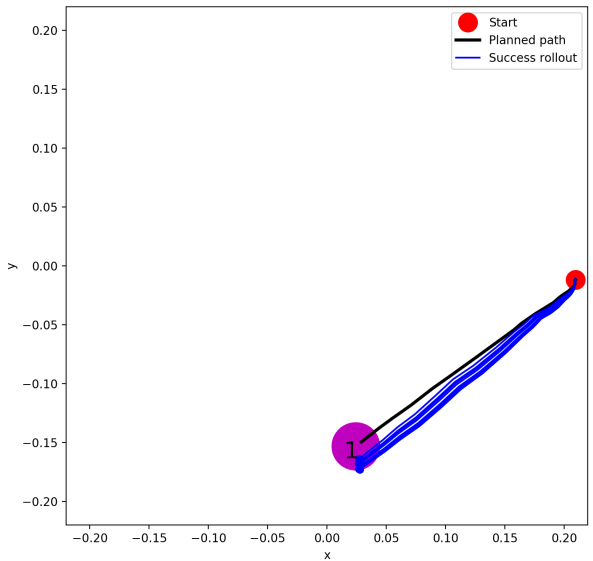


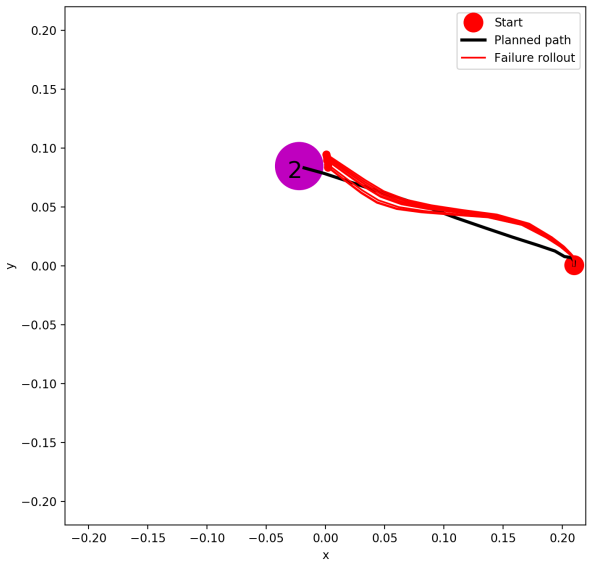


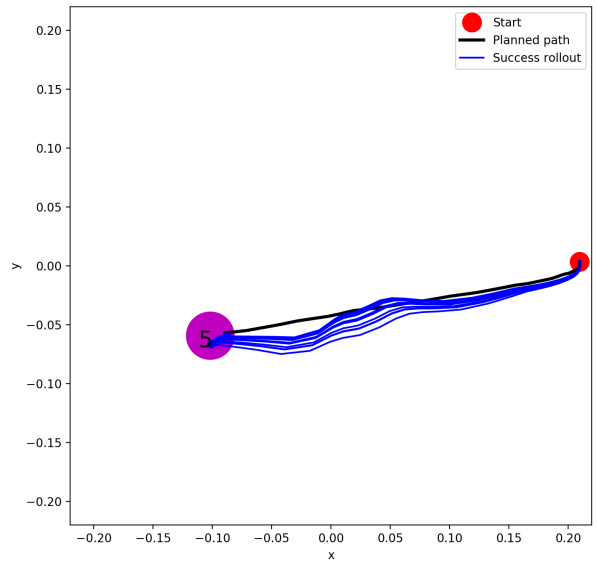


A*

Method	Goal Loc 1	Goal Loc 2	Goal Loc 5
A*	0%	100%	0%
LQR	100%	0%	100%







(A*-based) LQR