INVERSE LEARNING OF ROBOT BEHAVIOR FOR COLLABORATIVE PLANNING (2018 – 2021, #IIS-1830421)

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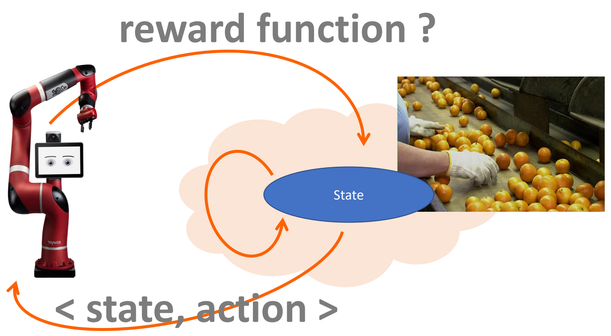
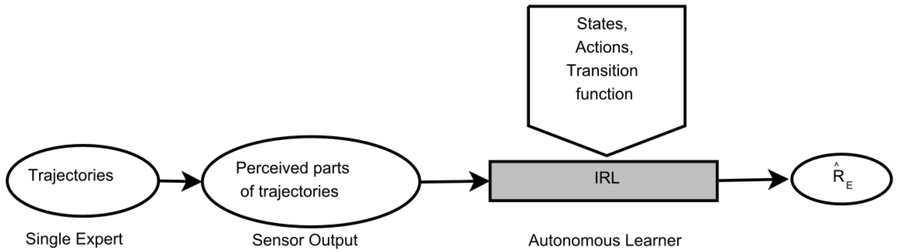
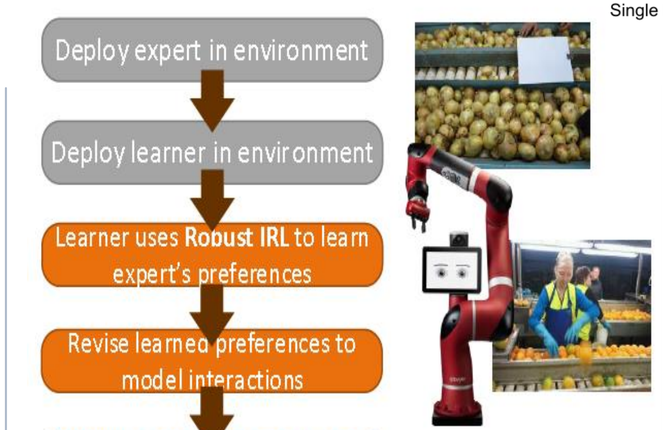
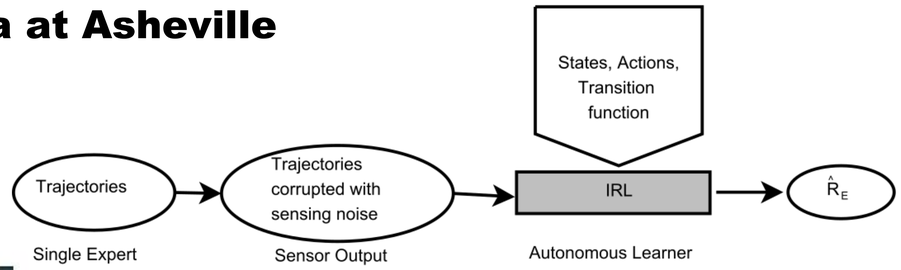


Inverse Reinforcement Learning



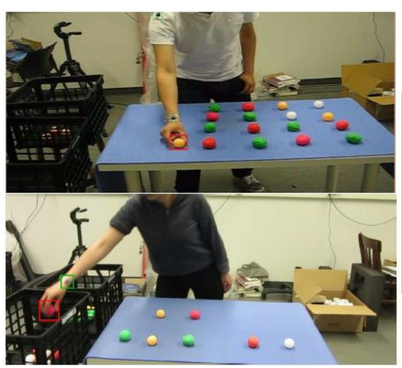




Task #1: Hidden Variables and Occlusion in Demonstrations

Method: EM formulation of maximum entropy IRL takes expectations over latent variables.

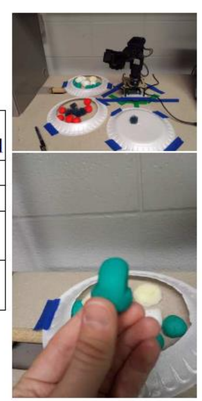
Proposed research: Extraneous perceptual features may help and build a deep learning architecture for improved recognition of state and action trajectories



(a)

Method	Correctly sorted	Balls dropped	Balls damaged
MaxEnt IRL	23	1	11
IRL*	21	3	5
Hidden Data EM	23	1	0
Occlusion-free control	23	1	0

(b)

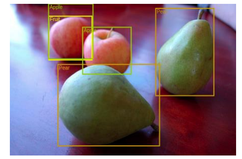


(c)

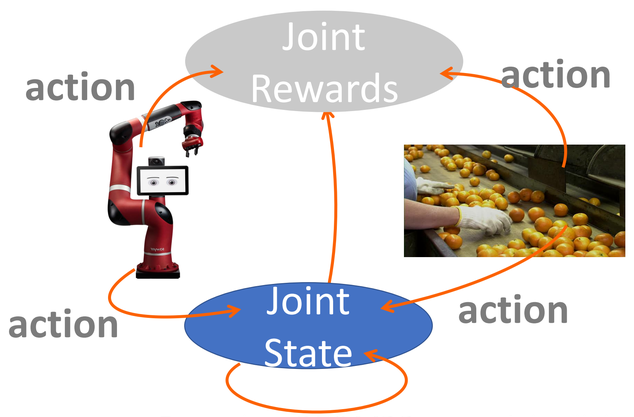
Task #2: Uncertainty due to Imperfect Observations

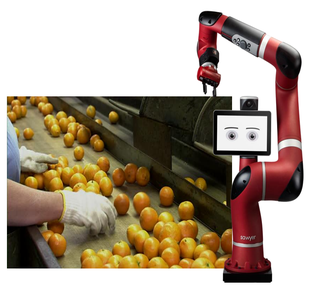
Method: Integrate noisy observations with latent MaxEnt using an observation model

Proposed research: Learn the observation model and efficiently perform the optimization in the context of many variables



Task #3: Ad-Hoc collaboration between human and robot





Spontaneously collaborate

Formulate **DEC MDP** to model collaboration and interactions. Solve using Bayesian learning