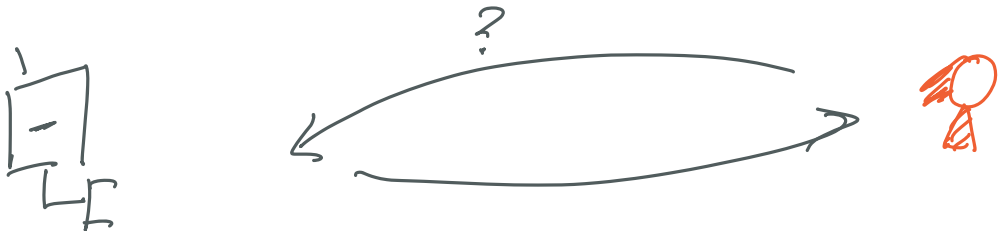
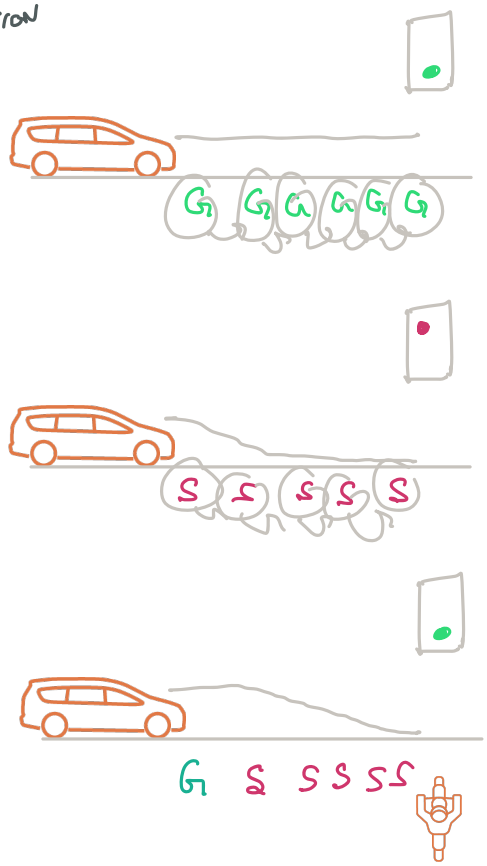
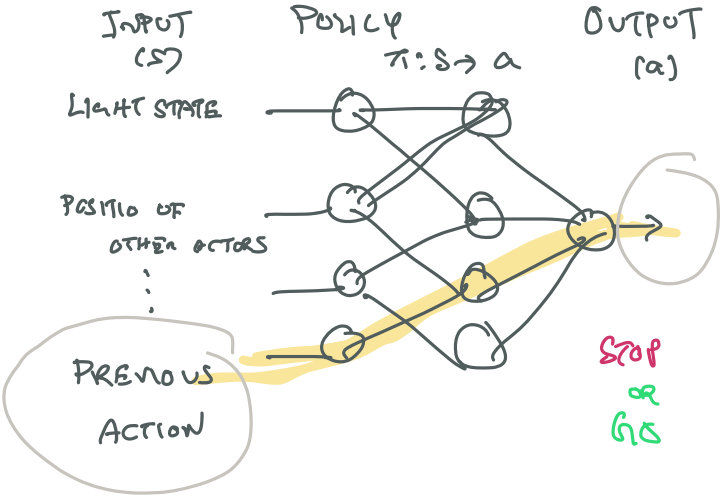
Various Ways to Give Robot Input



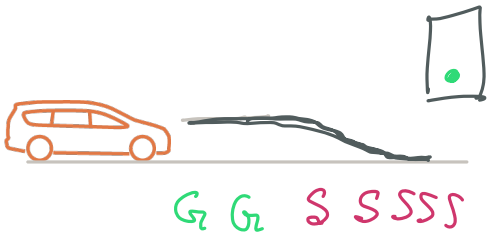
- Specify Cost / Constraints: ((1) safety constraint program)
- Demonstrations of You doing the task
  - ↳ Teleop the robot
- Preferences → (Ask human to choose from options)
- Interventions

HUMAN DEMONSTRATION





99%.



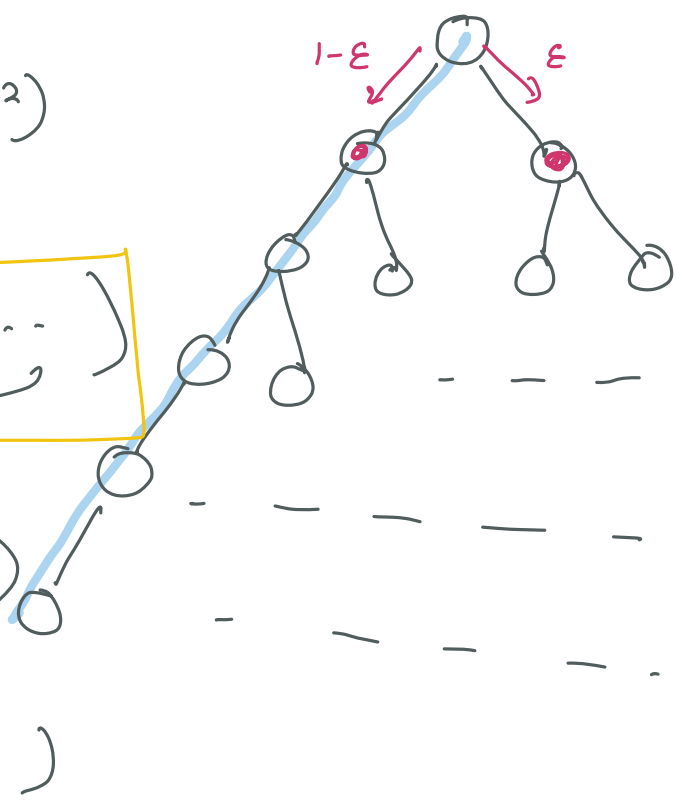
PROOF FOR BC

$$J(\pi) - J(\pi^*) \leq O(\varepsilon T^2)$$

$$\varepsilon \times \underbrace{\left(1 + 1 + 1 + 1 + 1 + 1 \cdots\right)}_{T}$$

$$+ (1-\varepsilon) \times \left(0 + \underbrace{\varepsilon\left(1 + 1 + 1 + \cdots\right)}_{T-1}\right)$$

$$+ (1-\varepsilon)\left(0 + \cdots\right)$$



$$= \varepsilon T + (1-\varepsilon)\varepsilon(T-1) + (1-\varepsilon)^2 \cdot \varepsilon \cdot (T-2) + \cdots$$

$$= \varepsilon\left(T + \underbrace{(1-\varepsilon)}_{\leq 1}(T-1) + \underbrace{(1-\varepsilon)^2}_{\leq 1}(T-2) + \cdots\right)$$

$$\leq \varepsilon(T + (T-1) + (T-2) + \cdots 1)$$

$$\leq \varepsilon \frac{T\cdot(T+1)}{2} \approx O(\varepsilon T^2)$$

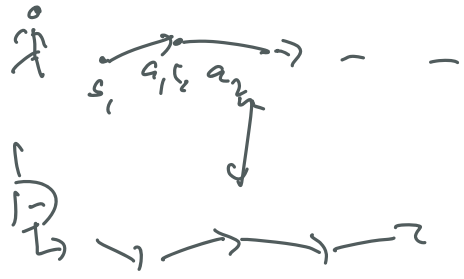
Non-Realizable Expert

#1

- **Privileged Information**

$$\pi^*(s, \phi) \to a$$

#2 **Different MDP**



#3 **Model Mismatch**

M, $\hat{M}$ Distillation