

HAZARD

Embodied Decision Making in Dynamically Changing Environments

ICLR 2024 Poster

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(Equal contribution*)

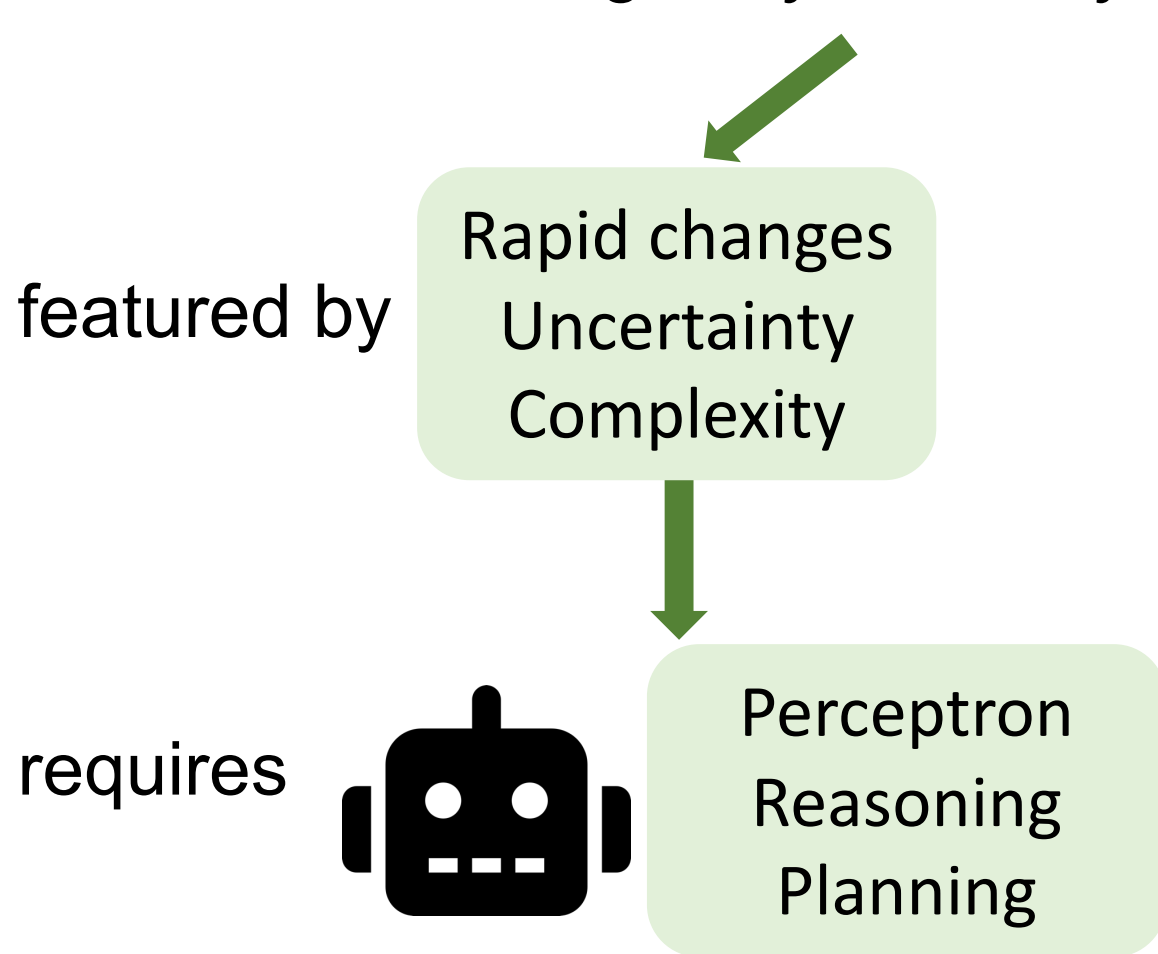
UMass
Amherst



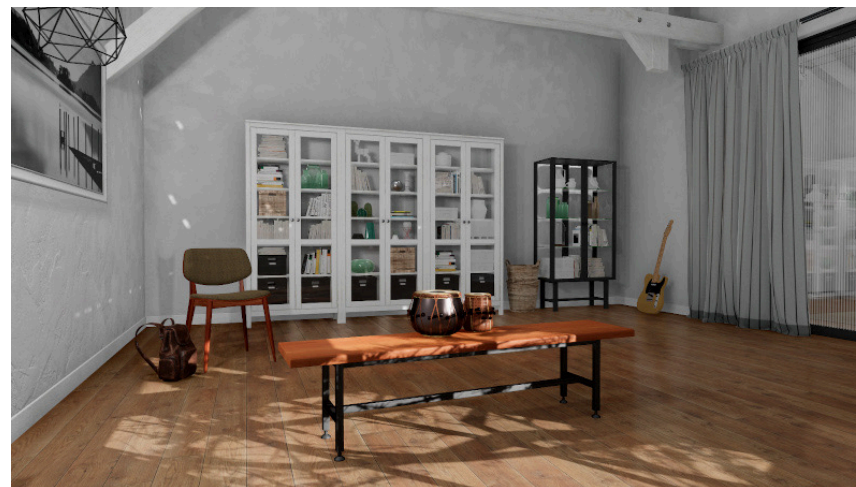
MIT-IBM
Watson
AI Lab

Motivation

Decision making in *dynamically changing environments*



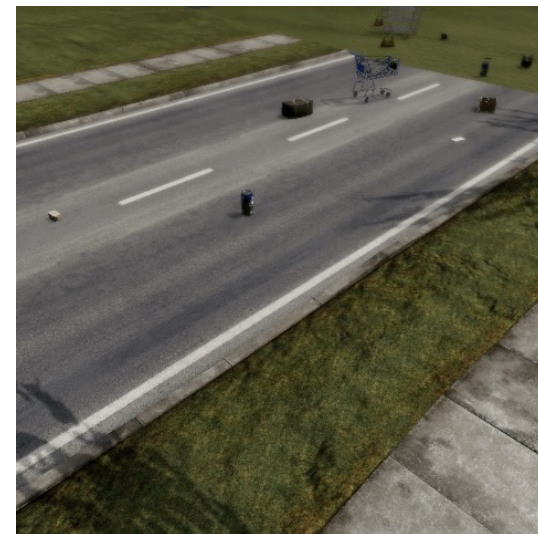
Need a simulator:
dangerous and expensive to
research in the real world



An Overview of HAZARD Challenge

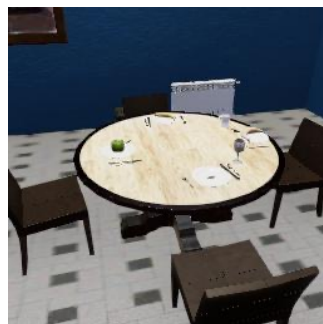
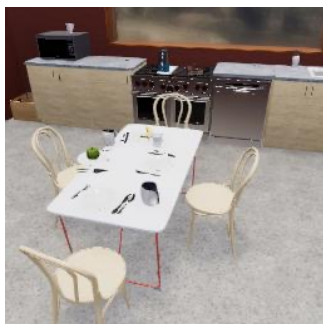
Simulator

fire, flood, and wind
(based on ThreeDWorld)



Dataset

(with procedural generation)



100 indoor scenes for fire and flood

100 outdoor scenes for wind

A Simulator for Disasters

Visual effect generation



Physics-based simulation

$$T'(o) = T(o) \cdot (1 - d) + d \cdot T_{env}(o)$$

$$W_{o'} = \min(D^{-2}, dist(o, o')^{-2})$$

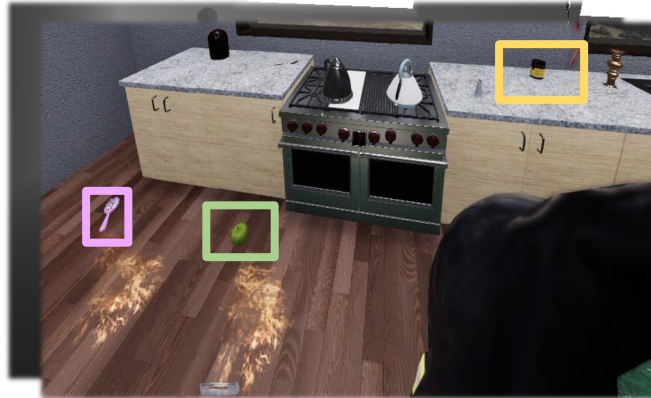
$$F_B = \rho_f V g$$

$$F_D = \frac{1}{2} \rho_f v^2 C_D A$$


ThreeDWorld platform


Task Settings

Observations



RGB-D observation

 Toothbrush, value 1

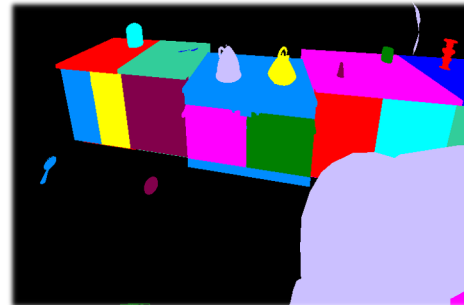
 Apple, value 1

 Bottle, value 5

Target object information

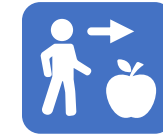


Thermal observation



Segmentation mask (optional)

Actions



walk to



explore



pick up



drop

Evaluation metrics

$$\text{Value} = \frac{\text{Value of rescued objects}}{\text{Value of all objects}}$$

$$\text{Step} = \frac{\text{Total steps taken}}{\text{Number of rescued objects}}$$

$$\text{Damage} = \frac{\text{Damaged objects amount}}{\text{Objects amount}}$$

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