

Generate motion plans for multiple arms in a decentralized fashion using diffusion models guided by reinforcement learning

## Motivation

- Propose a unified multi-arm diffusion policy capable of handling dynamic obstacles (e.g moving robots), eliminating the need for traditional roadmaps and extensive collision annotations
- Leverage diffusion models' generative capabilities to directly produce feasible actions for agents without relying on precomputed roadmaps
- Capture multi-modal distributions prevalent in multi-arm tasks during learning
- Use diffusion model to predict anticipated actions of neighbors for improved planning

## Next Steps

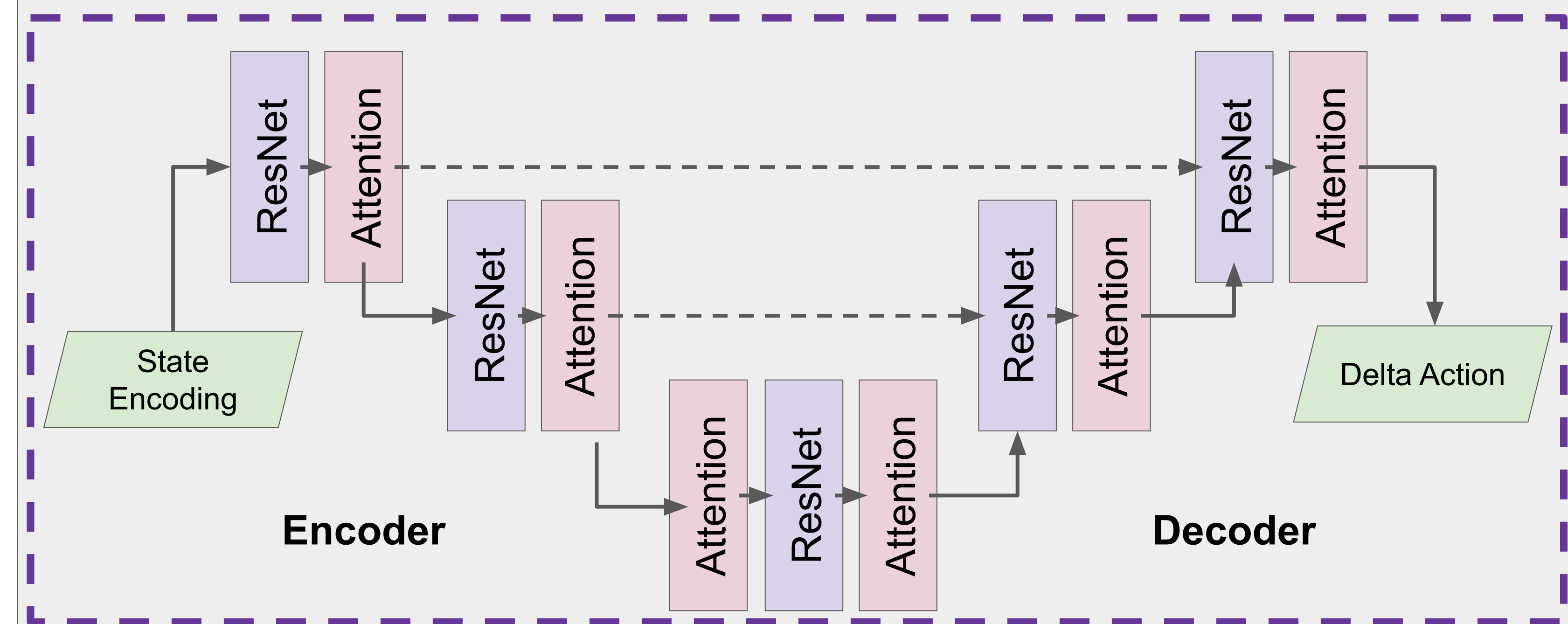
- Receding horizon control for reactive execution
- Combine learned diffusion model with multi-agent path finding planners to improve scalability for a larger number of agents

## References

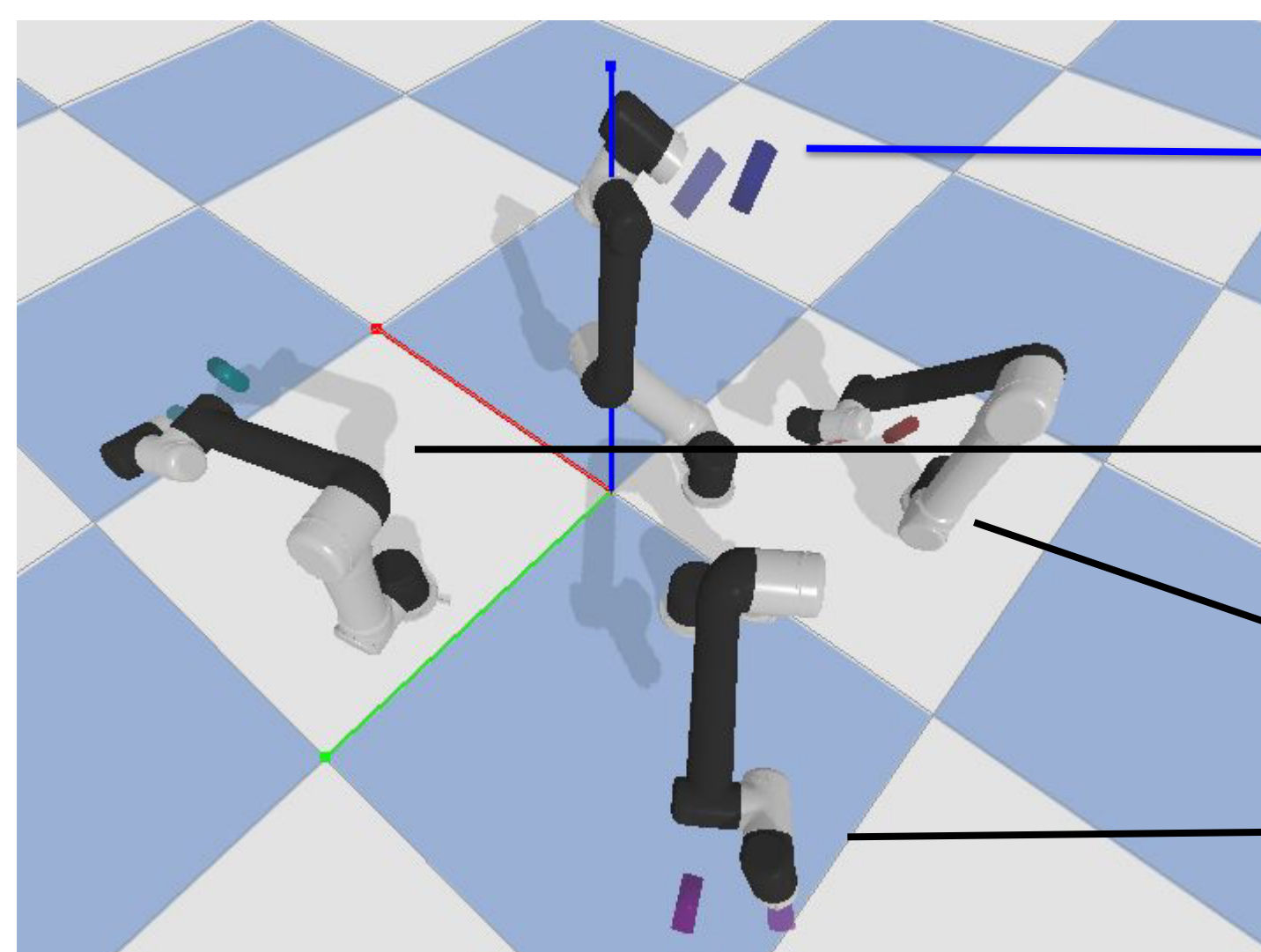
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## Approach

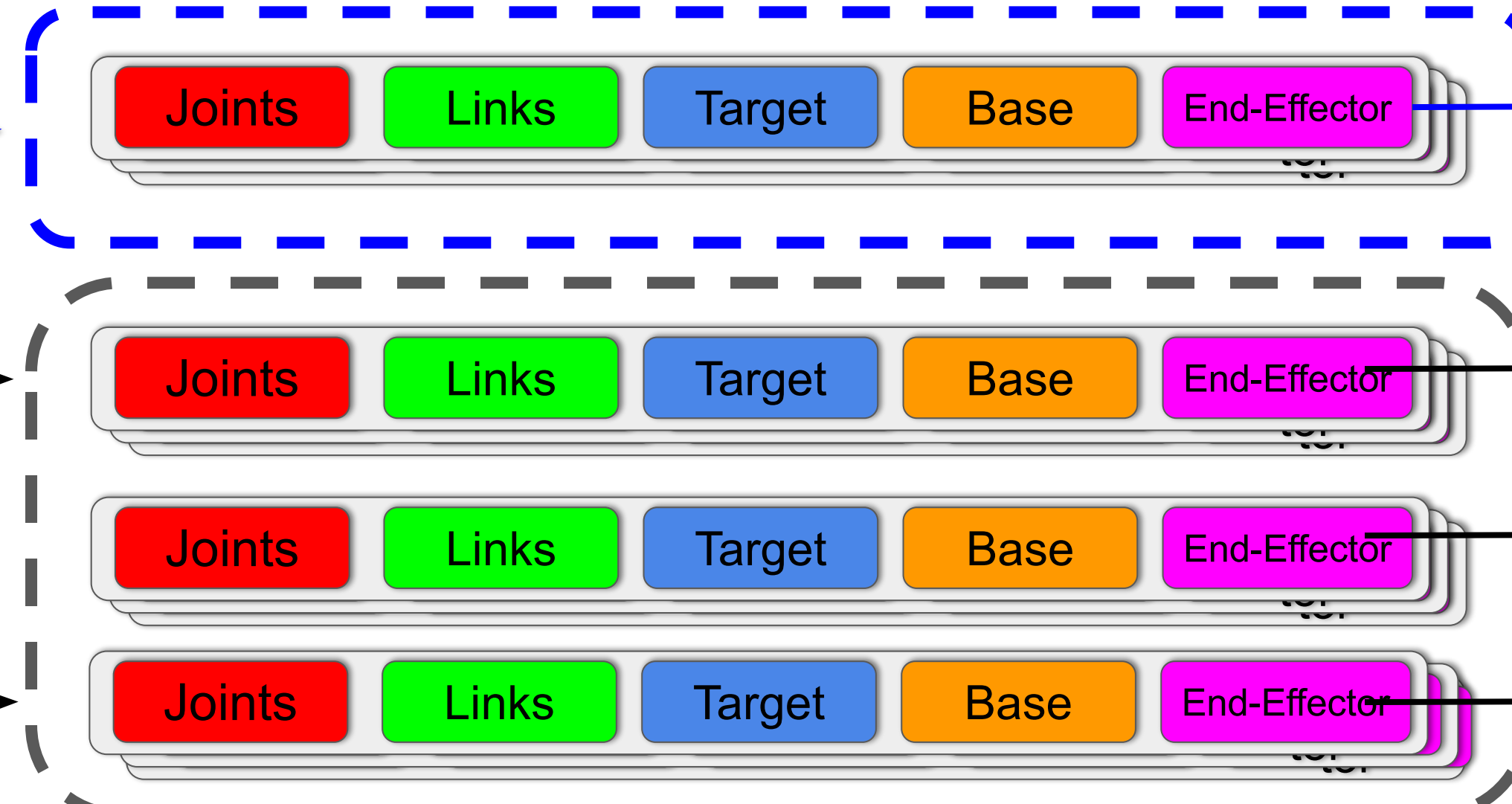
- Extend diffusion models performance in out-of-distribution settings using reinforcement learning
  - Integrate actor-critic framework where the critic evaluates the quality of actions improving model's robustness without limiting model expressiveness
- Utilize UNet architecture as noise-predictor network
  - MLP-based architecture hindered actor performance
- Combine multi-arm observations into a single state-encoder using LSTM cells



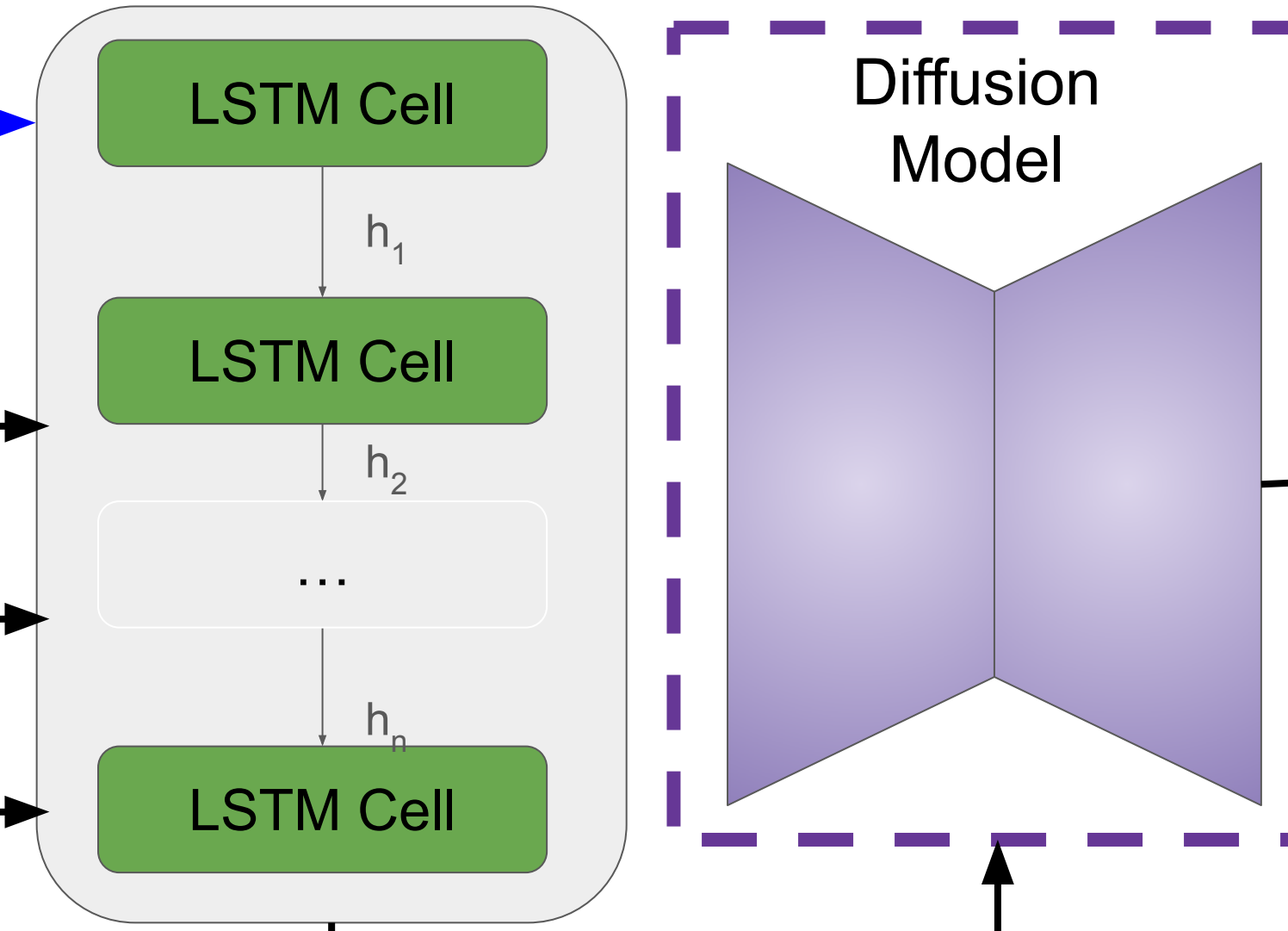
## Environment



## Observations



## Policy



## Actions

