Gymnasium-Robotics Documentation

Shadow Dexterous Hand

These environments are based on the [Shadow Dexterous Hand](), 5 which is an anthropomorphic robotic hand with 24 degrees of freedom. Of those 24 joints, 20 can be controlled independently whereas the remaining ones are coupled joints.

- `HandReach-v1`: ShadowHand has to reach with its thumb and a selected finger until they meet at a desired goal position above the palm.
- `HandManipulateBlock-v1`: ShadowHand has to manipulate a block until it achieves a desired goal position and rotation.
- `HandManipulateEgg-v1`: ShadowHand has to manipulate an egg until it achieves a desired goal position and rotation.
- `HandManipulatePen-v1`: ShadowHand has to manipulate a pen until it achieves a desired goal position and rotation.

Shadow Dexterous Hand with Touch Sensors

Touch sensor observations are also available in all Hand environments, with exception of `HandReach`. These environments add to the palm of the hand and the phalanges of the fingers 92 touch sensors with different recorded data depending on the environment. These touch sensors are:

- **Boolean Touch Sensor**: the observations of each touch sensor return a value of `0` if no contact is detected with and object, and `1` otherwise.
- **Continuous Touch Sensor**: the value returned by each touch sensor is a continuous value that represents the external force made by an object over the sensor.
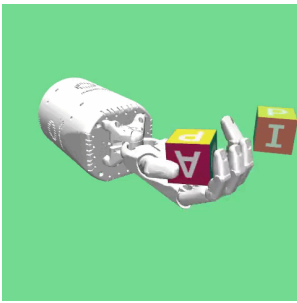
These environments are instanceaced by adding the following strings to the Hand environment id's: `_BooleanTouchSensor` or `_ContinuousTouchSensor`. For example, to add boolean touch sensors to `HandManipulateEgg-v1`, make the environment in the following way:
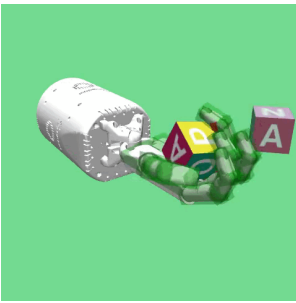
```python
import gymnasium as gym

env = gym.make('HandManipulateEgg_BooleanTouchSensors-v1')
```
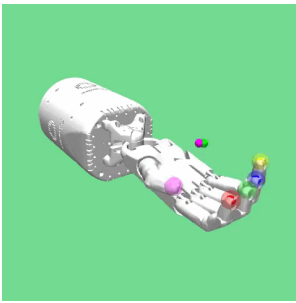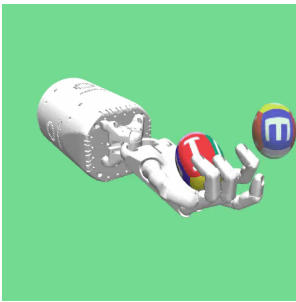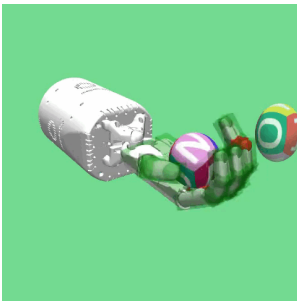

Reach
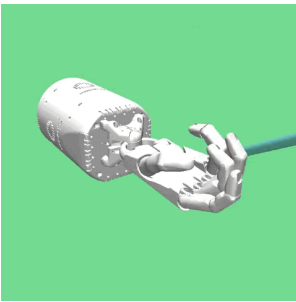

Manipulate Block
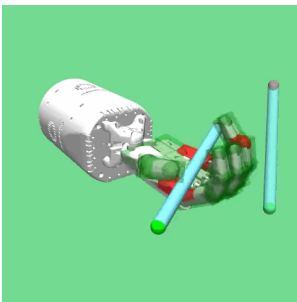

Manipulate Block Touch Sensors

Manipulate Egg

Manipulate Egg Touch Sensors

Manipulate Pen

Manipulate Pen Touch Sensors

References

If using the `Shadow Hand` environments, please cite:

```
@misc{1802.09464,
  Author = {Matthias Plappert and Marcin Andrychowicz and Alex Ray and Bob McGrew and Bowen B
  Title = {Multi-Goal Reinforcement Learning: Challenging Robotics Environments and Request f
  Year = {2018},
  Eprint = {arXiv:1802.09464},
}
```

To cite the `Shadow Dexterous Hand with Touch Sensors` environments, please use:

```
@article{melnik2021using,
  title={Using tactile sensing to improve the sample efficiency and performance of deep deter
  author={Melnik, Andrew and Lach, Luca and Plappert, Matthias and Korthals, Timo and Haschke
  journal={Frontiers in Robotics and AI},
  pages={57},
  year={2021},
  publisher={Frontiers}
}
```

v1.2.3 (latest)