

Lace Tying Protocol

Overall task summary

The purpose of this task is to “tie shoe laces”. Specifically the second stage with a “bunny ear”.

Full Video: <https://www.youtube.com/watch?v=Zw1yb994M6o> (please watch first!)

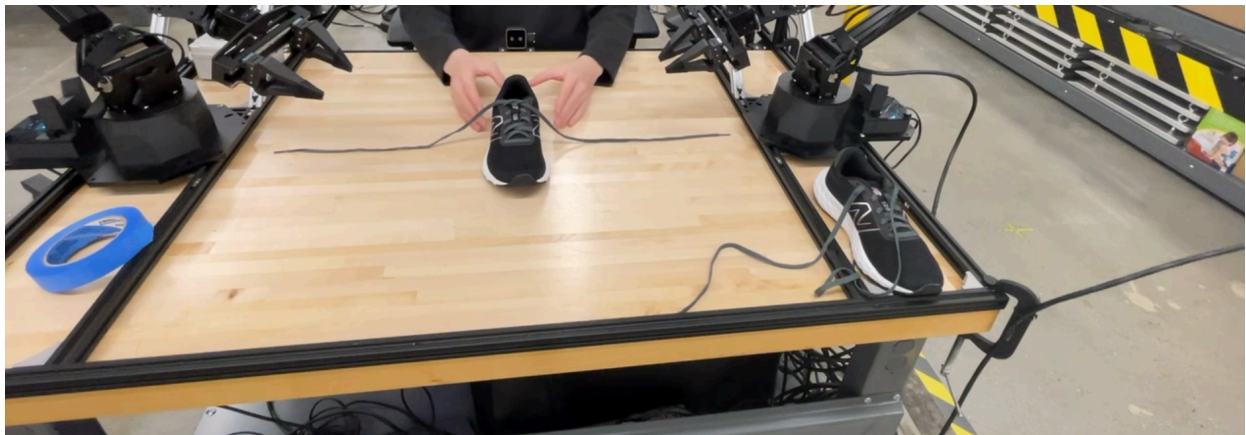
Required props

- Pair of shoes. Some variants:
 - https://www.amazon.com/dp/B09XRDQFGC?psc=1&ref=ppx_yo2ov_dt_b_product_details
 - https://www.amazon.com/dp/B09MZ2CRHY?psc=1&ref=ppx_yo2ov_dt_b_product_details

Resetting the scene

Place the shoe facing forward in the workcell. Use either the left or the right shoe. You can randomize the shoe location in a ~10cm circle (i.e. it doesn't have to be exactly centered).

Tie a simple loop and lay the shoe laces out to the side like this:



[Video of human tying with same strategy](#)

Step by Step Instructions

The correct technique is important. Please see the video as it's easier to understand than stills. Also, ask Tony to give a demo and introduction to the correct technique.

1. Loop the laces from opposite ends using each arm.



2. Open the grippers



3. Grasp the laces in the correct orientation



4. Pull the laces out with both arms at the same time.



Failure Modes / FAQ

- **What if you drop the laces with one of the arms?**
 - If you can recover, you can keep the episode going and try again.
- **What if the laces get tangled or otherwise get into a hard to recover state?**
 - Perform a reset with the left footpedal.
- **What if the laces aren't tied together properly when pulling on both laces at the end.**
 - Perform a reset with the left footpedal.
- **How to reset in case of failure?**
 - Reset the episode by pressing the left footpedal. Arms will reset to their starting positions at which time you can manually reset the scene with your hands.