Progress Report

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1 Specific Research Goals

- VPQEKF (—): On pause. Asif may look into it.
- DLO Manipulation Dataset (ICRA - Sept. 1st) - on-going.

2 To Do

- QEKF Paper - 30% extension (—):
- Implementation (—):
  - Noise issue: noise cannot be modeled - revisit
  - SfM: RQuEst cannot find solution – under investigation - HAVOK?
- DLO Manipulation: (ICRA - Sept. 1st)
  - Work on the paper everyday – up-coming
  - ICRA 2022 RL workshops: gym, stable-baseline3, and RL zoo – on-going
  - Setup digital twin reinforcement learing setup:
    - Unity Robotics extension setup – on-going.
    - Design dynamic DLO data collection system.
    - Build work cell. – on-going
    - Collect data and create a dataset.
    - Define evaluation metrics.
    - Create a high frequency RGBD dataset with UV-frames and open-loop input control actions as the ground truth.
  - Real-Time Preception – on hold
  - Learning DLO Dynamics and System Identification
    - List feasible approached for learing DLO dynamics – done
    - Model dynamics and deformity in a latent space

3 Progress

The following items are listed in the order of priority:

- XEst (RAL —): No update.
- DLO State Estimation (ICRA - Sept. 1st): I setup the DLO envronment [1] in Unity and I am able to run tests and train a model. Now I am looking into how to use this environment with Koopman operator to perform system identification on the DLO. I have been doing Unity ML-Agents tutorials in order to figure how I can interact with the simulation using python script. I have extracted training configuration poses as well.
- Maicol (REU): He has been working on UR5 workcell. He should be finished by end of next.
- DoD SMART (Dec 1st.): I started the application.
- PyTorch Tutorials: Transfer learning.

References

[1] M. Yu, H. Zhong, and X. Li, "Shape control of deformable linear objects with offline and online learning of local linear deformation models," in *2022 International Conference on Robotics and Automation (ICRA)*, pp. 1337–1343, IEEE, 2022.