

# Progress Report

Bardia Mojra

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Robotic Vision Lab

The University of Texas at Arlington

# 1 Progress

The following items are listed in the order of priority:

- DLO Dataset (**March 1st.**): This week, Maicol and I collected initial measurements for DLO dataset. We tested L515 LiDAR in different ambient light settings. L515 datasheet and user guide recommend operating the device in indoor environments and avoid sunlight as much as possible. We made various recordings of four DLOs in different light settings, i.e., at noon, at sunset, and after sunset. We did not observe a considerable difference between the measurements but we lack a systematic method for quantitatively measuring the effects of sunlight on DLO configuration estimation. See figures 1-4.

Figure 1: DLOs

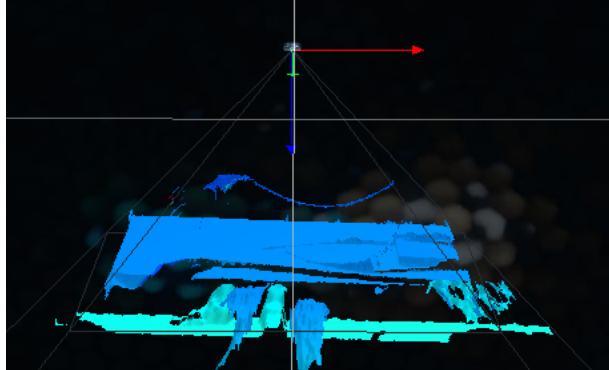


Figure 2: DLOs

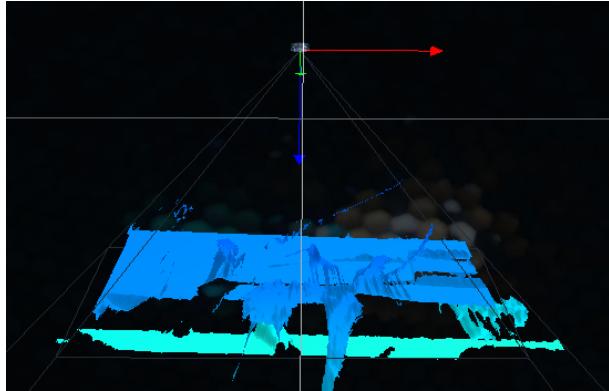


Figure 3: DLOs

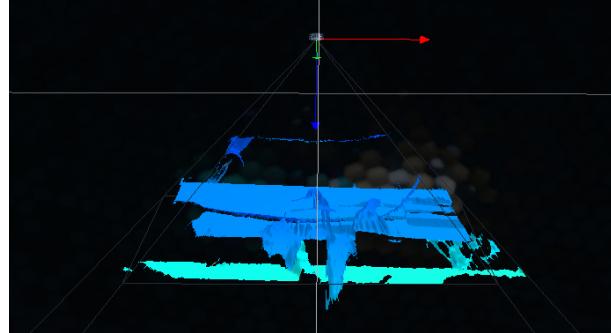
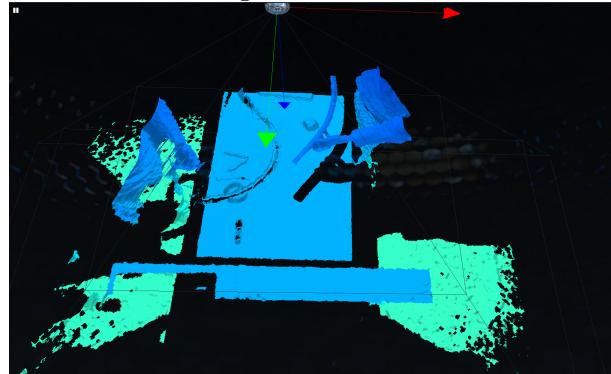


Figure 4: DLOs

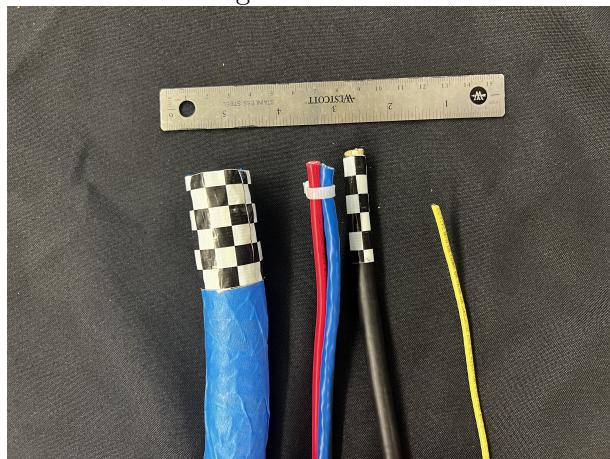


Perhaps, it would be useful in our paper if we provide information regarding ambient light (in lux) and how it effects our measurements and configuration estimation of DLO. The DLOs include a thick hose (part number and description needed), a AWG 10 red and black and CAT-6 bundle, a CSA LL90485 Water resistant with three AWG 16 conductors, a yellow Southwire E51583(UL) AWG 14 wire. See figure 5.

Currently, I am working on extracting the DLO shape from raw data.

- DLO Manipulation (**IROS**): [1].
- Maicol (REU): //
- XEst (**RAL** —): No update.

Figure 5: DLOs



## References

- [1] I. Abraham, G. De La Torre, and T. D. Murphey, “Model-based control using koopman operators,” *arXiv preprint arXiv:1709.01568*, 2017.

## 2 Research Plan - Out of date

This section outlines my current research plan where the main ideas, target conference/journal, and expected date of completion for each paper are provided. Target conferences: ICRA, IROS (March), CASE (Late Feb.), NIPS. Target Journals: RAL, CVPR, CORAL.

- Koopman-01 (**IROS - Dec. 1st - active**): Koopman-based MPC control of VTOL-DIP and VTOL-TIP in simulation, DLO pose estimation in simulation, experiments on choice of basis function and lifting dimensions, and performance comparison with optimal, robust, and/or adaptive control schemes.
- Koopman-02 (**ACC - Sep 30th - active**): A review on Koopman-based control schemes. **Not enough, make it part of another paper.** Read papers and write literature reviews.
- Koopman-03 (**RAL - Mar. 1st - status**): Extension to Koopman-01, Koopman-based dynamic estimation of DLO, collect dynamic DLO dataset, prediction of DLO configuration.
- Quest-01 (**IROS - Mar. 1st - next**): Optimal transform solution for QuEst based on dominant mode decomposition (DMD).