Paul Freihoefer & Evan Nusaputra

MENG 481 – Computational Dynamics

Project Summary

Evan and I both set out to continue some of the work that we did with our Senior Design Project and attempt to learn about image processing without a direct focus on our original Senior Design goal. Originally, we wanted to take footage of insects in flight and use image processing techniques like photogrammetry to determine 3D coordinate positions of the wing edges. Unfortunately, with the COVID-19 unpleasantness our hopes to collect any data were squashed (ahah) and after we shuffled to figure out where we were staying the focus moved to exploring image processing. We spent time reading “Close-Range Photogrammetry and 3D Imaging” and learned more about the background of photogrammetry and got a taste of the math behind it. While confusing the main idea behind photogrammetry is manipulating matrices and vectors to create a 3D coordinate system from 2D images (Luhmann 2020). We also read about some different feature detection techniques and then decided to take our project to Atom.

We worked in Python using an open-source package called “OpenCV” which has been created to cover a wide range of image processing. We experimented and played around with photogrammetry-like techniques and some edge detection/feature detection. We were able to project some 3D models onto 2D images and attempt to collect information on camera properties through the OpenCV calibration software. Due to the limitations of the virus we were stuck using our phone cameras and objects found around the house.

We created a podcast to try and cover the information that we learned while researching this project and during our senior design project. Hopefully, this gave an overview of the kind of things we were trying to work with and why they are interesting and relevant. The goal of the code we provide was to show us exploring these ideas. Ultimately, we are excited to share the results of this work with you during our presentation and plan on providing this code that we developed for the future design team that takes on our senior design project.

Reference

Luhmann, T., Robson, S., Kyle, S., & Böhm, J. (2020). *Close-range photogrammetry and 3D imaging* (3rd edition ed.). Berlin: De Gruyter. Retrieved from <http://www.degruyter.com/search?f_0=isbnissn&q_0=9783110607246&searchTitles=true>