# Progress Report

Bardia Mojra

August 15, 2020

Robotic Vision Lab
University of Texas at Arlington

# 1 Progress

Following items are listed in order of priority:

- Fellowship: I still need to work on my applications, I will write a new draft by next week. I have been avoiding this for far too long.
- Machine Learning: I did not work on ML course this week. We have a book on machine learning with TensorFlow at the lab, I will borrow that. I also just received [**?**]. As I will begin to work on ARIAC and OCRTOC under Chris, I will also start playing around and getting comfortable with TensorFlow.
- ARIAC: My Ubuntu machine ran out of space as I was setting up Docker and began going through ARIAC workshop videos. I backed up my files and reinstalled everything. It took me few days to get it right and setup my computer properly. It turns out installing GPU drivers is very simple and convenient on Ubuntu. Once installation is complete, before the first boot-up and while on the grub menu page, you press "e" and add "nouveau.modeset=0" after quiet splash or to be safer replace quiet splash "nomodeset" and proceed to log in. This Grub configuration uses a basic open-source GPU driver to boot up the OS environment. To install appropriate Nvidia driver, one must go to "Software Updater to Additional Drivers to Nvidia Corporation" and select top most option as it is the recommended driver for your device. For me that was the issue. I am working on finishing UR5 setup, it should be done soon.
- Gazebo: I need to do the tutorial on ROS integration.
- ROS: Still working on Udemy course and ROS tutorials. I am putting on hold to learn more about AWS RoboMaker with Chris. I am starting to understand ROS architecture, it runs every node as pthread and manages them using ROScore central node. I think I am ready to start development with Chris. I am the point that I can debug and do limited development but not quite ready to lead a ROS based project.
- Other challenges: I spend a lot time getting comfortable with Linux environment and it is starting to pay off. I am steadily transitioning to use Ubuntu as much as possible, that is why I ran out of space. It is a tough road and feels very slow, but it is important for me to develop these hands-on skills. I spent sometime figuring out how to

compile Latex on Ubuntu, I had it working but could not figure it out this weekend. I will have it sorted out. The way I look at, the more I learn anything, the faster I learn everything. But please, don't let me get too distracted.

- (On pause) Nolan and I have continued to work on TISR paper, I started a new document where I summarize background information. A copy of this document has been uploaded to GitHub.
- (On pause) I still need to dissect [6], [7], [8], [9], [10], and [11].
- (On pause) I still need to dissect [4].

## 2 Plans

Following items are listed in order of priority:

- Go through AWS RoboMaker tutorials before the workshop.
- Go through ROS Industrial tutorials and documentation.
- Go through UR Gazebo documentation.
- Resume Robotic Perception course as soon as possible.
- (On pause) Begin working on quaternions tutorial.
- (On pause) Need to read [12], [13], [14], and [15]; these papers seem fundamental to understanding the overall picture.
- (On pause) Read Digital Image Processing by Gonzalez and Woods.

## References


[1] K. Kimble, K. Van Wyk, J. Falco, E. Messina, Y. Sun, M. Shibata, W. Uemura, and Y. Yokokohji, "Benchmarking protocols for evaluating small parts robotic assembly systems," *IEEE Robotics and Automation Letters*, vol. 5, no. 2, pp. 883–889, 2020.

[2] G. Boothroyd, "Design for manufacture and assembly: The boothroyd-dewhurst experience," in *Design for X*, pp. 19–40, Springer, 1996.

[3] K. Van Wyk, M. Culleton, J. Falco, and K. Kelly, "Comparative peg-in-hole testing of a force-based manipulation controlled robotic hand," *IEEE Transactions on Robotics*, vol. 34, no. 2, pp. 542–549, 2018.

[4] W. K. Zinsser, *On writing well : the classic guide to writing nonfiction*. New York: HarperCollins, 30th anniversary ed., 7th ed., rev. and updated ed., 2006.

[5] W. Strunk Jr., *The Elements of Style: Classic Edition: With Editor's Notes, New Chapters  Study Guide*. 2018.

[6] A. Kirillov, K. He, R. B. Girshick, C. Rother, and P. Dollár, "Panoptic segmentation," *2019 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, pp. 9396–9405, 2019.

[7] C. Forster, M. Pizzoli, and D. Scaramuzza, "Svo: Fast semi-direct monocular visual odometry," in *2014 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 15–22, May 2014.

[8] B. Horn, "Closed-form solution of absolute orientation using unit quaternions," *Journal of the Optical Society A*, vol. 4, pp. 629–642, 04 1987.

[9] N. Silberman, D. Hoiem, P. Kohli, and R. Fergus, "Indoor segmentation and support inference from rgbd images," pp. 746–760, 10 2012.

[10] Y. Wang, Y. Sun, Z. Liu, S. E. Sarma, M. M. Bronstein, and J. M. Solomon, "Dynamic graph CNN for learning on point clouds," *CoRR*, vol. abs/1801.07829, 2018.

[11] K. He, G. Gkioxari, P. Dollar, and R. Girshick, "Mask r-cnn," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, p. 1–1, 2018.

[12] C. Dong, C. C. Loy, K. He, and X. Tang, "Image super-resolution using deep convolutional networks," *CoRR*, vol. abs/1501.00092, 2015.

[13] D. Liu, Z. Wang, N. M. Nasrabadi, and T. S. Huang, "Learning a mixture of deep networks for single image super-resolution," *CoRR*, vol. abs/1701.00823, 2017.

[14] K. Doherty, D. Fourie, and J. Leonard, "Multimodal semantic slam with probabilistic data association," in *2019 International Conference on Robotics and Automation (ICRA)*, pp. 2419–2425, May 2019.

[15] F. Wang, M. Jiang, C. Qian, S. Yang, C. Li, H. Zhang, X. Wang, and X. Tang, "Residual attention network for image classification," *CoRR*, vol. abs/1704.06904, 2017.