

**Sensors and Motors Lab**

**Individual Lab Report #2**

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**Team D - CuBI**

**Teammates: Jorge, Nithin, Bobby, Laavanye**

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## CuBi

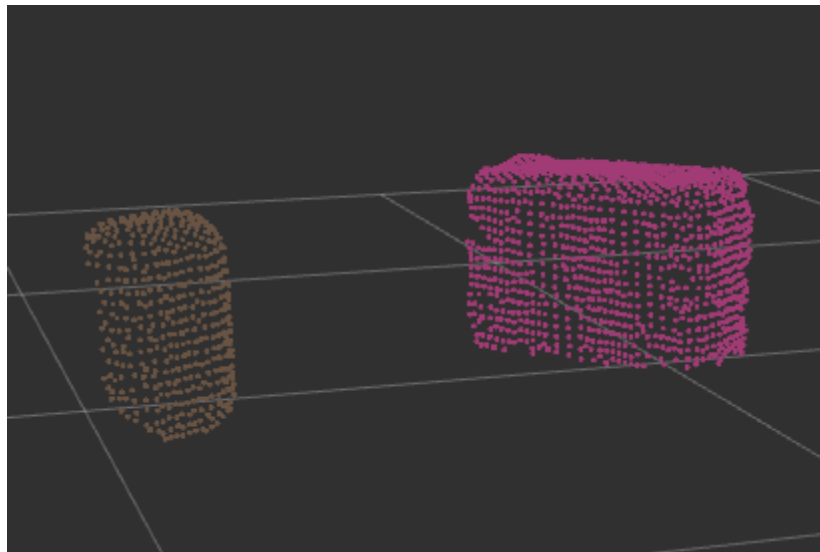
### Individual Progress

#### Laavanye

Further work was done to improve the processing of point cloud data, including:

- Statistical outlier removal
- Voxel filter down-sampling
- Clustering and masking

Below is the best output for a very carefully selected 3D image frame. But it is not the case all the time. Work has to be done to make a good preprocessing output for almost every frame and object.



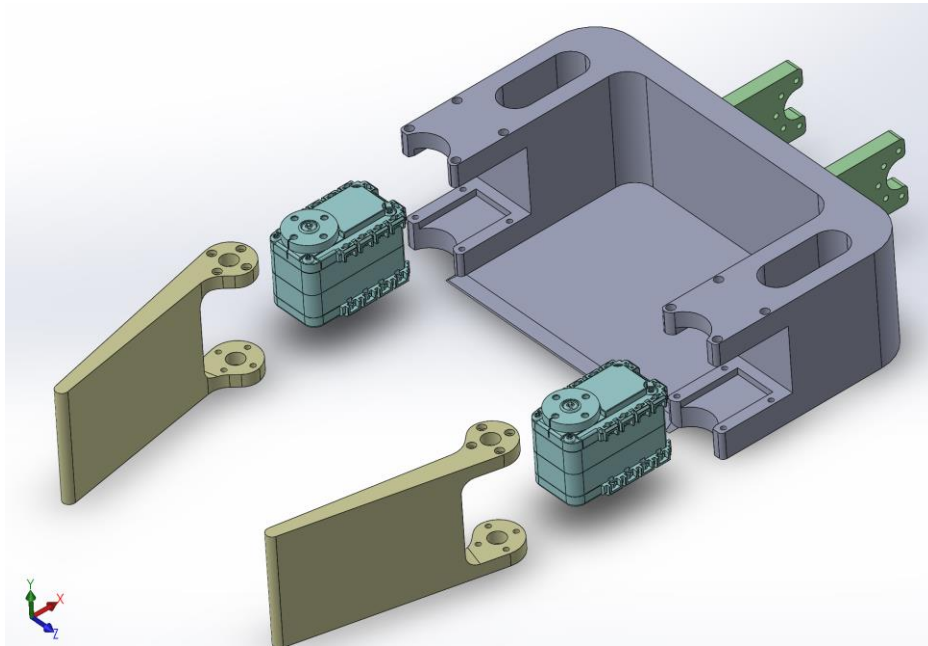
**Jorge** and **Nithin** continued working on the Dynamixel, but this time implementing them on the actual robot manipulator. The control of Dynamixel AX-12A motor was achieved, to power the gripper and grasp the objects. A 12V supply was provided to the motor using a ArbotiX-M controller and a USB2Dynamixel was used to control the motor. The motor was so powerful that it could pick up much heavier objects than estimated.

**Bobby** put a lot of work on the Turtlebot Wafer mobile base as follows:

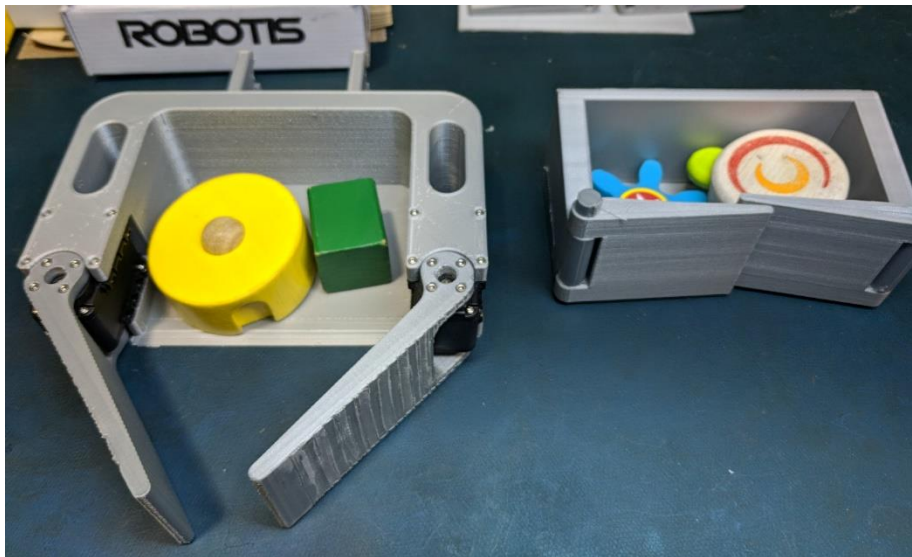
- Replace raspberry pi with Intel NUC (hacked with screws, need to be changed later)
- Splitter cable for power distribution (replace with power distribution board in the future)
- NUC will boot automatically when connected to power (set in BIOS)
- NUC will bring up as AP mode (WiFi access point) for remote access via SSH
- Joystick driver, cmd\_vel publisher and velocity smoothing mechanism

**Manipulator** continues to be my focus and substantial product was made:

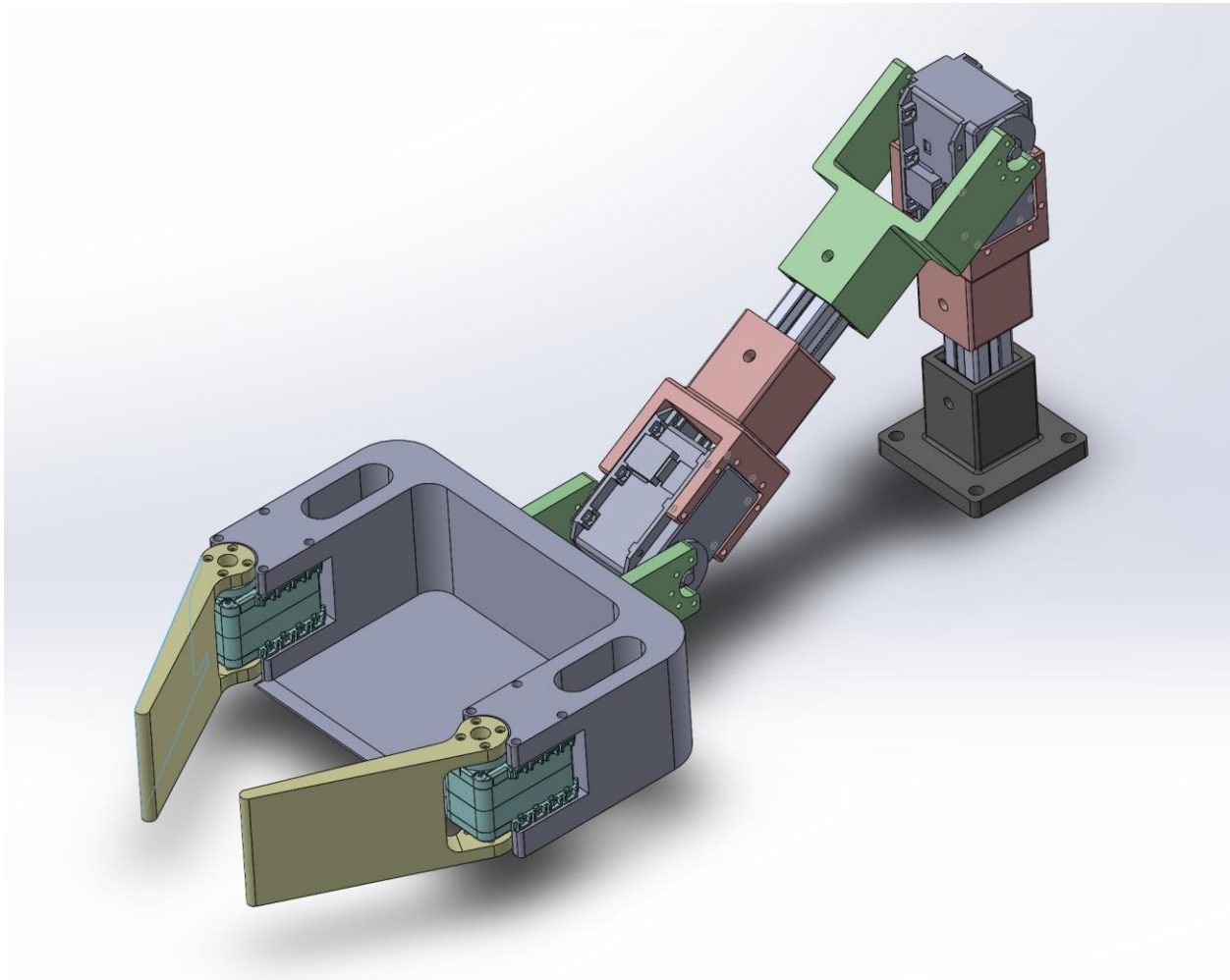
I have re-designed the front tray to accept the Dynamixel motors:



Assembly was done, tested and demonstrated during the progress review:



Below is the updated version of the complete manipulator.



### Next Steps

- 3D print and fabricate all the parts
- finalize assembly
- collaborate with team on ROS integration, controls
- in the near future mount manipulator on top of mobile base

### Challenges

- test payloads against actuators stall torque and smooth motion
- test multiple scenarios with different parts, dimensions, shapes and weights
- try and circumvent pathological cases of failed grasping