
Individual Lab Report - 10

Autonomous Reaming for Total Hip Replacement



 **HIPSTER** | **ARTHUR**

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Team C:

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1 Individual Progress

This week I made some improvements to the UI frontend, helped integrate all subsystems with the UI and finally, assisted in dry runs and debugging. 1 shows a screenshot of the updated UI.

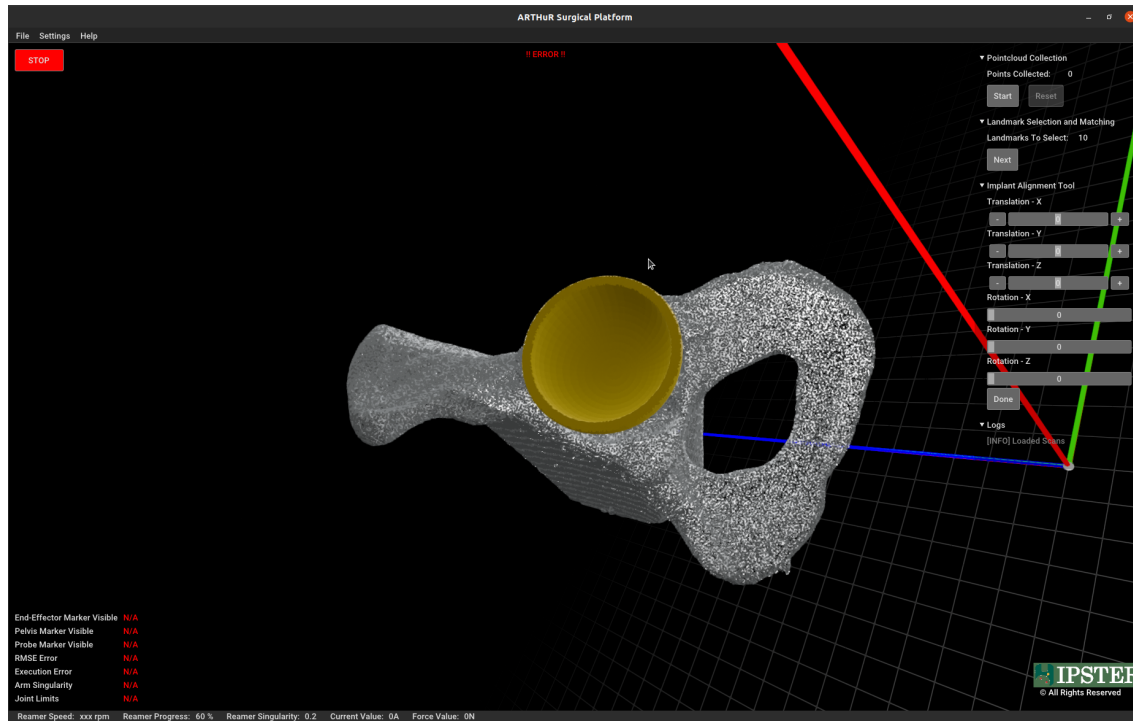


Figure 1: Pointcloud Collection

2 Challenges

There were several integration challenges. These include using the correct ROS topic names, message types, and publisher/subscriber frequencies. In the perception and UI integration, both subsystems access the same ROS parameter. This parameter controls the pointcloud collection start and stop. We were unable to get these to sync, however, upon trying multiple tests, we were able to figure out the issue.

3 Team Work

Following are the tasks accomplished by the team members since the previous ILR.

- **Kaushik Balasundar** worked on implementing a low-level position and velocity controller for the end-effector. He worked with Sundaram to integrate the end-effector controls with the watchdog and with Anthony to integrate and tune end-effector controls with arm controls. He worked with Anthony to integrate and tune end-effector controls with arm controls.
- **Parker Hill** assembled the end-effector hardware with Anthony and Sundaram, as well as designed and 3D-printed the end-effector cover. He redesigned the electrical system to be

adapted onto a single 3D-printed part and created custom connectors to interface with the motors. He worked with the entire team to aid in various integration and testing tasks, and with Anthony to determine sources of misalignment error and hand-tuned the base positioning. He adjusted origins of all meshes for ease of use in UI and system validation.

- **Anthony Kyu** worked with Sundaram to integrate the Watchdog Subsystem with the Arm Controller. He worked with Kaushik to integrate and tune the End-Effector Controls with the Arm Controller. He worked with Parker to determine sources of misalignment errors in the system and hand-tuning the base positioning for accurate alignment. He worked with Sundaram and Parker to design and 3D-print the end-effector cover. He also worked with the entire team to obtain acetabular reaming results for system validation.
- **Sundaram Seivur** He worked on completing the development of the watchdog with thorough testing. He worked with Kaushik to integrate the end-effector controls with the watchdog. He worked with Gunjan to integrate and display all watchdog critical functionalities on the User Interface. He assisted Anthony and Parker with the design and 3D print of the end-effector cover. He worked with Parker on the FVD evaluation metric and explored different tools for evaluation.
- **Gunjan Sethi** completed UI integration with WatchDog. She debugged issues with UI and pointcloud collection integration with Kaushik. She worked with Sundaram to provide the required post-implant-alignment data for the final reaming performance evaluation.

Everyone worked together to perform dry runs.

4 Plans

For future work, the following (individual) tasks have been planned for the MRSD project.

4.1 Create Poster

I will be creating a poster for the FVD day and the final poster presentation day.

4.2 Debug, Debug, Debug

As mentioned in the challenges section, many minor bugs exist in the UI. I will continue to debug those. We are now maintaining an Issues Log to track all the bugs.