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AI-generated content may be incorrect.

Connor Major

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*Logbook*

## Foreword

Previously, I attempted to achieve this project in Semester 1, 2025 for PAST onboarding. However, I did not achieve sufficient milestones for my work to be accepted. I am re-applying, however, as I consider this project challenging and fulfilling and failed to achieve most of the significant design, I am redoing this project. Milestones 1 & 2 have been kept as they are primarily research documents, however milestone 3 has been entirely abandoned with a new concept design.

## Work Completed

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Week** | **Time** | **Work Accomplished** |
| **13/8/25** | **0** | **2 hrs** | * **Installed Inventor NASTRAN** * **Joined PAST discord server** * **Watched youtube videos about inventor NASTRAN and the analysis process. Learned how to work with parts and assemblies and interpret simulation data** * **Reread my previous notes on JAXA requirements and concept designs** |
| **20/8/25** | **1** | **2 hrs** | * **Made logbook document and wrote a foreword** * **Revisited previous draft design concepts and cleared out old concept designs to make way for new ones** * **Attended session and took quiz** * **Researched manufacturers for potential designs and found JLCCNC and Xometry** * **Researched precision metal bending** |
| **22/8/25** | **1** | **3 hrs** | * **Came up with new concept design (#3) using CNC machined parts.**   While previous designs used bent metal parts, after researching the cost and quality of CNC machined parts, I determined that using some CNC parts would overall reduce manufacturing complexity as hand-bending metal precisely is far too complex for students to perform |
| **27/8/25** | **2** | **2 hrs** | **Attended session**   * **Researched bolts for the design. After asking Raph & Inde, I found that McMaster is preferred, and most designs used M2 or M3 bolts.** * **Learned about PAST PCB sizing and adjusted my concept design to meet PAST PCB sizing** * **Referenced JAXA clearances to update my design. I calculated the surface area percentage of my rails with recesses and adjusted the recess sizes to accommodate the required 75% by JAXA specification** * **Changed to 3 mounting points and larger brackets to allow for mounting ease and meet JAXA requirements** |
| **28/8/25** | **2** | **1 hrs** | * **Researched manufacturing methods for flat plate aluminum & the available aluminum 6061 sheets in Australia. Noted the allowable thicknesses for future concept design work.** * **While laser cutting allows fine precision, it isn’t suitable for thicker materials. Waterjets have rougher surface finishes, so they may need sanding** * **Researched satellite surface finishes and found that most materials need to be sanded or ground down.** |
| **29/8/25** | **2** | **2 hrs** | **Updated my rail designs. Reduced mass by adding cutouts while maintaining a safety margin over JAXA minimum spec, thickened the bracket to increase stiffness and allow for extra recess after researching bolt head heights on McMaster, and added chamfers to both surfaces to meet the JAXA spec.** |
| **30/8/25** | **3** | **1 hrs** | * **Consulted with my AERO3001 professor (Robert) about CAD options for cubesats. Learned about the dimensional accuracy and tolerances of JLCCNC and competitors, as well as their quality. Learned that BINAR uses their work for non-critical test hardware and about the drawbacks and advantages of these shops** * **Investigated the dimensional accuracy of JLCCNC and the range of surface finish / threading options they provide to drive design** * **Researched existing cubesat designs from both COTS providers (both websites and youtube) as well as student designs to gain an understanding of general concepts in cubesat design in terms of rough dimensions of components and general design trends** |
| **1/9/25** | **3** | **3 hrs** | * **Created and described 3 concept designs using what I learned about exsiting designs to base existing designs** * **Created a ranking system for my concept design** * **Listed pros and cons of each cubesat design** * **Selected my final design using my ranking system** * **Began modelling of concept design 3** |
| **2/9/25** | **3** | **2 hrs** | * **Refined model of concept design 3** * **Began selecting bolted components** * **Modelled total mass to be ~140g using inventor’s BOM system and iProperties** * **Refined design to use real 6061 sheet sizes** * **Used small representative areas of my design to investigate clearances and manufacturability of the design** |
| **6/9/25** | **3** | **2 hrs** | **Revised concept design assembly to include multiple layers by creating a tileable layer design through inspection of the constraint sets**  **Updated material sizing to improve level to level clearances and noted bolt sizings**  **Researched how to parametise designs in inventor to allow for quicker modification and began the process of reworking my dimension and constraint sets to allow for quicker edits** |
| **10/9/23** | **4** | **2 hrs** | **Attended the week 4 session**  **Had my design reviewed by PAST members Aiden and Jack to spot any glaring issues physically. Jack noted potential vibration concerns, leading to a design revision to enhance stiffness horizontally.**  **Discussed with PAST members about PCB thickness and ended up settling on a representative 92x92x1.6 pcb with rounded corners and a FR-4 material**  **After modelling a PCB, I split the frame into three modular sections that could be tiled in the assembly, allowing for ease of design modifications**    **A revised structural frame bottom with a PCB for the top mount.**  **Re-investigated specifications for required tolerances and adjusted assembly layout to make full use of allotted space.**    **New stackup.** |
| **12/9/15** | **4** | **1 hr** | **Modified the design of the horizontal reinforcement bars to add more mass (with the goal of reducing vibration and increasing supported load) and add central mounting holes so that solar panels or externally facing assemblies could be mounted on** |

## Final Design overview

Strengths  
Weaknesses  
Screenshots  
Concept

## Final Design BoM

|  |  |  |  |
| --- | --- | --- | --- |
| Part | Supplier | Cost | Link |
|  |  |  |  |
|  |  |  |  |

## Deliverables completed

|  |  |  |
| --- | --- | --- |
| Deliverable | Status | Link |
| Deliverable 1: Design requirements | Finished in Sem 1 | https://github.com/sudo-ellipsis/PAST-onboarding/blob/main/Deliverables/1.%20JAXA%20Requirements.md |
| Deliverable 2: Cubesat structure review | Finished in Sem 1 | https://github.com/sudo-ellipsis/PAST-onboarding/blob/main/Deliverables/2.%20Cubesat%20Structures.md |
| Deliverable 3: Concept designs | Started Sem 2 Week 2  Finished, Sem 2 Week 3 |  |
| Deliverable 4: Concept design CAD | Started Sem 2 Week 3  Finished, Sem 2 | None |
| Deliverable 5: FEA |  |  |
| Deliverable 6: Technical drawings |  |  |
| Deliverable 7: 3D print |  |  |

## Reflection