

University of Colorado at Boulder HELIOS V Team March Status Report

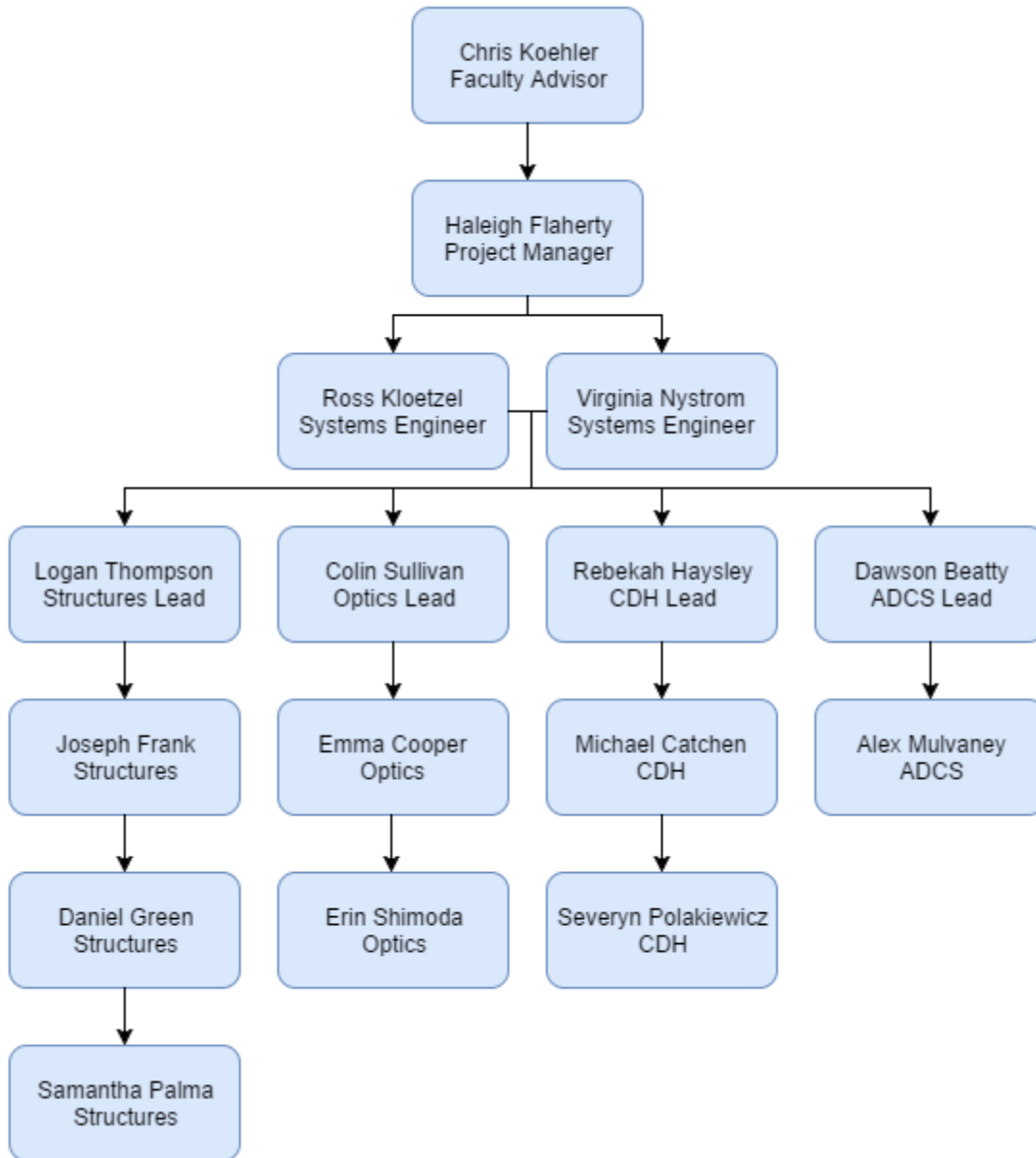
This month the HELIOS V team completed their final design review, the Critical Design Review (CDR). With this review, the team worked to finalize the design in preparation for the construction and testing phase of the project. After the review the team worked on reviewing the given feedback and several sub teams began testing components of their systems. In addition to completing the CDR, the team also worked on the first PSIP.

Team Demographics

Student	Ethnicity	Gender	Year	Major	Start Time	End Time	Grad/ Undergrad
Haleigh Flaherty	Caucasian	Female	Sophomore	Aerospace Engineering	January 2015	Current	Undergrad
Paige Arthur	Caucasian	Female	Junior	Aerospace Engineering	January 2015	Current	Undergrad
Ryan Cutter	Caucasian	Male	Junior	Aerospace Engineering	January 2015	Current	Undergrad
Erin Shimoda	Caucasian/ Asian	Female	Freshman	Aerospace Engineering	February 2015	Current	Undergrad
Virginia Nystrom	Caucasian	Female	Freshman	Aerospace/ Applied Math	February 2015	Current	Undergrad
Joseph Frank	Caucasian	Male	Freshman	Engineering Physics	February 2015	Current	Undergrad
Severyn Polakiewicz	Caucasian	Male	Sophomore	Aerospace Engineering	February 2015	Current	Undergrad
Rebekah Haysley	Caucasian	Female	Freshman	Mechanical Engineering	February 2015	Current	Undergrad
Colin Sullivan	Caucasian	Male	Freshman	Aerospace Engineering	February 2015	Current	Undergrad
Samantha Palma	Caucasian/ Asian	Female	Freshman	Mechanical Engineering	February 2015	Current	Undergrad
Ross Kloetzel	Caucasian	Male	Freshman	Aerospace Engineering	February 2015	Current	Undergrad

Michael Catchen	Caucasian	Male	Freshman	Aerospace Engineering	February 2015	Current	Undergrad
Alex Mulvaney	Caucasian	Male	Freshman	Aerospace Engineering	February 2015	Current	Undergrad
Logan Thompson	Caucasian	Male	Freshman	Aerospace Engineering	February 2015	Current	Undergrad
Dawson Beatty	Caucasian	Male	Freshman	Aerospace Engineering	February 2015	Current	Undergrad
Gage Froelich	Caucasian	Male	Sophomore	Mechanical Engineering	February 2015	March 2015	Undergrad
Daniel Green	Caucasian	Male	Sophomore	Mechanical Engineering	February 2015	Current	Undergrad
Emma Cooper	Caucasian	Female	Freshman	Aerospace Engineering	March 2015	Current	Undergrad

Team Organization



Accomplishments of April

Structures: This month the structures team has worked out several of the smaller details of the payload design. For example, they have created plans for the telescope mount that will hold the optics system in place (seen in Figure 1). Some additional changes they have made include adding lightening cuts to some of the larger aluminum pieces of the payload to reduce weight. This choice was made because the structures team has been able to make more detailed weight budget predictions as the SolidWorks models get more complete. These models have found that the payload is getting close to the HASP weight limit, therefore they plan to add lightening cuts to

reduce that weight.

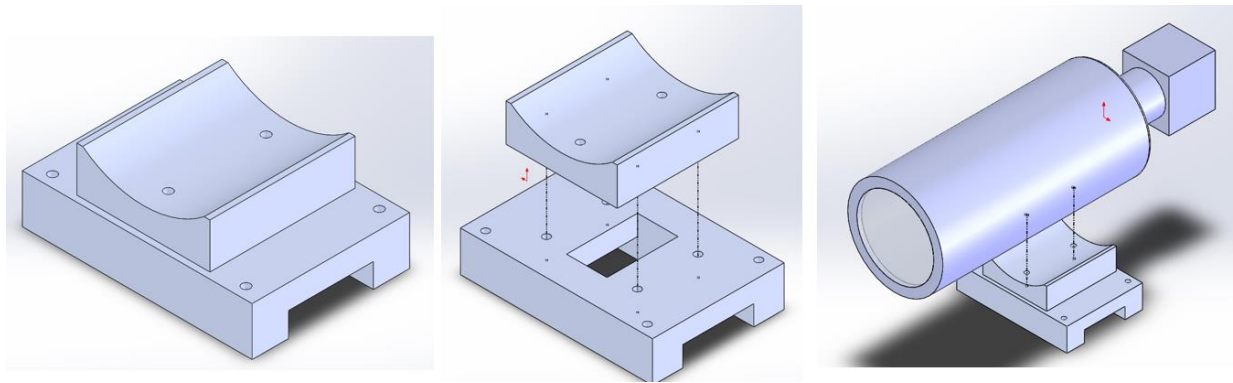
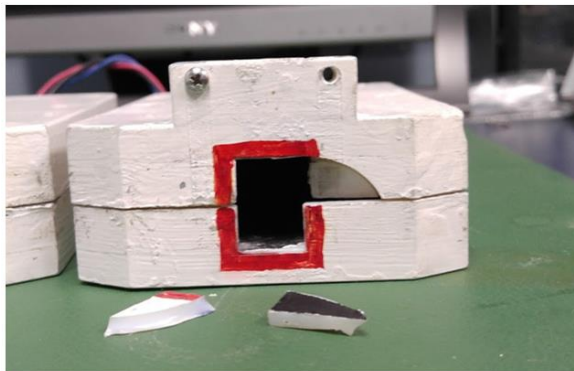


Figure 1: Telescope mount

The structures team has also made their machining and initial assembly plans. This includes knowing what machining processes that parts of the payload will require so that they can begin machining in the first weeks of May.

One problem that the structures team encountered this week is finding out that the photodiode housings from HELIOS IV have been damaged (pictured in Figure 2). The source of the damage is unknown, but believed to be due to the thinness of the walls on the front of the housing. The team has already begun reprinting the photodiode housings, using the same SolidWorks as the originals so that they are not changed from HELIOS IV. These photodiode housings so be completed today and will soon be shipped to the team.

Box 1



Box 2



Figure 2: Photodiode damages

Optics: The optics team have been working on two major aspects; defining HELIOS V's criteria for mission success, and improving the optics pictures. For the success criteria, the optics team met with Professor Jason Glenn, a professor of astronomy at the University of Colorado at Boulder, to develop a method of quantifying how "good" an image from the science camera is. The method the team currently plans to use is creating pixel value plots that allow the team to quantify how crisp the image. To explain this in further detail to the HASP team, the project manager has emailed the directors of HASP separately to discuss the mission success criteria asking for a one on one meeting.

Improving the optics system is the main goal of the team. As this payload will be limited by the quality of the hardware, the team has been doing in-depth research into the best products to use on the payload. They have also begun testing their current hardware through several test images taken with the optics equipment.

CDH: The CDH team worked on how to make the two microprocessors on the payload communicate and improved the list of commands for the payload. The team has successfully had the two Pis communicate using an Ethernet cable. For the list of commands, the team has added several health check commands to help in monitoring the payload over flight.

ADCS: As the ADCS team is still waiting to begin testing until the structure is complete, they have instead been focusing on the physical reset. This reset has been implemented to prevent a failure such as on HELIOS IV when the counterweight failed and caused the payload to miss count its motorsteps.

In addition to the physical reset, the ADCS team has created detailed testing plans for their system so that they can begin testing as soon as the structure is ready.

EPS: The EPS side of the systems team has been working on understanding the electronics on HELIOS IV so that they can reroute lines that will no longer be use. They also have been working to reprint new diode boards to go into the new photodiode housings. This diodes are the exact same as HELIOS IV.

Systems: The systems team led the team in writing the PSIP report. In addition to this, they have created the testing plans for full systems tests and day in the life tests.

Plans for May

The HELIOS V team is now moving into the construction and testing phase of the project. The management team created end of the semester goals for each team which will be completed by May 9th. For the structures team, this includes ordering the raw materials they will need for the structure and having completed SolidWorks models that are ready to go to the machine shop. The optics team will be ordering their remaining parts for their system and continue testing it. This includes finding the idea location for the focal reducer and camera to be placed so that the light is correctly focused into the camera for the best quality pictures. The CDH team will work to have

the upper housing Raspberry Pi communicate with the science camera so that they can test their code for it. ADCS will be finalizing the physical reset options and soon begin testing when the structure is complete.

This is all to be done in the first week of May. After this, the team will begin the true construction phase as the payload will be built and assembled before the end of May. Currently, the goal is to have the full system integrated no later than the first week of June to give as much time for systems testing as possible.