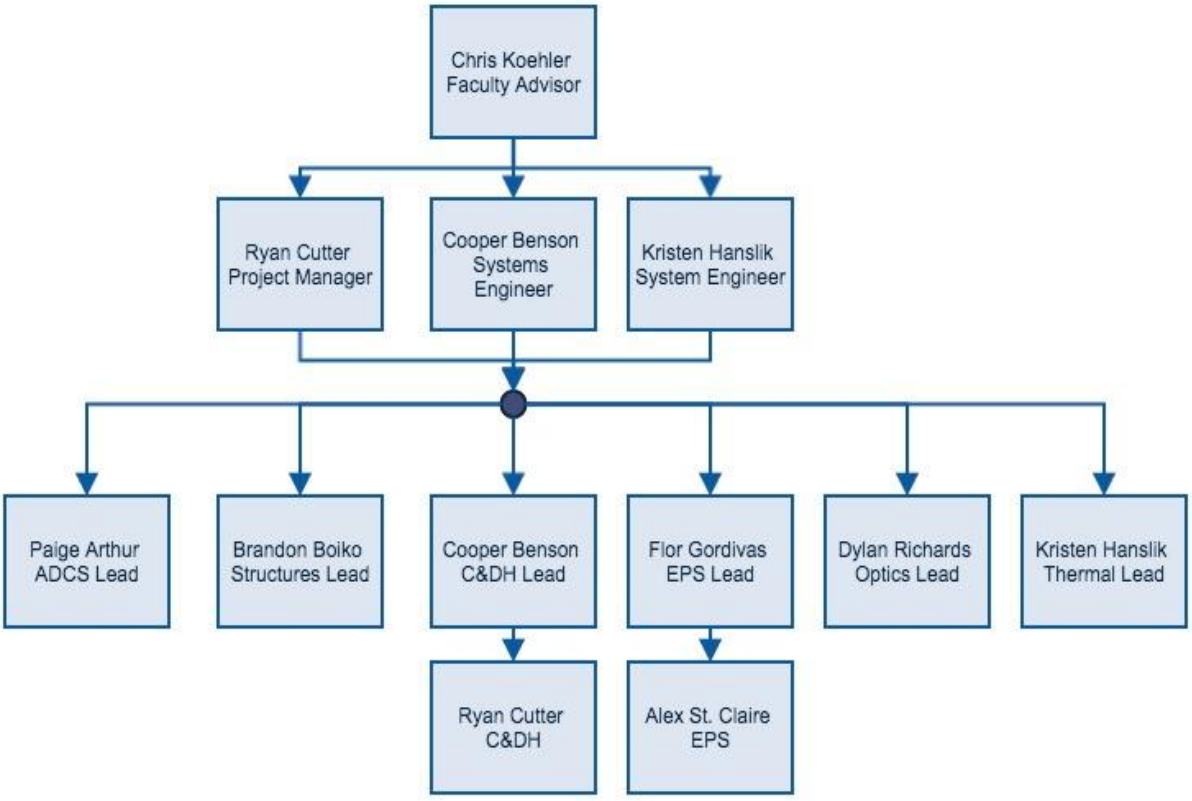
University of Colorado at Boulder HELIOS IV June Status Report

In the month of June HELIOS ran multiple full systems tests, during which they found and fixed minor issues. They made the tracking movement smoother by adding heavier filters and slightly changing the software. They painted the structure, installed MLI, and integrated all components into the structure.

Team Demographics:

Student	Ethnicity	Gender	Year	Major	Start Time	End Time	Grad/ Undergrad
Paige Arthur	Caucasian	Female	Junior	Aerospace Engineering	November 2013	Current	Undergrad
Cooper Benson	Caucasian	Male	Junior	Aerospace Engineering	November 2013	Current	Undergrad
Kristen Hanslik	Caucasian	Female	Senior	Computer Science	December 2013	Current	Undergrad
Dylan Richards	Caucasian	Male	Junior	Aerospace Engineering	November 2013	Current	Undergrad
Ryan Cutter	Caucasian	Male	Junior	Aerospace Engineering	January 2014	Current	Undergrad
Brandon Boiko	Asian and Caucasian	Male	Senior	Mechanical Engineering	June 2014	Current	Undergrad
Kevin Paynter	Caucasian	Male	Senior	Mechanical Engineering	October 2014	December 2014	Undergrad
William Vennard	Caucasian	Male	Senior	Mechanical Engineering	January 2015	May 2014	Undergrad
Anthony Torres	Caucasian	Male	Junior	Aerospace Engineering	October 2014	May 2014	Undergrad
Flor Gordivas	Hispanic	Female	Senior	Electrical Engineering	October 2014	Current	Undergrad
Rebecca Lidvall	Caucasian	Female	Senior	Aerospace Engineering	October 2014	May 2014	Undergrad
Alex St. Claire	Caucasian	Male	Sophomore	Aerospace Engineering	November 2014	Current	Undergrad

Team Organizational Chart:



Accomplishments of June:

ADCS: The Attitude Determination and Control System conducted multiple systems tests as the weather permitted. During these tests, they characterized the photodiode field of view, ensured the system would not be thrown off by reflections or shadows, and determined the optimal filtering of the photodiodes. They found and fixed several minor tracking errors in the ADCS code and added crosshairs to the ADCS images to better tell how centered the sun is in the images. They purchased and installed heavier filters in the photodiode housings to reduce noise in the photodiode data and installed razor blades to reduce reflections. They smoothed the movement of the payload by fixing the uplink code, which was causing everything to slow down, and fixed the ADCS camera interval by changing the temperature sensor sampling interval, which was also slowing down several components. They determined that the system will continuously move counter-clockwise until locking onto something, which, while unplanned, increases probability of success because it guarantees the system will actively look for the sun until it finds it, reducing the need for nudge commands. They also added several features to their test stand to prevent power cables from getting tangled when they spun the turn table.

C&DH: Command and Data Handling has fixed the issue that caused the ADCS camera to not boot up correctly. They finished testing all of the uplink commands, fixing the panning mode and the command that switches to the backup diode pair. They worked with Optics to test the timing of the two cameras and determined that they both took pictures at 10-second intervals with an

acceptable accuracy (i.e. the time the images were taken can always be known to within one second accuracy). CDH has written an additional command to cleanly shut down the payload that the team will send before power is cut to the HASP payloads at the end of flight. They have worked on data analysis by writing a script that will quickly organize and plot the data for each of the sensors and motors.

EPS: The Electrical and Power System tested the system with low and high voltages (28V and 33V) and ensured it ran successfully. They integrated the power board with the structure and measured the wires so that they can install new, shorter wires that will make the payload less crowded and reduce weight.

Optics: Optics has gotten the ADCS camera to successfully focus on the sun. They are currently working on adjusting the filter on the GoPro to reduce reflections in the images. They have been running systems tests with ADCS and analyzing the resulting images. The most successful system tests have produced images with the sun consistently within half of a degree of the center of the image. However, this depends on calibrating the photodiodes at the beginning of every day. The team is currently working on a way to make it so that this step is no longer necessary.

Structures: Structures has drilled holes in the baseplate for the Raspberry Pi to be attached. They were planning on countersinking the screws in the bottom of the baseplate, but determined that this was not necessary. They integrated all of the components into the structure, including the Raspberry Pi, the power board, and all of the sensors. They primed and painted the outside of the structure white and cut and attached the MLI for thermal protection.

Management: Management has created systems testing documentation and systems demonstration documentation. All systems tests have followed this documentation and changes have been made to the documentation as needed. Management has determined that the most recent systems test is acceptable for providing HASP with proof of full systems testing, and will be provided to HASP once the data from that test has been organized and analyzed. They have run a demonstration test as well to run through what they will present during the demo to HASP. They have made travel arrangements to Texas on August 2nd and back home on August 8th. They have almost finished the finalized version of the PSIP. They have organized the team meetings and have continued to mentor the SIMBA team.

Plan for July

HELIOS IV will give a demonstration of their payload's capabilities to HASP. They will run more full systems tests including day in the life testing and will solve the problem of having to recalibrate the photodiodes every day they run tests. They will implement image analysis. They will replace some of the wires with shorter ones to make the payload less crowded. They will finish the final version of the PSIP and send it in, and then will begin working on the FLOP.