University of Colorado at Boulder HELIOS IV February Status Report

In the month of February, the team ordered a new camera with a very wide field of view to replace the science camera, which had a very narrow field of view. They have been updating their design accordingly. Structures has found a way to mount the new camera and EPS is updating the power board to adequately supply it power. CDH has gotten the new camera working and has finished the image analysis code. ADCS succeeded in tracking the sun on both elevation and azimuth.

Team Demographics:

Cooper Benson: Caucasian male, sophomore, Aerospace Engineering

Paige Arthur: Caucasian female, sophomore, Aerospace Engineering

Kristen Hanslik: Caucasian female, sophomore, Aerospace Engineering

Dylan Richards: Caucasian male, sophomore, Aerospace Engineering

Ryan Cutter: Caucasian male, sophomore, Aerospace Engineering

Brandon Boiko: Asian / Caucasian male, junior, Mechanical Engineering

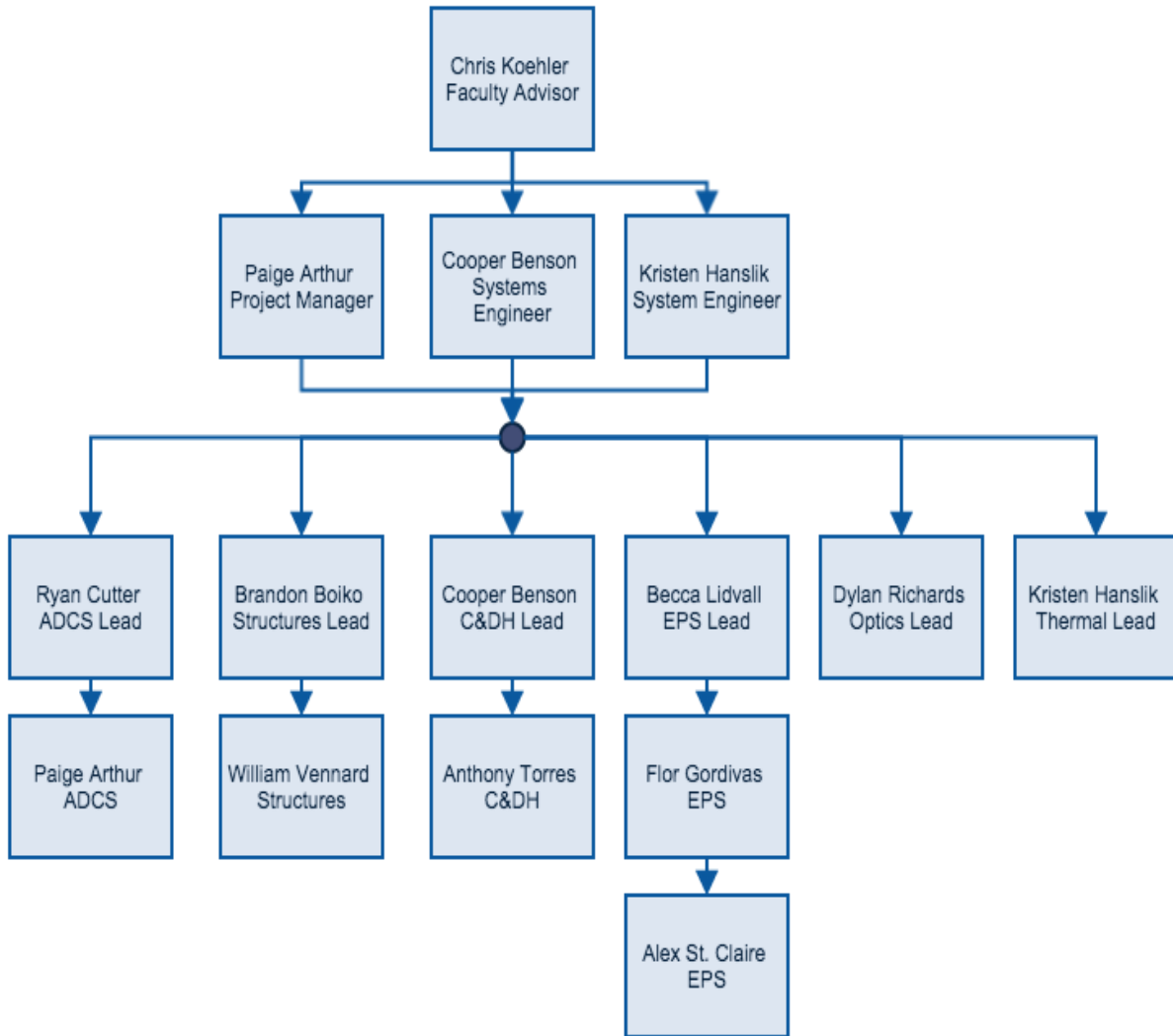Flor Gordivas: Hispanic female junior, Electrical Engineering

Rebecca Lidvall: Caucasian female, junior, Aerospace Engineering

Anthony Torres: Caucasian male sophomore, Aerospace Engineering

Alex St. Claire: Caucasian male freshman, Aerospace Engineering

William Vennard: Caucasian male junior, Mechanical Engineering

Team Organizational Chart:

Chris Koehler
Faculty Advisor

Paige Arthur
Project Manager

Cooper Benson
Systems
Engineer

Kristen Hanslik
System Engineer

Ryan Cutter
ADCS Lead

Brandon Boiko
Structures Lead

Cooper Benson
C&DH Lead

Becca Lidvall
EPS Lead

Dylan Richards
Optics Lead

Kristen Hanslik
Thermal Lead

Paige Arthur
ADCS

William Vennard
Structures

Anthony Torres
C&DH

Flor Gordivas
EPS

Alex St. Claire
EPS

Accomplishments of January:

ADCS: The Attitude Determination and Control System worked with Structures and their mentor, Lee Sutherland, to better align the elevation gear. This allowed the system to turn successfully on elevation to the payload's maximum attainable height. They were then able to run their tracking algorithm with both sets of diodes and both motors through the power board. As a result, the payload now appears to be successfully tracking on both elevation and azimuth. There have been some minor problems with backlash from the elevation gear and resistance from the azimuth gear, but those problems should be resolved with the new structure. ADCS is now finalizing their flight code by programming resets on azimuth (so that the payload cannot turn more than a full revolution) and stops on elevation (so the payload will not try to turn higher or lower than it is physically able).

C&DH: Command and Data Handling has updated the flight code to reflect a change in how image analysis will be carried out. They added several new threads to flight code and cleaned up

the flight code directory. They finished the image analysis code and will test it soon with ADCS and the camera. They ordered and received a new camera that is currently working far better than the old ADCS camera did in the past. They also tested the new GoPro camera.

EPS: The Electrical and Power System finished testing the power board with the components. They have been updating the power board to reflect the changes from the new wide FOV camera and the problems encountered with the previous revision and will order the board within the next day or two. They finished setting up the temperature sensors and have been testing all of the environmental sensors through the Gertduino; however, they have encountered problems trying to get the Gertduino to run the sensors properly. They tested the GoPro by taking multiple images over a long period of time.

Optics: Optics researched and chosen a new camera with a wide field of view, a GoPro Hero 3. They have been researching the filters that they want to place over the lens of the camera to ensure that the image does not become oversaturated with light. They are planning on testing the field of view of both the GoPro and the new ADCS camera tomorrow to verify that the FOV is the same as reported by the manufacturers.

Structures: Structures has been machining the new structures for HELIOS IV. They have finished the base structure and intermediate structure and redesigned the camera mounting plate for the new GoPro. The have starting on the motor mounts. They created new files to reflect the changes from the new GoPro. They have ordered and received more parts including the helical inserts, bearings, metal rods, dowel pins, and nuts.

Management: Management has responded to comments on the proposal, put together a document that includes all of the design changes that came about as the result of the proposal comments, and updated the proposal to reflect the changes and include the comment responses and design changes document. They have organized the team meetings and put together an updated schedule and budget. They have continued to mentor the SIMBA team. They also organized a demo day in Space Grant during which the team presented an overview of their design, changes from the proposal, and a general timeline and demonstrating the payload successfully tracking a light source. They have coordinated with the director of COSGC.

Plan for March

HELIOS IV will implement the image analysis software into the flight code and test with ADCS. They will characterize the ADCS system with the cameras by taking images as the system tracks and comparing the images to the photodiode data. They will finish the new structure and transfer all of the components from the old structure to the new one. They will hold another demo day for Space Grant before spring break. EPS will order the new board within the next day or two and, once it arrives, they will populate it and test all of the components with it.