University of Colorado at Boulder April Status Report

In the month of April, the HELIOS III team began the first stages of implementation. The team was cleared to proceed with their CDR design and begin prototyping and testing the system. At this point in time, most of the subsystems have ordered parts and have begun testing their concepts. The HELIOS III management team also submitted an official paper to the annual Colorado Space Grant Symposium and presented the HELIOS III project at the symposium.

Team Demographics:

Cooper Benson: Caucasian male, freshman aerospace engineering

Paige Arthur: Caucasian female, freshman aerospace engineering

Kristen Hanslik: Caucasian female, freshman aerospace engineering

Chris Rouw: Caucasian male, freshman aerospace engineering

Justin Alvey: Caucasian male, freshman aerospace engineering and applied math

Chris Bradford: Caucasian male, freshman aerospace engineering

Dylan Richards: Caucasian male, freshman aerospace engineering

Tyler Lugger: Caucasian male, freshman aerospace engineering

Ryan Cutter: Caucasian male, freshman aerospace engineering

Matia Astarita: Italian international student, freshman aerospace engineering

Griffin Esposito: Caucasian male, freshman aerospace engineering
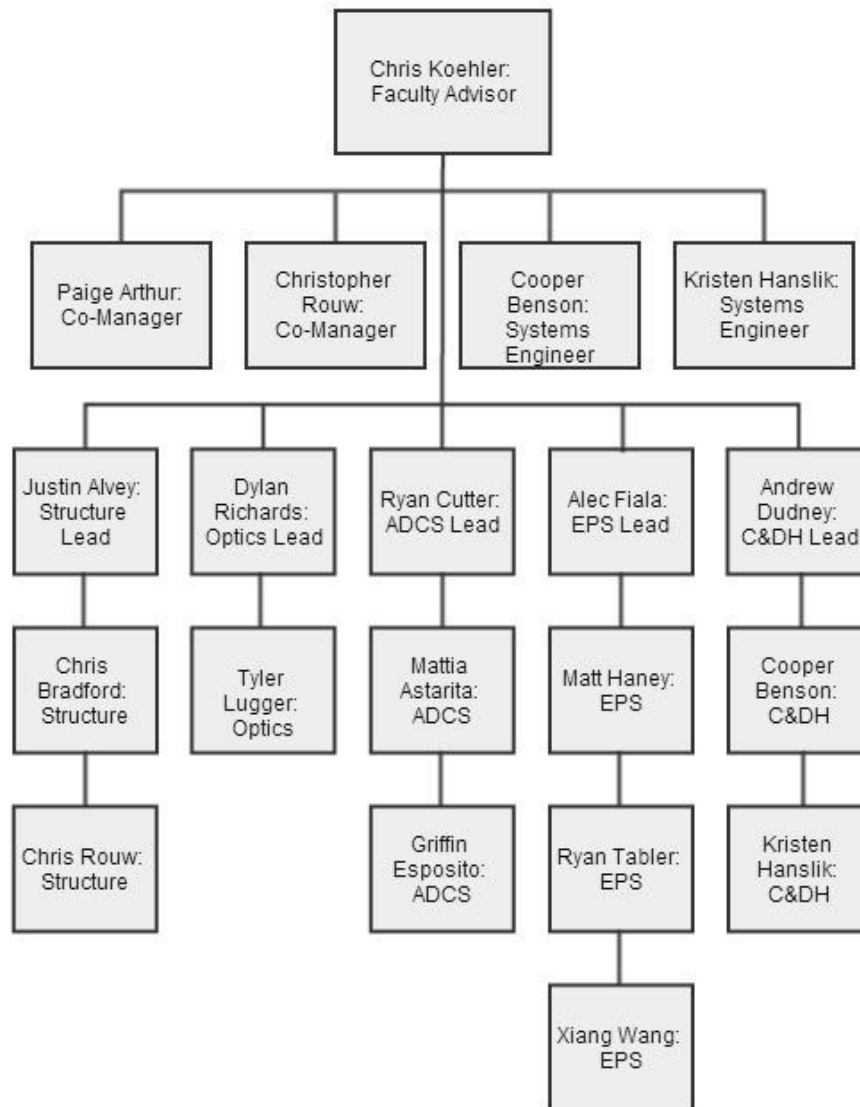
Alec Fiala: Caucasian male, freshman aerospace engineering

Ryan Tabler: Japanese male, freshman electrical and computer engineering

Xiang Wang: Chinese international student, sophomore electrical and computer engineering

Matt Haney: Caucasian male, freshman electrical and computer engineering

Andrew Dudney: Caucasian male, freshman electrical and computer engineering

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                    Chris Koehler:
                    Faculty Advisor

    Paige Arthur:    Christopher      Cooper         Kristen Hanslik:
    Co-Manager       Rouw:            Benson:        Systems
                     Co-Manager       Systems        Engineer
                                      Engineer

Justin Alvey:   Dylan          Ryan Cutter:   Alec Fiala:    Andrew
Structure       Richards:      ADCS Lead      EPS Lead       Dudney:
Lead            Optics Lead                                  C&DH Lead

Chris           Tyler          Mattia         Matt Haney:    Cooper
Bradford:       Lugger:        Astarita:      EPS            Benson:
Structure       Optics         ADCS                          C&DH

Chris Rouw:                    Griffin        Ryan Tabler:   Kristen
Structure                      Esposito:      EPS            Hanslik:
                               ADCS                          C&DH

                                              Xiang Wang:
                                              EPS
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Accomplishments of April:

C&DH: The C&DH team has completed two major milestones since March and is working on a third and fourth currently. The team has been able to succesfully take images from the Raspberry Pi (Primary CPU) with the HELIOS II cameras and save the images to the Pi. The team has also learned how to program the gain, shutter speed, and exposure of the cameras and will be able to change the settings with relative ease. The team encounted issues when connecting the Raspberry Pi, Gertduino, and computer together. However they are working to resolve these issues and complete their first communication test between the microcontrollers and a simulated ground.

ADCS: The ADCS team has aquired a set of photodiodes, a motor, and a motor driver. They have been able to succesfully record photodiodes readings using an Arduino Uno, however as

they have yet to create an Op Amp circuit, they have been unable to use the Raspberry Pi. Furthermore, the team have been able to generate a motor response based on the photoiode readings. The more intense the light, the slower the motors turn. Currently the ADCS team is working with Dr. James Green and members of the electrical energineering depratment at the University of Colorado at Boulder to create the Op Amps. The team attempeted to reuse the op amps from HELIOS II, however since they are using different photodiodes, the op amps did not work.

EPS: The primary goal for EPS during April was to design and test circuits essential for the poer board. The team spent most of the month working on understanding and creating the buck convertor circuit. They also learned the required Altium software in order to pring the PCB boards. Currently they are in the procces of creating a sinlge layer PCB for the buck convertor to test their circuit prior to printing the first power board PCB. The team encountered difficulties with the buck convertor throughout the process. They learned the buck convertor they purchased required a complex external circuit inorder to function as expected. They have worked closely with the HELIOS II EPS team to overcome many of the challenges and are in the final stages of testing the individual buck convertor circuit.

Optics: The Optics team is still in the conceptual stage of the project. The team is currently determining the final lense and filter configuration. The primary factor in the determination is whether or not to use a powered H-alpha filter. They have been working with faculty at the University of Colorado at Boulder as well as Day Star, the company responsible for manufacturing the powered filter. The team has made progress in creating a testing plan for the optics system. They have determined the most effective methods to test the FOV of the ADCS and Science camera. They have also worked with more senior members of the Colorado Space Grant Consortium to set up the correct testing procedures for outgassing. Finally, the team has begun researching what the gain, shutter speed, and exposure of each camera should be.

Structures: The strucutres team has completed the final model Solid Works. They are now in the process of creating a full-scale working model out of Acrylic. The base structure has been laser cut from varying thicknesses of acrylic and all the aluminum L brackets have been cut. They team plans to complete the model by Friday, April 25th and instal the gears the before Friday, May 2nd. Once done, the team will test the viabilty of the structure and make any modifications to the solid works. Then the team will began construction of the final structure, which will be made of Aluminum 6061.

Management: The management team has secured funding from multiple sources for the HELIOS III project. They were successfully award a $3000 grant from the Undergraduate Research Oppurtunity Program and an additional $10,000 from Dr. James Green with the University of Colorado at Boulder's Center for Astrophysics and Space Astronomy. The team is currently waiting to hear from the Univeristy of Colorado at Boulder's Engineering Excelence Fund. The management team submitted a formal paper to the Colorado Space Grant symposium and presented at the annual sysmposium.

Plan for May:

The semester ends on May 9th, 2014 for the University of Colorado Boulder. At this point, the team will decrease in size as members leave for the summer. The team will continue to work on the goals set forth during the semester. Once all individual subsystems are complete, they will begin testing between subsystems. The current goal is to have full system integration by July to allow for a month of testing and modifications prior to the official HASP integration and testing in Texas.