HASP Payload Specification and Integration Plan

Payload Title: ARIES-DYNAMICS

Payload Class: [✓ Small] Large (circle one)

Payload ID: TBD

Institution: Inter-American University of Puerto Rico

Contact Name: Jorge J.Quiñones

Contact Phone: 787-241-7525

Contact E-mail: jorgej1609@yahoo.com

Submit Date: 4/20/2012

I. Mechanical Specifications:

A. Measured weight of the payload (not including payload plate)

Total Weight of HASP Components	
Weight (g)	***Instruments/Components***
150	Panel Solar x 3
80	Caps Superior and Inferior
146.4	ADS Board
186.4	ACS Board
550	Payload platform
354.8	Bottom Box
308.2	Two Motors
42	Two Pitch Towers
89	Damper
47	Side Cage
40	Motor Cage
43	Servo Motor
163.77	CubeSat
283.8	Slip Ring + Bottom Damper
7.8	Pulley
3.1	Bottom Pulley
9.5	Two Bearing in Columns
86.89	Platform for Columns
19	Two Bearing in Bottom Box
122.24	Heating Plate + Empty Board
13.3	Principal Rod
2746.2	**Total**

B. Provide a mechanical drawing detailing the major components of your payload and specifically how your payload is attached to the payload mounting plate

See attached Drawings.

C. If you are flying anything that is potentially hazardous to HASP or the ground crew before or after launch, please supply all documentation provided with the hazardous components (i.e. pressurized containers, radioactive material, projectiles, rockets…)

The Aries-Dynamics team is not flying anything that is potentially hazardous to HASP or the ground crew.

D. Other relevant mechanical information

II. Power Specifications:

A. Measured current draw at 30 VDC

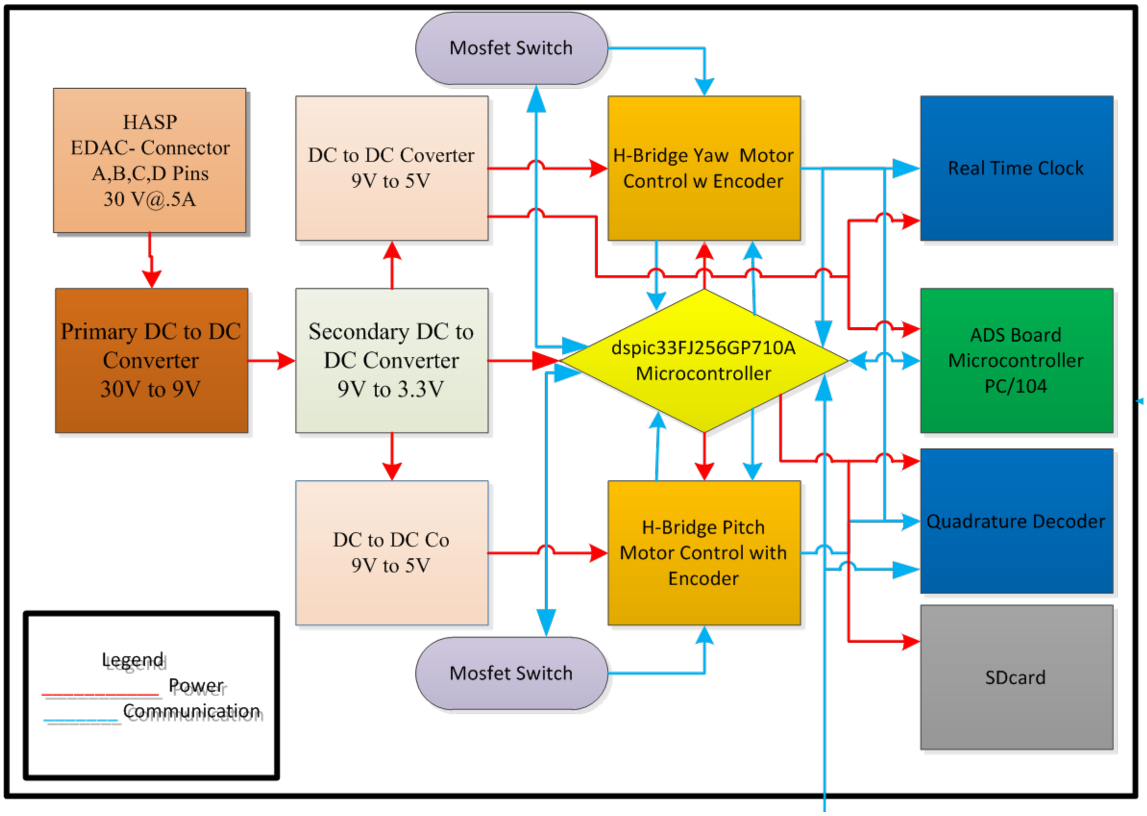
The primary available power source during flight is a 30V at 0.5A from HASP.

ADCS/Flight Computer Board, Run on HASP power				
Sensors	Voltage (V)	Current (A)	Power (W)	Power Source
Digital Temperature Sensor DS18B20	3.3	0.012	0.0396	HASP
PIC24HJ128GP306A Microcontroller	3.3	0.04	0.132	HASP
DSPIC33F256GP710A Microcontroller	3.3	0.05	0.165	HASP
Real Time Clock PCF2127AT	3.3	0.00013	0.000429	HASP
SD card circuit	3.3	0.038	0.1254	HASP
Razor IMU	3.3	0.025	0.0825	HASP
MAX3232 Converter	3.3	0.014	0.0462	HASP
SPI to UART Converter SC16IS750	3.3	0.006	0.0198	HASP
Quadrature Decoder HCTL-2032	5	0.00001	0.00005	HASP
External Clock ECS-100X 30MHz	5	0.07	0.35	HASP
FT232R USB UART	5	0.015	0.075	HASP
H-Bridge L293DD	5	0.12	0.6	HASP
Motor Encoders	5	0.01	0.05	HASP
Current Sensor ACS712	5	0.028	0.14	HASP

Solar Panels Electrical Components	5	0.114	0.57	HASP
Atmega 2560	5	0.05	0.25	HASP
GPS Lassen IQ	5	0.026	0.13	HASP
Antenna	5	0.05	0.25	HASP
	Total	0.67	3.025979	

The total current consumption in the payload is delivered by the HASP platform. The resulting power consumption will be around 3.025979 W which is fine because the HASP can provide a total power of 15W.

B. If HASP is providing power to your payload, provide a power system wiring diagram starting from pins on the student payload interface plate EDAC 516 connector through your power conversion to the voltages required by your subsystems.



The Attitude Control system / flight Computer Board will consist of a Primary and Secondary DC to DC converter to regulate the power from 30V to 9V and from 9V to 3.3V, 5V respectively. In addition this board will have a microcontroller which is in charge of processing the data received from the ADS microcontroller connected through the PC/104 Bus. The data obtained will be used to determine the proper control action for the DC motor to make the required corrections to the payload motors and monitor all the systems.

C. Other relevant power information

III. Downlink Telemetry Specifications:

A. Serial data downlink format: [✓ Stream] Packetized (circle one)

B. Approximate serial downlink rate (in bits per second)

1200 bits per second.

C. Specify your serial data record including record length and information contained in each record byte.

D. Number of analog channels being used:

0.

E. If analog channels are being used, what are they being used for?

F. Number of discrete lines being used:

2.

G. If discrete lines are being used what are they being used for?

The discrete line will be used to perform an ON and OFF in case where the microcontroller is not responding or stop working. Thus the purpose is to reinitialize by software the sensors.

H. Are there any on-board transmitters? If so, list the frequencies being used and the transmitted power.

Transmitters will not be used.

I. Other relevant downlink telemetry information.

IV. Uplink Commanding Specifications:

A. Command uplink capability required: [✓ Yes] No (circle one)

B. If so, will commands be uplinked in regular intervals: Yes [✓ No] (circle one)

C. How many commands do you expect to uplink during the flight (can be an absolute number or a rate, i.e. *n commands per hour*)

The uplink command will be sent only when is necessary, such as sensor stop getting data or some x function need to be re-configured (sensors registers). To do so, can be sent a specific command where if it is HIGH then re-initialize some x function.

D. Provide a table of all of the commands that you will be uplinking to your payload.

Wake Up Command:

Command Name:	ON
Hex Command Byte:	4F
Description:	Wakes up the payload from sleep
Critical?	Yes
Payload Response Message:	"Command Received: ON"

Sleep Command:

Command Name:	OFF
Hex Command Byte:	46
Description:	Puts the payload on sleep mode
Critical?	Yes
Payload Response Message:	"Command Received: OFF"

Heater On Command:

Command Name:	HON
Hex Command Byte:	48
Description:	Turns on the heater
Critical?	No
Payload Response Message:	"Command Received: HON"

Heater Off Command:

Command Name:	HOFF
Hex Command Byte:	68
Description:	Turns off the heater
Critical?	No
Payload Response Message:	"Command Received: HOFF"

NULL Command:

Command Name:	NULL
Hex Command Byte:	00
Description:	Terminates listening mode
Critical?	No
Payload Response Message:	"Unrecognized or NULL command"

Example of Command Transmission String

Here is an example of the TON command string in hexadecimal format:

"01028054030D0A"

Byte	Hex Value	Description
1	01	Start of Heading (SOH)
2	02	Start of Text (STX)
3	80	Payload ID + Checksum
4	54	Hex Command Byte
5	03	End of Text (ETX)
6	0D	Carriage Return (CR)

E. Are there any on-board receivers? If so, list the frequencies being used.

On-board receivers will not be used.

F. Other relevant uplink commanding information.

V. Integration and Logistics

A. Date and Time of your arrival for integration:

August 1, 2012.

B. Approximate amount of time required for integration:

4 Hours.

C. Name of the integration team leader:

Jorge J. Quiñones

D. Email address of the integration team leader:

jorgej1609@yahoo.com

E. List **ALL** integration participants (first and last names) who will be present for integration with their email addresses:

Jorge J. Quiñones

jorgej1609@yahoo.com

Christian Morales

chris69mo@gmail.com

F. Define a successful integration of your payload:

All electrical components will power up and perform according the design, motors will be reset and oriented, the attitude determination will be tested to ensure proper data gathering and the payload will be attached securely to the HASP platform for testing and further launch.

G. List all expected integration steps:

1. Mount payload to HASP platform.
2. Connect the payload bottom box slip ring, to the HASP power (30V@.5A) and serial data pins from the EDAC connector. To provide connection to the other slip ring on the top cube to power on the systems.
3. Verify that the power system is working properly and supplying the require operating voltage of every subsystem.
4. Verify the communication to and from HASP platform.
5. Turn on flight computer and run the initial setting configuration.
6. Verify the flight computer performance and enable all subsystems.
7. Verify and monitor temperature sensors readings and turn on/off heater if necessary.
8. Verify motor functionality and encoders readings.
9. Perform thermal and vacuum test.
10. Troubleshoot for any faults on electrical or communication systems.

H. List all checks that will determine a successful integration:

1. Successfully complete mechanical check and integration.
2. Verify payload current and voltage composition to ensure proper functionality.
3. Verify with the HASP ground station. Verify Uplink and downlink commands.

4. Verify ADS functionality. Verify that all the sensors gather data.
5. Verify DC motors orientation and control algorithm functionality.
6. Verify that other payload do not interfere with ARES-Dynamics payload orientation.
7. Complete thermal and vacuum checkout.
8. Verify functionality after thermal and vacuum test.

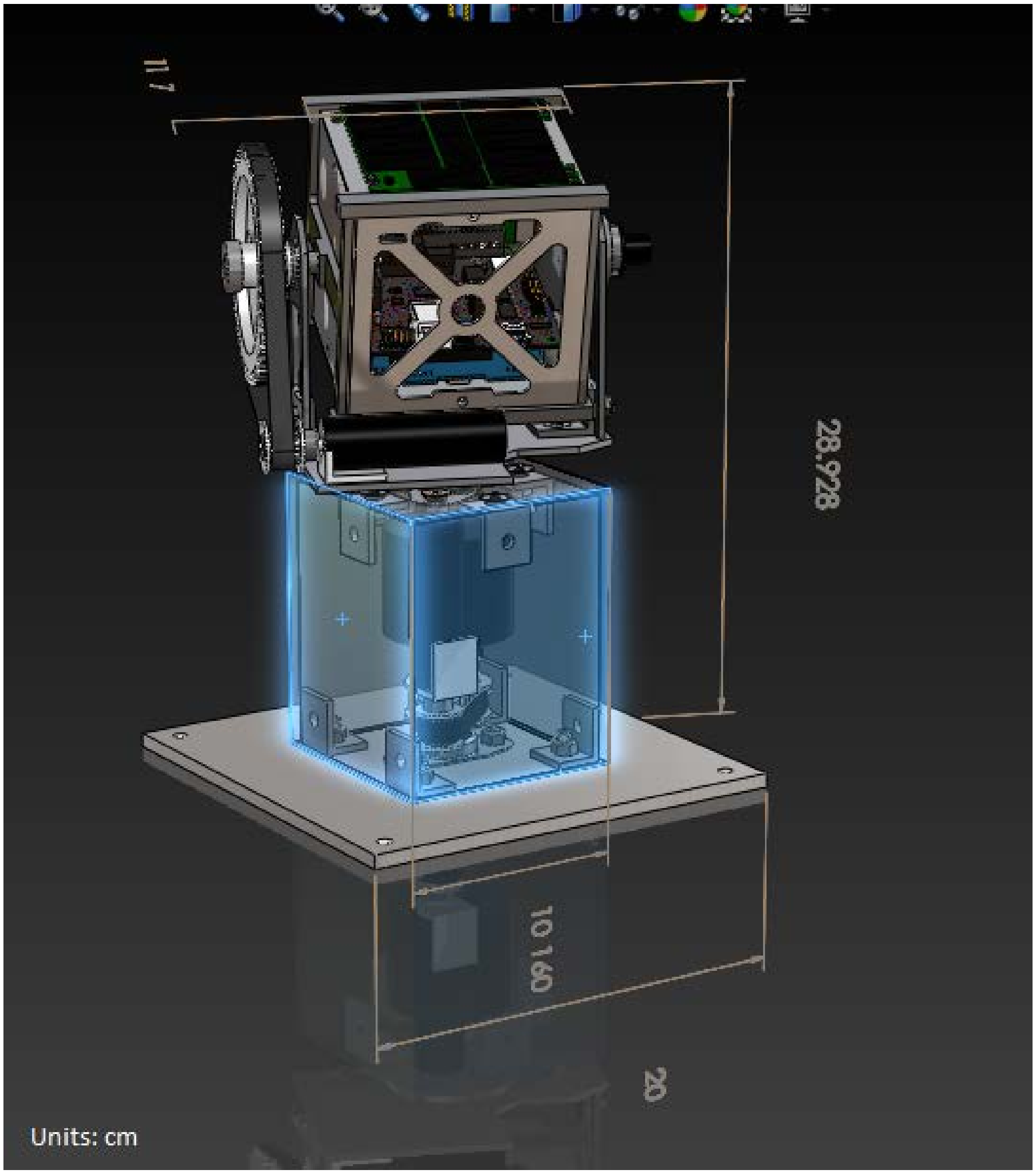
I. List any additional LSU personnel support needed for a successful integration other than directly related to the HASP integration (i.e. lifting, moving equipment, hotel information/arrangements, any special delivery needs…):

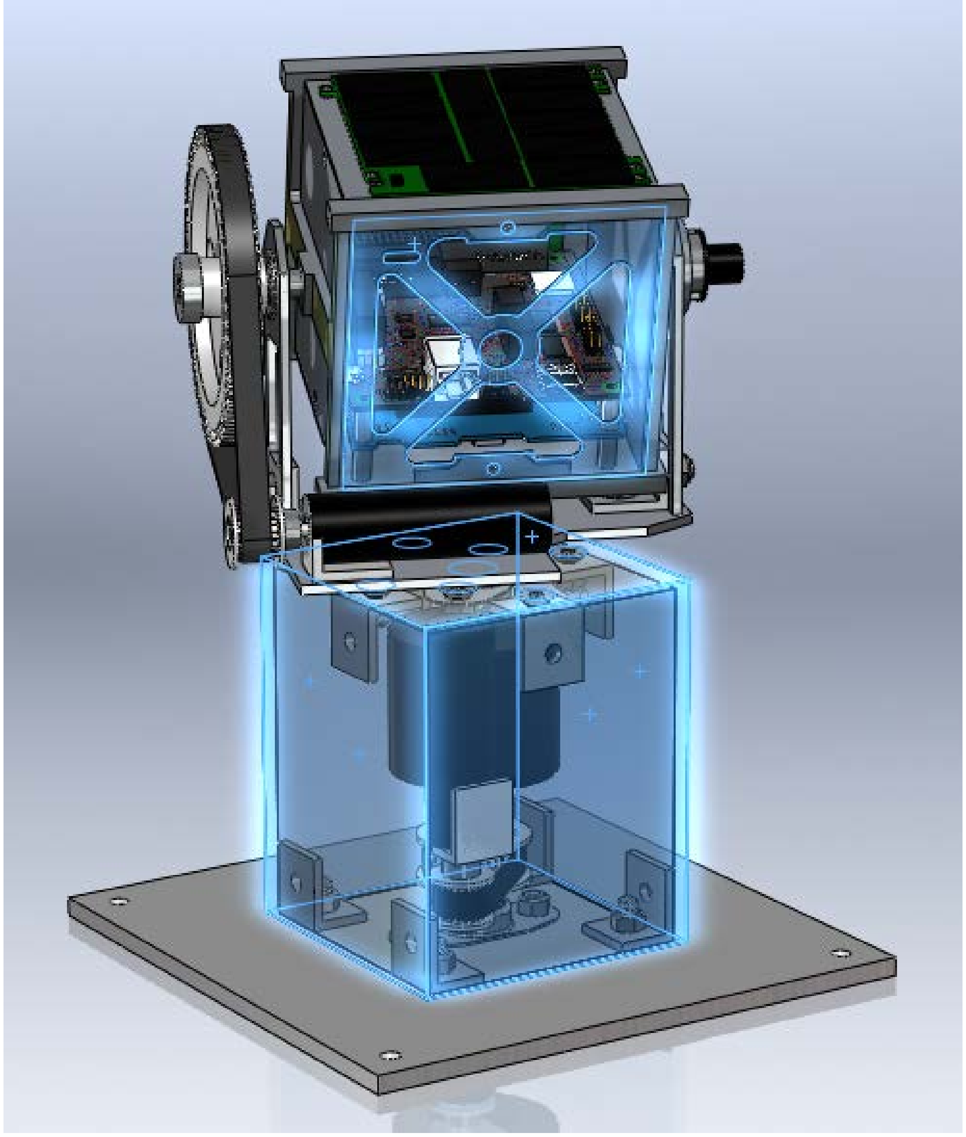
None additional support is requested.

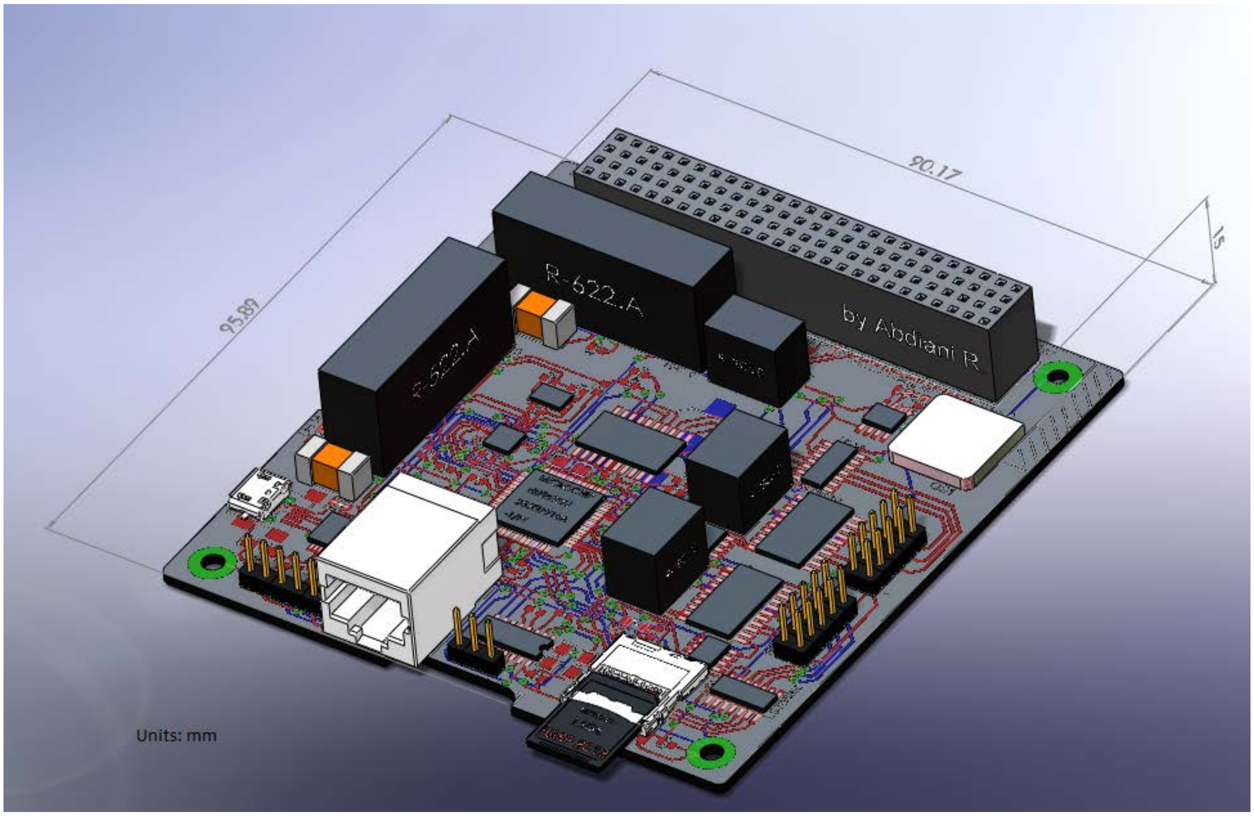
J. List any LSU supplied equipment that may be needed for a successful integration:

Adjustable power supply (or supplies) that can provide output voltages: 3V, 5V, and 30V. Oscilloscope and Soldering station for any modifications.

Mechanicals Drawings



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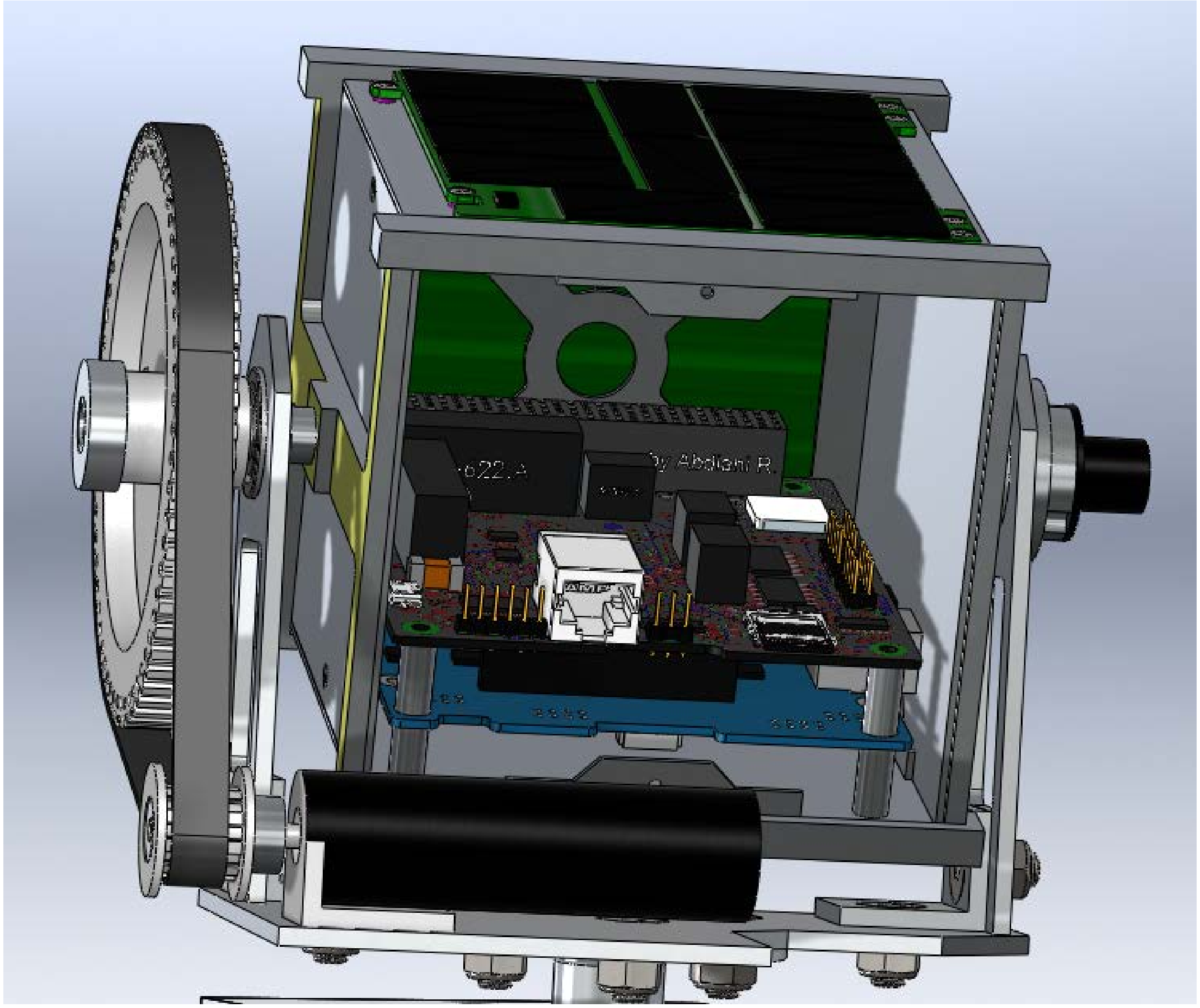
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