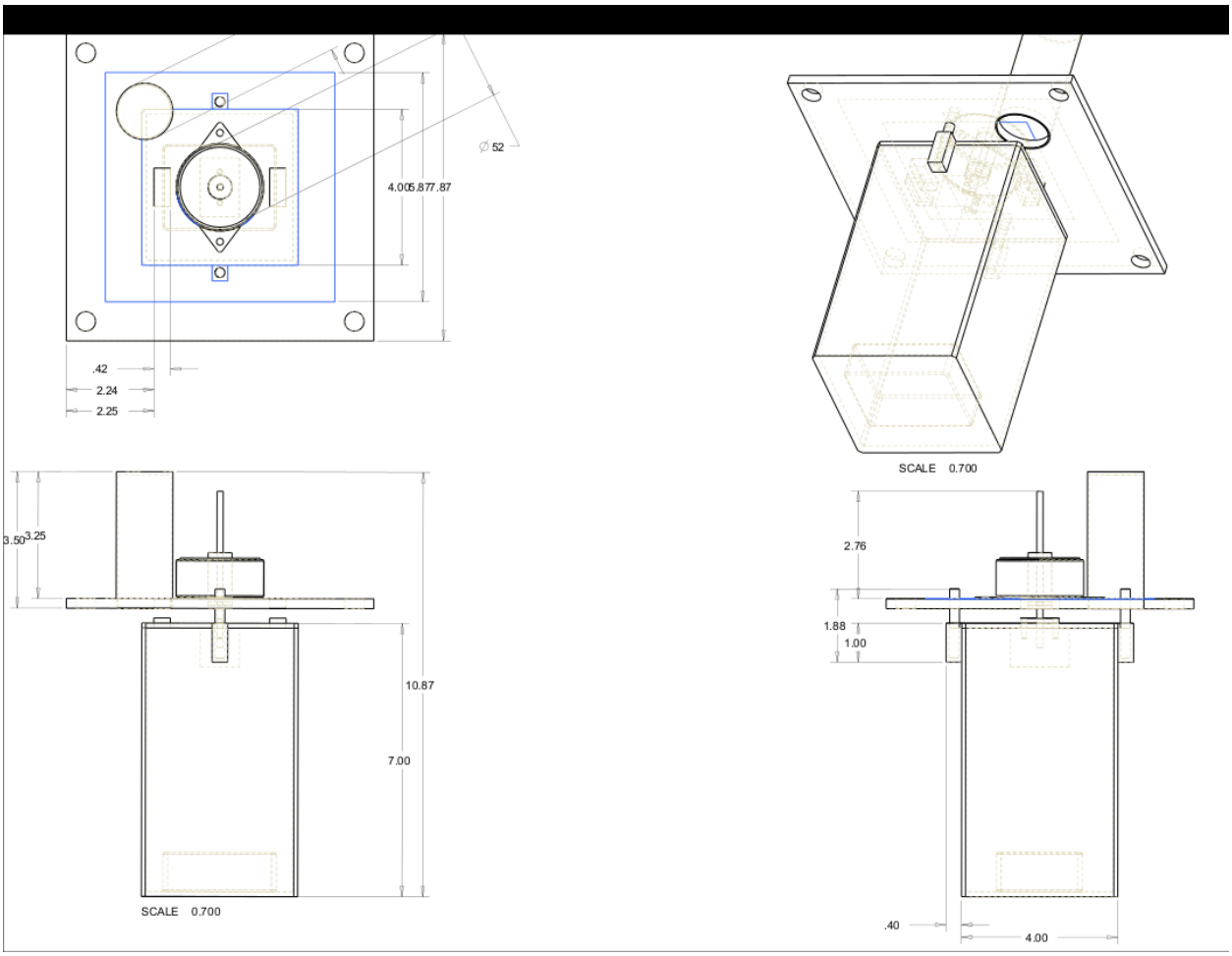
University of Maryland
February 2012 Status Update

HASP 2012: StratoPigeon III

1. Activities of Team Members

The mechanical team has been working on CAD models of the updated detachment mechanism. The following is a description of the design and new CAD for the mechanism: (CAD is also attached additionally in the email)

Deployment of the payload is actuated by a linear stepper motor capable of outputting twenty-four pounds of force. The motor turns a nut inside its body and drives out a M6.35 threaded rod, approximately one and quarter inches in length, which is securely bolted to the top of the payload. This actuator, made by Anaheim Automation, is a simple and lightweight linear drive system that will provide more than enough force to detach the payload. Stainless steel guide pins, mounted to the HASP interface plate, guide the payload out on Teflon linear bearings, to prevent torquing during deployment and to guide the payload into place during assembly. The threaded rod, Teflon guides, and female hypertronics connectors are all attached on the payload and fall to earth with it. This detachment process actively separates the payload and interface plate which are driven apart an additional quarter inch after the connectors disconnect. The order of contact during assembly is as follows: first the guide pins, then the M6 screw, and finally the hypertronics connectors, which allows the linear actuator to pull the payload up into position, making assembly much easier than before.



The electrical team has continued working on the PCB designs and finished with the first design iteration. First revision of the board layouts are included at the end of the status update. A 2nd estimate of a maximum power (max draw for each component) has been established with the new internal components:

Component	Current (A) @ 30V	HASP Power	Battery Power
SSD 1	0.03	HASP only	Not used
SSD2	0.03	HASP only	Not used
Tracking PCB	0.12	Not used	Battery only
Heat1	0.03	HASP only	Not used
Heat2	0.03	HASP only	Not used

Heat3	0.03	HASP only	Not used
Heat4	0.03	HASP only	Not used
Motor Board	0.03	HASP only	Not used
Stepper Motor (active)	0.26	HASP only	Not used
Repeater PCB	0.12	HASP only	Not used
Total draw (worst case all on)	0.59		

The tracking PCB is only powered through the battery and not considered in the total HASP draw. The PCB's and operations plan are also designed such that the large draw components are not on at the same time. For example, the 3 internal payload heaters will never be on at the same time as the stepper motor, bringing the draw back down to 0.5 A. The repeater PCB will also be asleep (micro controller activated) until the stepper motor has finished actuation, bringing the total draw down to 0.38 A. Preliminary board layouts for the internal tracking board, power interface board, and external motor driver and repeater boards are attached after this report.

2. Issues Encountered During Design

Mechanical placement of the electronics PCBs on the HASP plate has become slightly challenging due to the arrangement of the stepper motor and alignment pins, leaving only 1.8" in width to place PCB's. The PCB's will therefore be mounted vertically in a box in that area.

3. Milestones Achieved in February
   a. First revision PCB design completed
   b. First revision PCBs ordered
   c. First revision mechanical CAD completed
   d. Stepper motor ordered and tested (standalone)

March Target Milestones

e. Detach testing of mechanical mock up
f. Internal electronics frame designed and CAD made
g. Hypertronics connectors ordered
h. PCBs populated
i. Initial PCB testing

4. Current Team Members and Leaders

The StrotoPigeon III payload is being designed, built, tested, and integrated by a long standing team called the Balloon Payload Team in the Space Systems Lab of the University of Maryland - Aerospace Engineering Department. Our Balloon Payload Program started in the Fall of 2003 after the Faculty Advisor, Dr. Mary Bowden, attended a "BalloonSat Workshop' in Colorado. The program has developed a balloon launch capability in Maryland that regularly launches freshmen payloads in the fall and payloads from other schools in the spring. We have now flown 33 tracked flights, most all with successful recovery of payloads. This team will be developing and testing StratoPigeon III, including at least one balloon flight in Maryland to test the new drop mechanism concept.

Team Members who will be actively participating in our HASP Payload development are as follows:

Dr. Mary Bowden - Faculty Advisor
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301-275-7723

Connie Ciarleglio - Student Lead/Electronics Lead
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Chris Carlsen - Mechanical Systems Lead
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David Thoerig - Ground Software Lead & Testing
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Kristy Weber - Electronics & Operations
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Lauren Powers - Mechanical Systems

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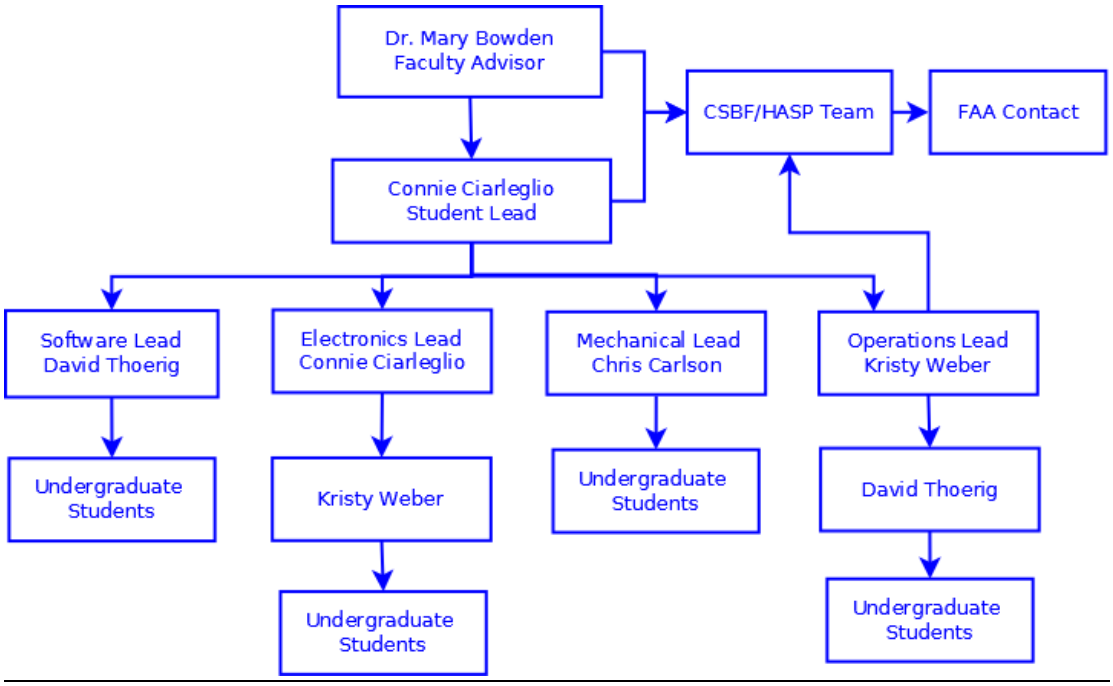
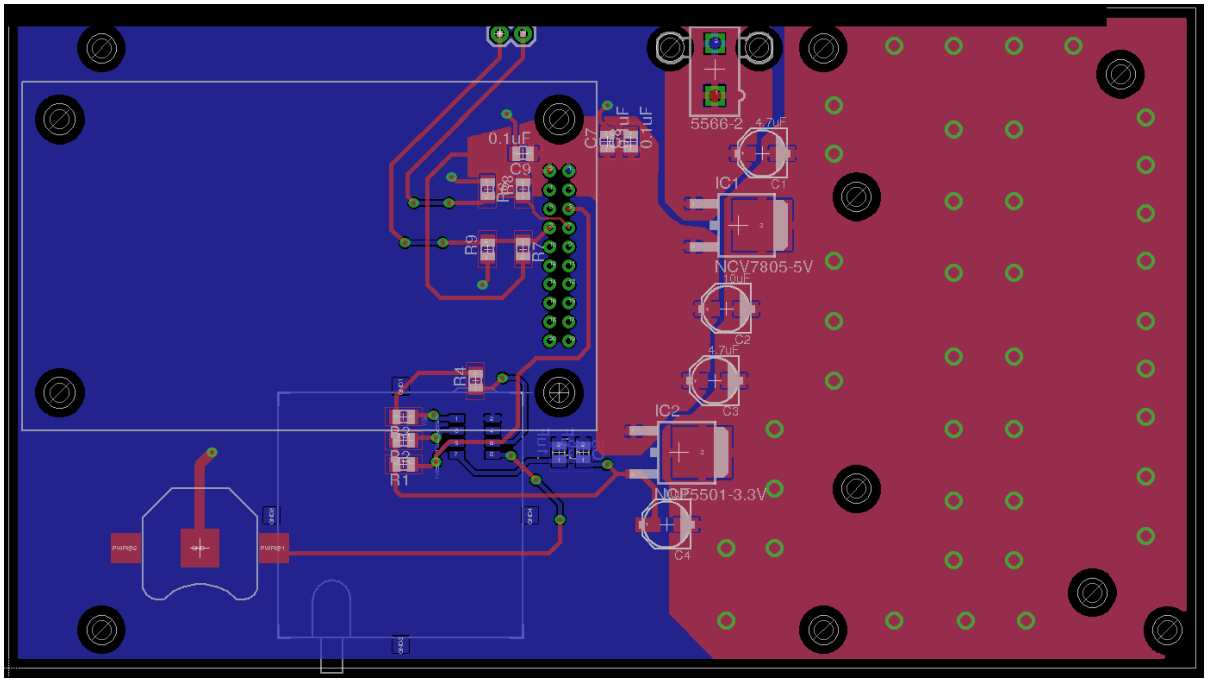
Our organizational chart (shown below) also includes some additional undergraduate students recruited from among the 28 freshmen payload designers who participated in our program last semester.

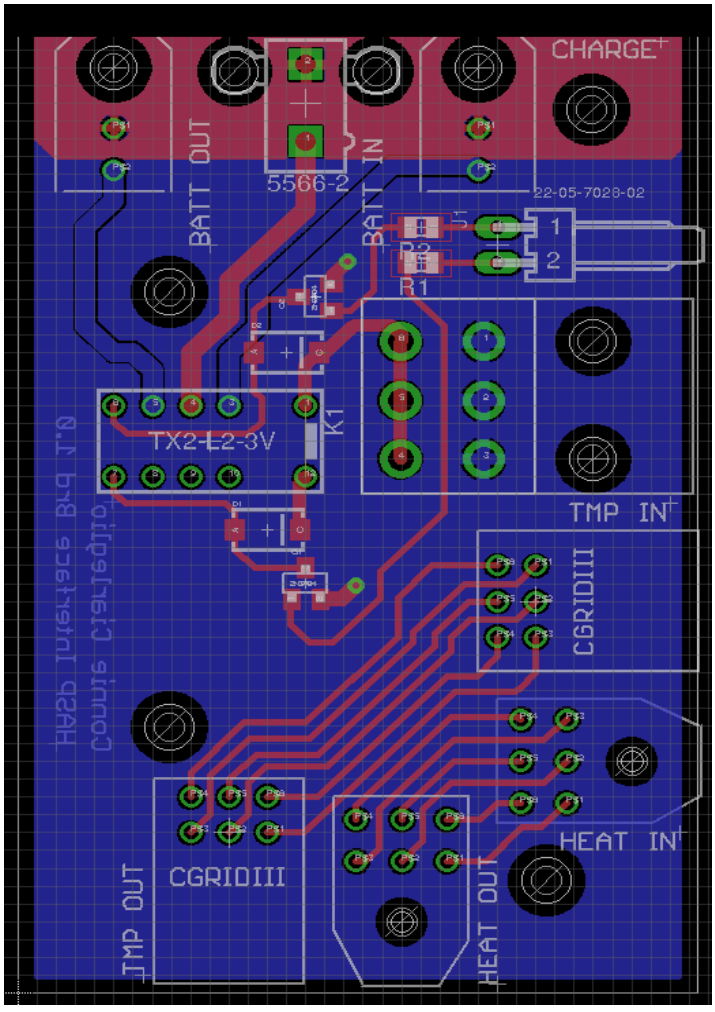


Preliminary Board Layouts

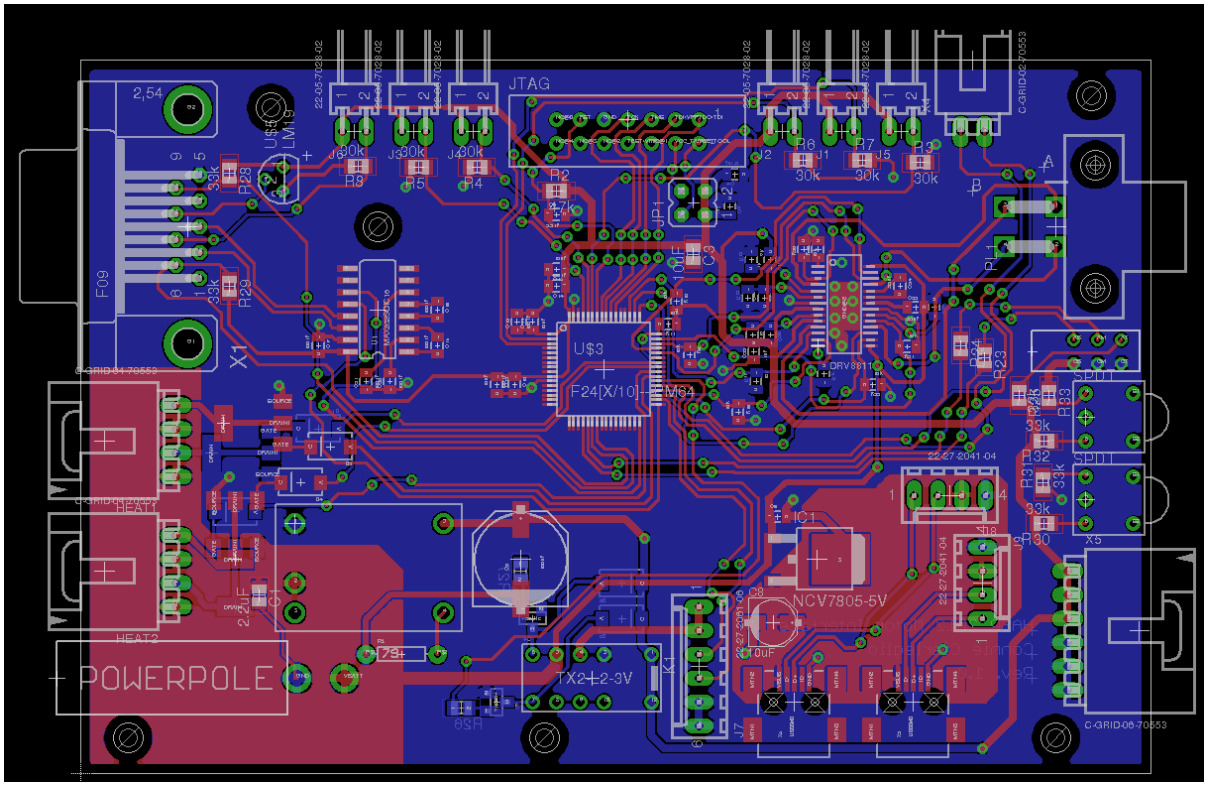
Tracking PCB (internal to payload)



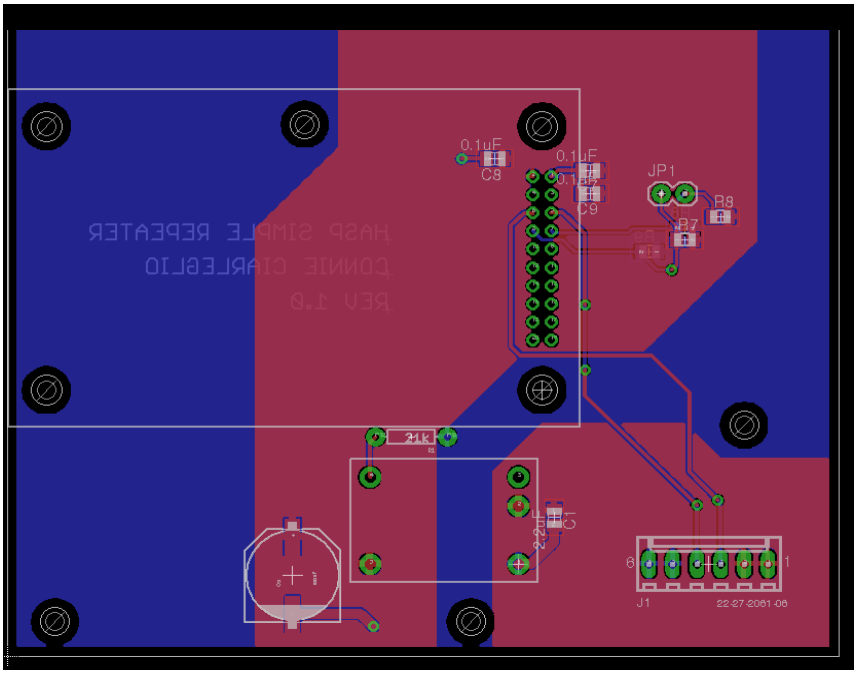
Power Interface PCB (Internal to payload)

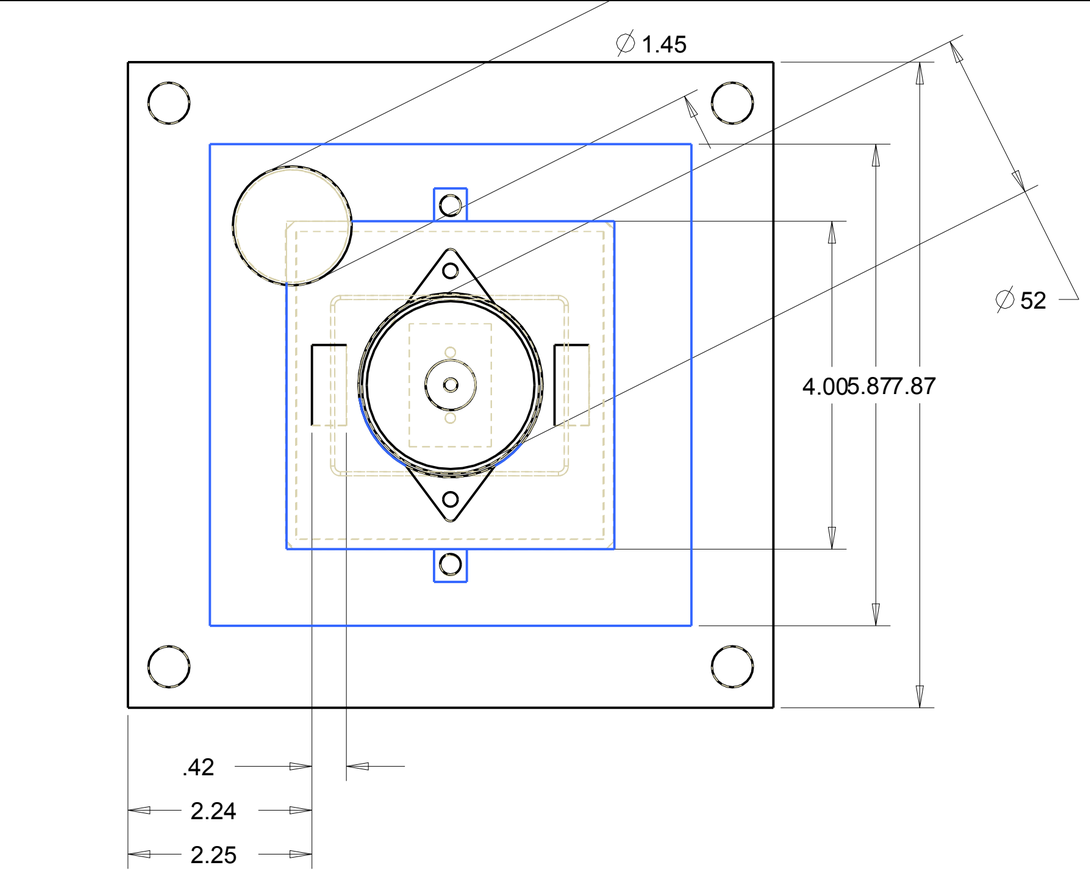


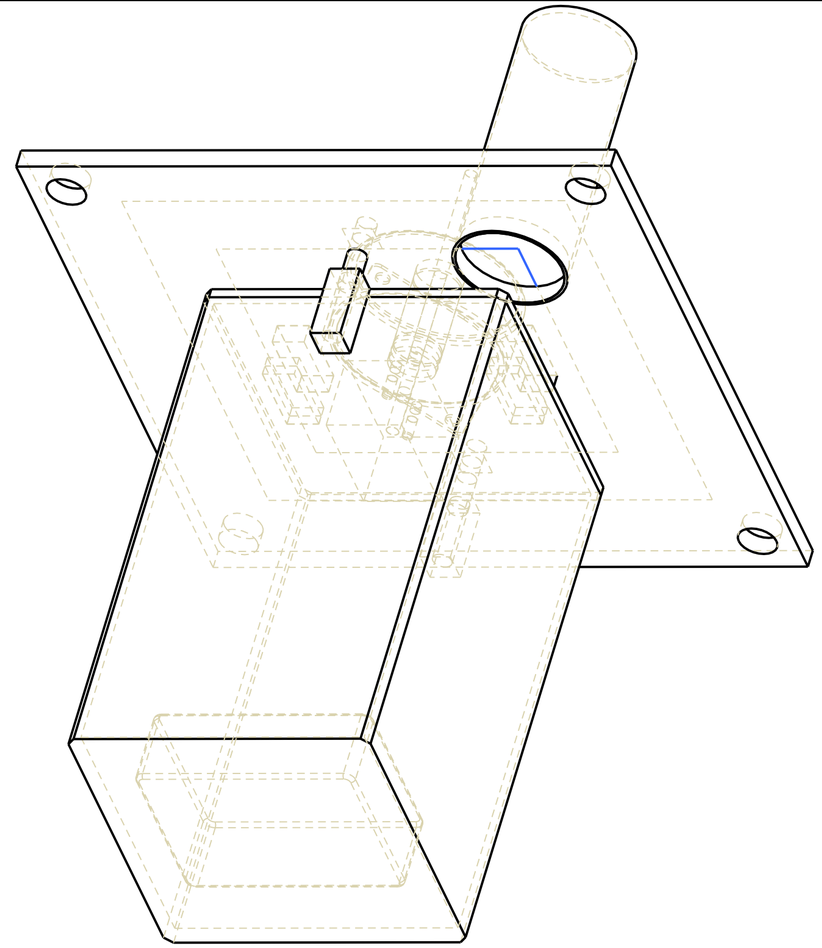
Motor Driver PCB (Testing Layout)



Repeater PCB (Testing Layout)







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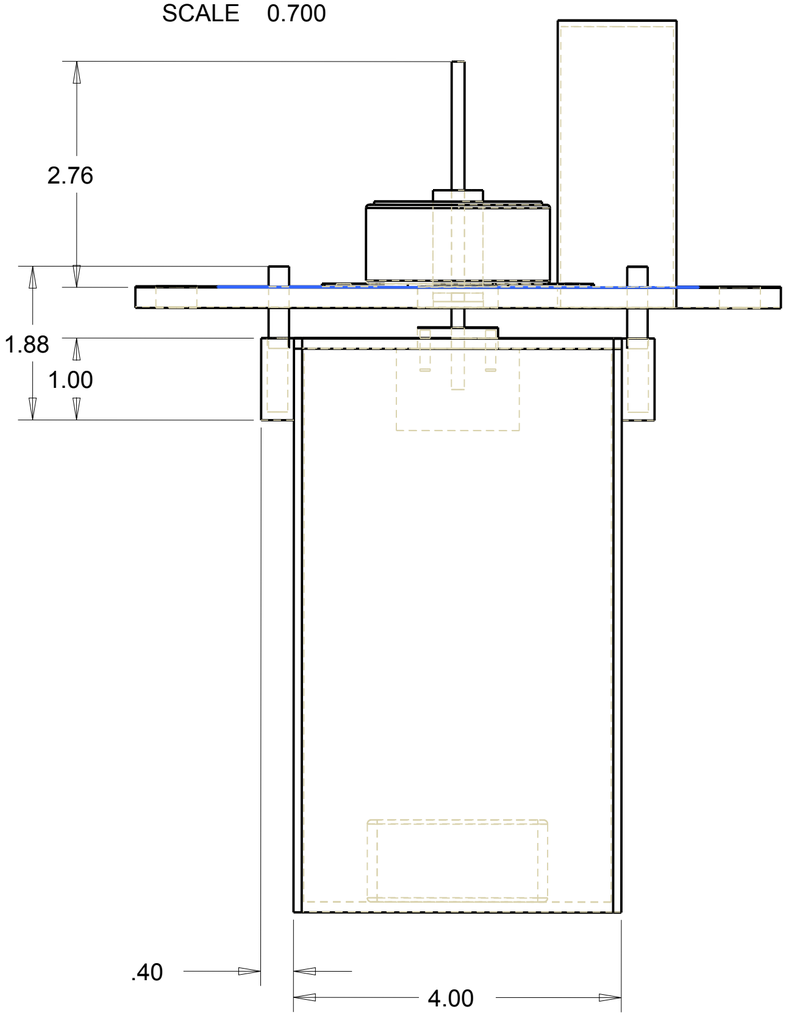

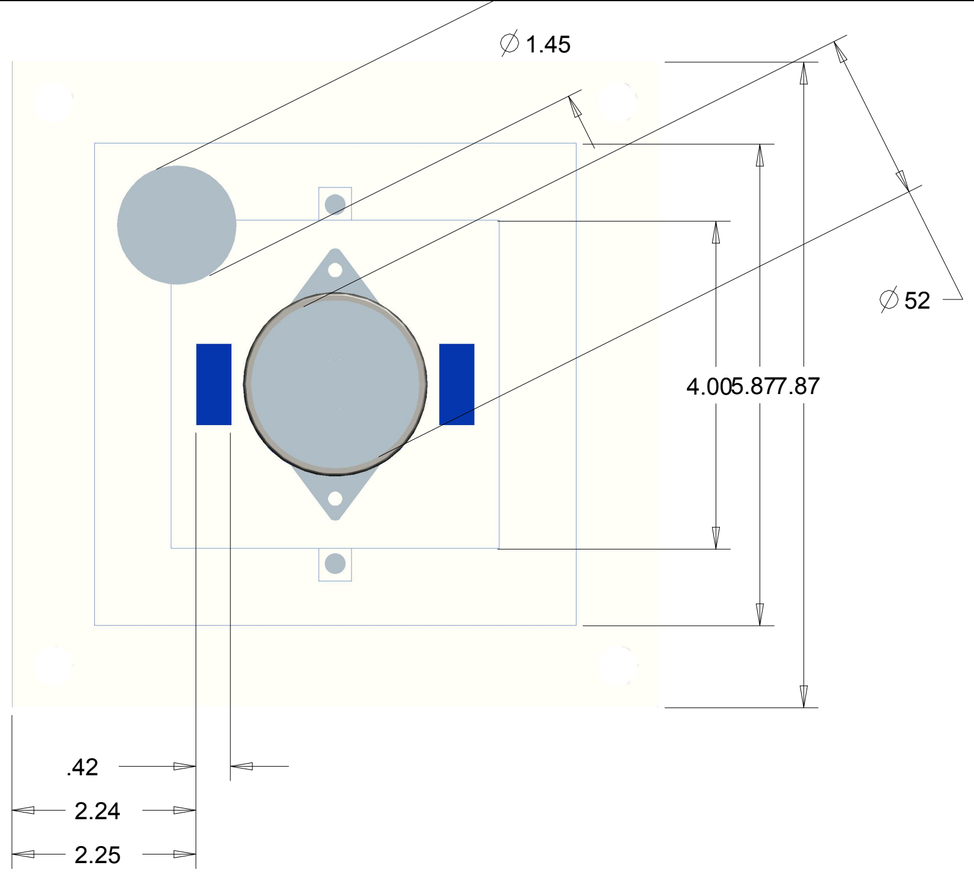

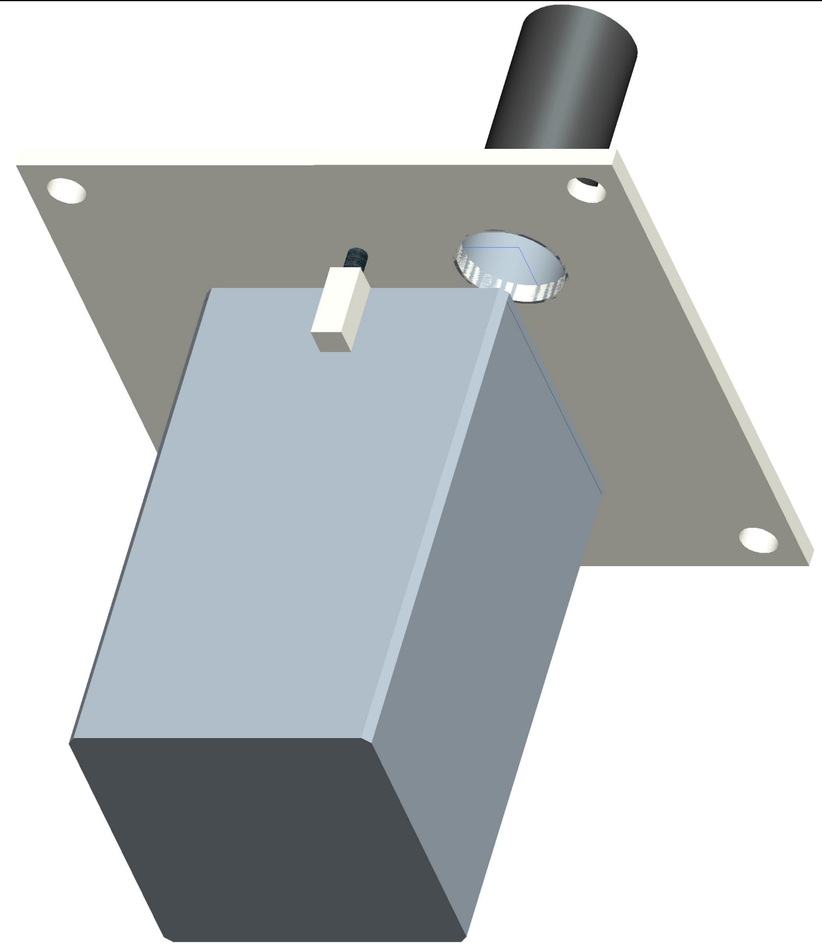

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