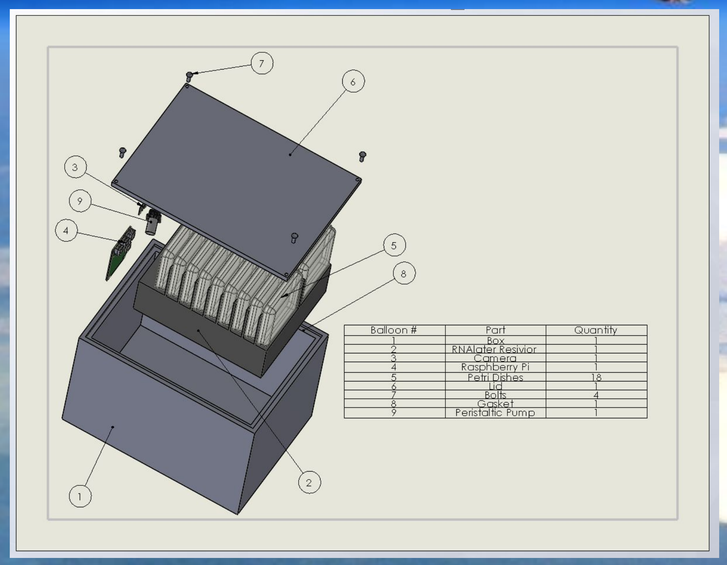
High Altitude Balloon Experiment: Biological Container and Injection System

Problem Statement:

Our client has asked us to design a self-contained, sterile, modular containment and injection system in order to support plant life in a high altitude balloon experiment. Currently, an astronaut has to inject the chemical fixative, RNAlater into the Petri dish. Because no one is present to inject the fixative in this balloon experiment, an autonomous solution is required. The plants need to maintain conditions between 15 and 25℃ and pressure of 1 atm while in conditions of .01 atm and -70 to 50℃ . It also needs to withstand 14 gs of force and be no larger than a shoebox. The client would like pictures every 2 hours, and a log of pressure and temperature. The budget for this project is $150.

Solution:

- Purchase a pressurized box (Potentially a pressure cooker)
- Add more insulation to help protect against temperature change
- Have a small electric heater with a program to regulate the temperature
- Have the petri dishes vertically oriented in small slots to allow easy assembly
- Use a small electric pump to inject the RNALater into the petri dishes
- We will design our own petri dishes to hold the plants and distribute the RNALater



Balloon #	Part	Quantity
1	Box	1
2	RNAlater Resivior	1
3	Camera	1
4	Raspberry Pi	1
5	Petri Dishes	18
6	Lid	1
7	Bolts	4
8	Gasket	1
9	Peristaltic Pump	1