Client Interview Transcript

Thursday, 9/25/2014 – 8:00 -9:10 am

- Client interview was conducted with Marc Murbach, NASA Ames.

Notes, background and introduction:

- Refer to the ICES paper that gives a sense of what we will do, some of the focus on:
    - How to bring back capsules from ISS
    - Necessary features and steps of Corona program; spy satellite

- Introducing concept of Ballistic coefficient (β)
- Stages of Small Payload Quick Return (SPQR):
    - De-orbit, getting down from 400 km to ~ 100 km , [Drag devices]
    - Hot part of the entry, TDRV Tube Deployed Re-entry vehicle
    - Deploying the parachute upon reaching below ~ 30 km, refining: control the parafoil with GPA guided system

- Review and take off from where Josh (UI alumni doing his master thesis that involved in the initial development of the paraofil GPS) left off, two keys we want to work on:
    - Technologies contributed to the actual break and to the control parafoil particularly
    - Being able to return small samples in a controlled fashion from the space station or some other platform, small biological oratory

- What we will do also: Master the development of the exo break and the TDRV particularly

- The following questions were answered:

General Questions

1. Can we use any pre-existing equipment?
    - Snowflake gear, extra parafoils, small canister with a monkey board controller, winch controls (probably will be sent by next week)
    -

- Subject to change: Arduino based system with GPS and control two separate winches.
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- The GPS guidance algorithm is TBD, and we want GPS input and control

2. How will this product be used when it is finished (for design purposes)?
    - Delivering small payloads from the ISS

3. How often is the parafoil going to be maintained?
    - Its astronaut proof, and will be Packed once on earth and then to shove the equipment into the canister and put it in the RV (Return Vehicle)
4. How many times is each system expected to be reused?
    - One time use of parafoil, and titanium shed of Canister

5. How much control do we have over when the parafoil is actually released?
    - Not much control, and one of the problem we stepped around before was the parafoil release and inflation, so parachute was stiffed as a way of dealing with the issue.

6. Is there any confidential information in this project that we should be aware of?
    - Not yet. Potentially in the future, and will be using unlocked GPS system by Marc.

7. What is the desired altitude/temperature/environment at which the parafoil is going to be deployed?
    - TDVR (tube-deployed re-entry vehicle) at ~120km?
    - parafoil deployment at ~10km (VAST was able to deploy snowflake at ~15km)

Electrical Engineering Questions

8. What wireless technology will we be using/ and sensor technology?

- ***Follow few things:***
    - Follow Tech Ed Sat 4 (will talk later about it)
    - Follow sub-orbital flight

- ***Concerns:***
    - Working with the Hp technology, we should have separate wireless intelecom to illuminate where we're going with this

- Step up a system on a sub-orbital flight, what we have: a wireless pod that will be located on top of the Exo break to measure technician pressure and temperature and on the forward end of the device behind the parashat, well be measuring technician pressure and temperature

- Arduino mini board is the processor and HP shield and that will relate the information to our base station on a semi rocket and base station will take the data and packetized it and ship to the iridium modem (similar to what he wants us to do)

- Late next week: a teleconference regarding the topic (contact with Gabe)

9. Will we be reusing the VAST datalogger board for this project, or is there already proprietary hardware in place?
    - On this, the idea is to build Arduino base device that has right interface number through, we will talk about these specs also in the next telecon.

10. Is the timer that will release the parafoil automatically adjusted by the sensors, or wirelessly controlled from the ground?
    - Iridium is able to determine the release, but also to have a backup timer "dead man" to command and control it.

Mechanical Engineering Questions

11. How big (dimensions) is the payload supposed to be?
    - 10.5 cm diameter by 31 cm in length? (size of the PCTCU canister)
    - 3U (able to hold 3 cube sats)

12. How massive can the payload be? (I know 6 lbs for the balloon…)
    - Start with volume constraints, and we need rapid experimentation

13. Is the parafoil already made? Yes
    - PC104 format 1 or 2 stacks of board, and will be powered by 1 or 2 ISS approved cannon batteries or others.

14. Do we have a canister built?
    - They will provide us with a couple of extruded aluminum canister and experiment on it and build our own. Aluminum extrusion is used and water

jet to water jet all the antenna and other fasteners bolts, and artificial piece of meal then flip it on the next side -> (the canister)

- Remind Marc: to send

15. How much room will the parafoil itself take up in the capsule?

    - What he'd like us to do now is to keep on working with the parafoil system that they already have, and parafoil package by definition small it'll fit in a less of 1/3 of a U. The whole thing may fit into a 2U volume, 3U cube*

- Insulation of the parafoil requires further discussion

Computer Science Questions

16. Which softwares/ computer languages are going to be used?
    - Arduino (C language)

- Diagnostic information is very desirable and focused on developing on GUI, and have another panel for control

- **Action items:**
    - Remind Marc of sending the aluminum extrusion canister
    - Writing a list of things to have Marc send/bring up
    - Holding the teleconference about the wireless technology
    - Contact Gabe and team to schedule a time for the teleconference
    - Contact Travis that has the snowflake equipment
    - Have a diagram block ready to be sent to Marc
    - Follow ISS release
    - Ben will compile any questions or concerns after discussion, and send them to Marc