Rascal Senior Design Meeting Minutes

Rascal Internal Document

Configuration Management and Quality Assurance (CMQA)

10/14/2013 -- Revision: -

Revision History

Rev	Date	Description	Author	Approved	Pages
-	9/30/2013	Weekly Systems Meeting Minutes Format	Tom Moline	TO	All

Primary Contacts:

Tom Moline tmoline@slu.edu 630-401-0791

Tyler Olson tolson6@slu.edu 812-204-1098

Background:

This document provides a format from which all Rascal Senior Design Meeting minutes will be recorded. It serves as a way of making information on what transpires at these meetings more easily understood and accessible. Along with being e-mailed to each member working on the Rascal senior design project, upon the conclusion of each meeting, these minutes will be stored on the Rascal common server under the CMQA and Rascal Senior Design Meeting Minutes headings at . The items that will be included in each of these minutes are listed in the Table of Contents on the next page. A list of team leads, along with their contact information, is listed in the table below:

Team Leadership and Contact Information

Team	Acronym	Leader	E-Mail	Phone Number
Propulsion	PRP	Nate Richard	nrichar8@slu.edu	608-732-7147
Propulsion	PRP	Jennifer Babb	jbabb1@slu.edu	636-579-6816
Propulsion	PRP	Bryant Gaume	gbryant1@slu.edu	636-448-0378
Structures	STR	Tyler Olson	tolson6@slu.edu	812-204-1098
Project Manager	PM	Tom Moline	tmoline@slu.edu	630-401-0791
Principal Investigator	PI	Dr. Swartwout	mswartwo@slu.edu	314-977-8214

Table of Contents

Common Acronyms/Terms

-SSRL: Space Systems Research Lab
-SCARAB: SLU Core Aerospace Research Application Bus
(i.e. Common Elements Used between COPPER and Argus)
-LV: Launch Vehicle
-CubeSat: A Standard Configuration in Which Small Satellites are Constructed as to Ease LV Integration
-Pumpkin: Company that Produces CubeSat Skeletons and Electronics
-1U: One Standard Unit (10 cm x 10 cm x 10 cm)
-P-POD: Poly-Picosatellite Orbital Deployer
(i.e. The Standard Structure in which Any CubeSat is Stored During Launch and Ejection)
-VU: Vanderbilt University
-AFRL: Air Force Research Lab
-UNP: University Nanosat Program
(i.e. Program Run Out of the AFRL that Conducts Nanosat Competitions as to Aid in the Cost and Development of University Satellites)
-JPL: Jet Propulsion Lab
-ORS: Operationally Responsible Space
(i.e. The Organization Responsible for Providing COPPER with a Launch)
-Minotaur: Name of the Rocket in which COPPER will be Launched
-ELaNa: Educational Launch of Nanosatellites
(i.e. Program run by NASA that helps facilitate spots on launches from NASA and DOD facilities)
-EPS: Electrical Power System
(i.e. The System Used to Control and Monitor the State of the Battery being Used in a Satellite System)
-ClydeSpace: Company that Produces CubeSat Size Batteries and EPS'
-Spectrolab: Company that Produces Solar Cells and Solar Power Systems
-Trac: System Used to Label and Record the Location and Movement of Every Item in the SSRL

Action Items List

Action Item	Team	Individual(s)	Due Date	Progress
Learn Git By this Friday	**JB,BG,TO**	**Jennifer Babb, Tyler Olson, Bryant Gaume**	**10/18/2013**	**0%**
Finish Preliminary Mission Objectives	**TM**	**Tom Moline**	**10/15/2013**	**0%**

Previous Action Items

1. ***Ask for a List of Missions Similar to Rascal***

- **This was accomplished.**
- **Nate's Synopsis**
  - Rascal is a very difficult mission.
  - Small satellites use magnetometers and gps to track position and attitude.
    - Each of them are doing RPO (Rendezvous-Prox Ops).
    - Embrey-Riddle is going to try to find a Resident Space Object (RSO) and take 3-D images of said object.
    - Strand-2 will have two satellites and a Kinect sensor, want to dock.
      - Have a propulsion system called WARPDRIVE, which is fun.
    - Tyvak is essentially Rascal, except it will not be connected when kicked out.
    - No satellites are kicked out together.
  - Past missions:
    - None of them really worked.
    - DART tried to rendezvous with an old communication satellite, ended up hitting it, at which point the mission ended in a public sense.
      - Never entered the correct mode for close operations.
    - XSS11 did an RPO of minotaur stage that took it up (worked).
    - Surrey did another satellite that worked, but ended up drifting too far apart to conduct RPO, closest they got was 5,000 km.
    - Still, none were attached together.
- **Jennifer's Synopsis**
  - GLADOS tracked space junk, didn't really conduct rendezvous.
  - Orbital Express wanted to conduct docking between two spacecraft, were successful.
  - XSS10 used line of sight guidance, was successful, lasted only 24 hours.
  - Orbit Debris sat (Switzerland) wants to remove space debris from orbit.
  - MITEX used three satellites, used image processing on two satellites to observe target satellite.
    - Likely was not successful.
- **How are we better than other programs?**
- **Nice to have an idea, but until it flies, it doesn't exist, once again.**
- **Have already addressed the initial conditions question.**

2. ***Create Report Template and Put it on Git***
- **It is on git.**

3. ***Resend Git Server URL to the Team***
- **Sent it out to everyone.**
- **Action Item: Be able to use git by this Friday**

4. ***Create Orbit Analysis***
- **Being more than 1 km away would make rendezvous very difficult.**
- **In terms of timing, orbit transfer needs to be done at the correct point in the orbit.**
    - Just need to know relative orbit parameters.

General Discussion

1. ***Updating the RFP***
- **Will be implementing changes mentioned at last meeting by tonight.**

2. ***Creating a GANT Chart***
- **Will be done this afternoon.**

3. ***Specific Mission Objectives***
- **What do they have to do in terms of relative distances, time scales, and number of rendezvous.**
- **It is productive to look at these vs. cost, performance, schedule, and risk.**
    - How one goes about proving they are better.
    - Cost is a big driver.
    - Could do half the things for a 1/10 of the price and be more likely to be picked up.
    - Design space for prox ops are usually bigger than Cubesat size, thus, showing it fits in a Cubesat is impressive.
- **But why is this important?**
    - What can this be used for?
    - Can it be used for a repair?
    - Can it do something to the other satellite?
    - Is it worth pursuing?
    - Might be enough to show that taking a lap around the other satellite and take images over the course of the orbit.
        - Right now, if repairs need to be made, it is worth just making a new satellite, as opposed to initially making it serviceable and sending up a repair satellite.
        - Can justify having a 20 million dollar CubeSat mission to fix GEO satellites.
- **Want to look at development time, cost, precision, image processing, etc.**