

# Initial Meeting

Tuesday, September 8, 2020 3:37 PM

Lead Coordinator: Avery Brock

TA: Jacob-Cobi Brower brow4012@vandals.uidaho.edu

I can meet MF 10:30-5:00, T Th 11:00-5:00, W 11:30-5:00

GOAL: First Task Be Done by Thanksgiving

- Project Budget: 6,000

## Primary Task - Finish 9523 Board

- Have 3 subsections, 1 subsection
- 9523 - Electrical Engineers and Computer Science, Computer Engineer
- Project Tasking - Lead by 2 EE and Comp Engineer
- It would be a waste of time to build the PC104 board, we do need to improve the power supply for the board
  - Make it so SCUBEE board connect via an adafruit board to the PC104
- CS People:
  - Pick straws for who will work on the Firmware encryption
    - Group Effort, get it done quickly
    - 1 should work on this
- Software, look at the Team Fire report, it's on a GitHub page. It's almost finished don't start over
- Look at the Team SCUBEE & Team Fire Wikipedia pages.
- **Secondary Task: Altitude Determination and Control System (ADCS)**
  - Familiarize with what the device will do - physics based
  - Once we understand specs, should go to the electrical engineers who will develop further parts: driver, motor etc.
  - ME will get pretty far on the device
  - This project will be started as the other one is going on. ME's will focus on understanding prior to bringing the team over
  - There are some good models from other Universities
- **Third Task: Possible 'AI in the Sky' sided project ( we need something to run on the TFLOP GPU)**
  - Entirely computer science. Finish the 9523 First.
  - We should understand radiation effects
  - We are a showy project, "Satellite that we can play chess with" Something analogous that human GPU interaction that's on the satellite
- Additional Notes
  - If we need it, Avery Brock can buy it and ship it to us.
  - We might not be traveling to NASA to test the project and visit. :(
  - 3D printed materials, GPU cooling
  - FANNG will get us hardware

# 2nd Meeting

Friday, September 11, 2020 3:29 PM

## Attendance:

Taegan Williams - **Scribe**  
Grace Rosenvall - **Team Manager**  
Lillian Mortensen  
Andrew Pilchard - **Treasurer**  
Cosette King  
Feng Li - **Team Instructor**  
Harrison Thomsen  
Jacob-Cobi Brower - **Team TA**  
Robert Goes  
Avery Brock - **Team NASA Consultant**  
Joe Dennison  
Finan Bryan - Primary Client Contact

## Goals for Meeting:

- Team Contract (Finan and Drew got a great start, we should review it)
- Budget Champion (We need one)
- Client Interview?? (I'm thinking by subteam if we want to go that route)
- Subteam Organization (perhaps subteam leads or managers? not sure)

## Meeting Minutes:

### [3:31 PM] - Call to Order

### [3:32 PM] - Team Contract Review

Grace Rosenvall - How do we want to sign it?  
Andrew Pilchard - explaining the document structure  
Finan Bryan - explained his sources and guidelines for the document

### [3:44 PM] - Budget Champion

Andrew Pilchard is our Treasurer/budget champion  
Lillian Mortensen offered to help with budget  
**PURCHASER** - will be the treasurer single point of purchasing  
\* Purchaser should ask Fang before making an order

### [3:46 PM] - Team Roles and Management

Grace Rosenvall is setting team role descriptions to finalize the team contract  
Finan Bryan volunteered to be the **Primary Client Contact**  
Avery Brock would like to be aware of when a meeting is scheduled

### [3:58 PM] - Feng discussed VAST project Design

Lillian Mortensen mentioned she helped with the payload of the project

### [4:00 PM] - The Wiki Master

Group decided to assigning 1 or 2 wiki masters later in the project

### [4:01 PM] - Team Contact Review

Reviewed all points and expectations of the Team Contract - available in the oneDrive folder

**[4:10 PM] - Budget**

Budget will be discussed in subcommittee meetings.

Fang broke down the budget to \$3000 travel and \$3000 building supplies

Avery discussed more of a plan to travel around January

On hand, we should have a 9523 and a black box with breakout hardware

JOE DENNISON will pick up our current boards from the EE department

We will also need a SIM card with a dataplan

**[4:19 PM] - Client Interview**

Once we have our sub-structure created we will meet with Avery to discuss goals for each group

CS GROUP - Prioritize the 9523 project with a due date of early NOV so we can launch in FEB

**[4:26 PM] - Meeting Adjourned**

**Action Items:**

- **Grace Rosenvall** - Post links to the wikis in the resources folder on discord
- **CS Group** will decide on what roles and positions for projects we will create
- **All Groups** need to plan meeting times for dedicated projects

# 9523 - 1st Meeting

Wednesday, September 16, 2020 3:23 PM

## Agenda for this meeting:

- Finish budget draft ( Due Thursday )
- Brainstorm questions for client interview
- Determine meeting times and locations (online/in-person) for future meetings
- Determine best way to communicate meeting organization and project progression.

## Attendance:

- Cosette
- Harrison Thomsen
- Joe Dennison
- Robert
- Taegan
- Drew Pilchard

## Meeting Minutes:

### **[3:29 PM] - Call to Order**

### **[3:30 PM] - Analysis of Fire and SCUBBEE GITHUB**

- There is no comments in the code for SCUBBEE's work on the 9523 will take more time to analyze

### **[3:31 PM] - Confirmation on completion of NASA FORMS**

- All complete, troubles with filling out form in its PDF state

### **[3:33 PM] - Drafting budget**

- Items Needed
  - Adafruit breakout board
  - Jettisons Tx-2 module 1, maybe 2
  - Intel nano network stick
- We will reach out to Avery about doing a client interview **THIS FRIDAY 9/18**.
  - Drew will reach out to Finan, our client contact, Finan will ask Avery
  - Drew will contact other groups for needed items

### **[3:39 PM] - Client Interview With Avery**

- Split into disciplines chat to come up with questions regarding our parts of the project
- We will make a one drive document for client questions
  - Software side, where do we start working?
    - We plan on documenting the previous code better with a style guide

### **[3:45 PM] - Determine the meeting times and locations**

- We can determine after our meeting with Avery
- General idea, the library, Bell, or Gaus buildings

### **[3:48 PM] - Communication and meeting organization and project progression**

- Emails will be sent for more active response in oppose to our discord communication

### **[3:52 PM] - Meeting Adjourned**

## Action Points:

- Client Questions creations for Friday
- Finishing the budget (writing the document) - Drew
- Organizing with Avery for the client interview Friday

# 3rd Meeting

Friday, September 18, 2020 3:26 PM

## Attendance:

- Taegan Williams - **Scribe**
- Grace Rosenvall - **Team Manager**
- Lillian Mortensen
- Andrew Pilchard - **Treasurer**
- Cosette King
- Feng Li - **Team Instructor**
- Harrison Thomsen
- Jacob-Cobi Brower - **Team TA**
- Robert Goes
- Avery Brock - **Team NASA Consultant**
- Joe Dennison
- Finan Bryan - **Primary Client Contact**

## Goals for Meeting:

- Follow up on last meeting's action items
- Any updates from Dr. Li/Avery?
- Follow up on timeline for the next few weeks
- Walk through PRD creation for both sub teams (DUE THURS)
- If time, start generating questions in breakout rooms

## Meeting Minutes:

### [3:30 PM] - Call to Order

### [3:32 PM] - Questions for Client Interview

- o We will come up with client interview questions in sub meetings this next week.

### [3:33 PM] - Covering Last week Action Items

- o Completed Action items

### [3:34 PM] - Deadlines Coming up, Timeline

- o Product Requirements due Thursday
- o Client Interview is also due
  - 10 - 15 questions
  - We need to do the client interview before product description.

### [3:37 PM] - Walk through Product Requirements Creation [THURS Due]

- o Talking about what our end product needs to look like
- o Lillian volunteered to writeup the document for product requirements

### [3:41 PM] - Questions for Client Interview

- o What wiki page is the most relevant for us to finish the project?
- o What are the basics so we can generate more questions?

### [3:44 PM] - Avery Steps to start

- o Avery prepared a slide show with basic information.
  - **IRIDIUM**
    - SCUBBEE made designations on the 9523 board
    - Updated schematic needs to happen to the development board

- Boost converter needs updated, rf transmit power
- Avery will design the PCB so we will not need to share files. We will send him what needs to be designed and he will send us the board over holiday break
- COMPE will wire up the dev board, ADA fruit GCE
- Will need to manage firmware on 2 separate boards until new board is designed
- We shouldn't be using a PI board, would take longer and we can't implement.
- Main task: designing the boost converter gallium nitrite, probably will be silicon
- CS will be working on non-hardware firmware development that manages voltages and turns things on and off. Parsing and spitting it out into the 9523
- Will be doing the ground server portion of it heavily
- Encryption and decryption within firmware and software
- Look at SCUBEE Hardware
- Look at FIRE Software
- GOAL: FALL - Get everything Avery needs to design the board ASAP
- GOAL: SPRING - Flight ready and tested unit
- Questions
  - ◆ Pressure or time requirements?
    - ◇ Launch is in June, not really
  - ◆ Where should we work in regards to the breakout board?
    - ◇ Broadcasts at dangerous levels, 9523 is basically a satellite phone, it operates as an L band device, or same frequency as GPS, it can negatively interact with biological life. Do not have anything within a meter that uses GPS. Do this outside. Do not walk near the antenna when broadcasting. Very controllable.
  - ◆ Any more documentation on previous CS work? Misinformation?
    - ◇ May have had a dud antenna at the start. If you have questions contact Michael Atkinson who led the CS development last year.
  - ◆ SIM Card, Irdium Modem?
    - ◇ Talk to Li about where it might be at. Silvery box with Iridium sticker on it, says 9523. Could be mounted on the board. It is mounted on there. Life is easy. Take it off and put it in an ESP bag before anything.
- **ADCS Sub-Group**
  - Heavily mechanical engineering, more hands off. We will probably not have a finished model at the end of the year for this project.
  - Need to look at research from other universities to select adcs components to build and test.
  - Need to design a driver to enable control system growth
  - Research materials to pick out Sun Sensor, Magnetometer, IMU (accelerometer and gyroscope) , Torque Rods, PCB Magnetorquers, Reaction Wheels
  - Refer to the slides for the control options specified for this project
  - Eventually would like for this to be machine learning controlled
  - ME will lead component researching and selection.
  - EE will lead the electronic components and firmware
  - CS will help with controls and firmware as needed, control options and research
  - MSE will be the consultant for materials and wear considerations( reaction wheels), radiation shielding
  - GOAL: FALL - Modeling and Research
  - GOAL: SPRING - Device prototypes and have something for EXPO
  - Questions
    - ◆ What's the scale?
      - ◇ The satellite should be able to control a 6 use satellite. Should be 20 x 30 x 10 or closer to reality 25 x 40 x 10. ADCS is usually variable.

- Should fit within an extrusion, x y plane limited, z plane open.
  - ◆ What orbit? Radiation tolerance?
    - ◇ Low earth orbit. Care about shielding for 20-30 Krad. In low earth orbit 6-12 months will only have 1-2 Krad. We would like to plan for higher which would mean more radiation
  - ◆ Machine Learning?
    - ◇ Requirement is that 9523 needs to be done. If you can split your time and work on the machine learning great, but focus on 9523.
- Budget - TX2
  - There are several more powerful modules, but they need to be easy to integrate. Right now we are using a commercial breakout board. Will talk more about AI in next slide.
- **AI SUB-Group**
  - CS should manage, primarily a research project with lots of coding
  - Most open, research useful machine learning on a space craft. Cameras are the inputs. Data storage is onboard only
    - ◆ Self-contained, shouldn't need a lot of data out. Shouldn't need a lot of data in
  - Effects on radiation while the program is running, are we getting computational or memory issues when we are running?
  - Develop a low band with slow paced interactive program to demonstrate GPU abilities, be able to play chess against the satellite. Something that needs to be run on the GPU. NO STREAMING, no graphics.
  - If EE is available, design a better carrier for the Nvidia GPU
    - ◆ Could interface with the ADCS
  - Be able to switch between programs that are actively running. Needs to be able to be controlled so that it is not running constantly. Usually ran in intervals.
  - Will need to consider heat pipe, we are considering copper with different materials in the pipe in consideration with how they react in a vacuum. The internal degree of the satellite is 10-20 C
    - ◆ Outside -10 - 40 C, absolute vacuum no convection.
  - GOAL: FALL - Proposed Demonstrations and shielding experiment
  - GOAL: SPRING - Software or hardware we could fly?
  - Questions
    - ◆ Do they have existing data from previous groups?
      - ◇ Maybe, Avery will look into processes to get that information
    - ◆ This will not be run on TX2 already live?
      - ◇ We cannot touch the TX2 after launch. Needs to be pretty low bandwidth

**Action Items:**

# 9523 - 2nd Meeting

Wednesday, September 23, 2020 3:29 PM

## Agenda for this meeting:

- Discuss Product Requirement Document (Due Thursday)
- Buy Breakout board (Budget Draft Due Thursday)
- Discuss future meetings with Avery (From now to Snapshot #1)
- Prep for Client Interview (On Friday at 3:30pm)

## Attendance:

- Cosette
- Harrison Thomsen
- Joe Dennison
- Robert
- Taegan
- Drew Pilchard

## Meeting Minutes:

- **[3:29 PM] - Call to Order**
- **[3:30 PM] - Product Requirement Document**
  - We will have a CS and an EE apply some time into the Product Requirement Document
    - Robert and Taegan will help write some of the PRD
  - Atmel Studio for 9523
- **[3:33 PM] - Discuss future meetings with Avery (From now to Snapshot #1)**
  - No future group meetings with Avery in the near future
  - We will try and meet with Avery on Thursdays via zoom with Avery
  -
- **[3:43 PM] - Additional parts for breakout board**
- **[3:50 PM] - Write up questions on the document for Client Interview**
  - Every Person should put at least 1 question into the document.
- **[4:03 PM] - Meeting Adjourned**

## Action Points:

- Work on product requirements document
- Drew is buying the board and jumpers
- Utilize Tuesday 3:30 - 4:20 for workshop or meeting
- 5 questions per discipline on the 9523 Client Questions



# 4th Meeting

Friday, September 25, 2020 3:16 PM

## Attendance:

Taegan Williams - **Scribe**  
Grace Rosenvall - **Team Manager**  
Andrew Pilchard - **Treasurer**  
Cosette King  
Feng Li - **Team Instructor**  
Harrison Thomsen  
Jacob-Cobi Brower - **Team TA**  
Robert Goes  
Avery Brock - **Team NASA Consultant**  
Joe Dennison  
Finan Bryan - Primary Client Contact

## Goals for Meeting:

- Client Interview
- Set goals for Snapshot 1

## Meeting Minutes:

### [3:33 PM] - Call to Order

### [3:32 PM] - Questions with Avery

1. Avery Prefers Cisco Web X or Microsoft Teams
2. Will need female to male jumpers for SAMD51 to RS-232
  1. Get the dupot style ones
3. Will need to look at the state machine on the FIREs github to see how it connects with the Iridium
  1. May not need to talk to it, but will need to boot sequence in the right order to catch if anything happens
4. The SAMD51 and the dev board will not communicate with each other
5. If it's the Pi is in C, should be easy to port to SAMD, if the code is in python we will need to rewrite
6. When we remove the Iridium, the 9523 could take its spot, use the simulator till the power is certain, then we can put the 9523 back on

### EE Questions

1. Look at the iridium guide
2. Look at the iridium guide
3. NO reason to consider SiC, but look at GaN so we can get a higher switching frequency and GaN is immune to radiation effects
4. Up to the team to let the EE play with the firmware development
5. PCB, the dev board is ready to go
6. Dev board schematic should be on the team SCUBBEE wikipedia page. Avery has PDFs

### CS

1. Encryption standards were emailed to grace, pretty loose, meet or exceed standard listed to the US government security standard. NASA Standard 1006 - space system protection standard. Minimum requirements for command and control encryption. May want to look at the NASA software standard - npr7150.2 - will need to talk to mark about classification and if we will need to follow through with this
2. We have to figure out, short burst data is sent to a gmail account. We will bring Alex on the line to get more information about this. We will need to communicate with a

server on the ground. We will need a specific IP, TCP connection, maybe AWS could be where they are making their server

3. Crypto system would be integrated into the control software. Should be a separate library. Lightweight encryption library.
4. Will need to make sure tht it's a lightweight and can run on the board
5. They wrote code that ran on dev board that controls the power. Heck where that is at in their repository. Will need to get the base firmware before the 9523 goes back on the board. It's a 9 wire protocol that standard.

Main thing for CS is to figure out what we need, the previous team was able to talk to the modem and was able to use rootx. They never figured out what the ground server needed to look like.

#### ADCS Questions

1. Shouldn't be longer than a year
2. Will need to be further discussed in another breakout meeting
3. Operating voltage should be the same at the 9523
4. Operating temperatures, no convective cooling, out gassing of materials - this point we shouldn't worry because we are prototyping. Low melting point metals, could use steel but not tungsten or titanium

Stopped answering questions, refer to the zoom recording on the onedrive

#### Follow Up questions:

- CS - have a good understanding of last year's code and position so we are not trying to start over again
- Shipping requirements - we won't be touching the flight stuff it's a large pain to get stuff from NASA right now
- Depending how far we get we might need to worry about UL requirements.

#### **[4:22 PM] - Snapshot 1**

- deliverable will become an action item

#### **[4:23 PM] - Meeting adjourned**

#### **Action Items**

- Start creating goals for snapshot 1

# 9523 - 3rd Meeting

Wednesday, September 30, 2020 3:28 PM

## Agenda for this meeting:

- Discuss Product Requirement Document (Due Thursday)
- Buy Breakout board (Budget Draft Due Thursday)
- Discuss future meetings with Avery (From now to Snapshot #1)
- Prep for Client Interview (On Friday at 3:30pm)

## Attendance:

- Cosette King
- Harrison Thomsen
- Joe Dennison
- Robert
- Taegan
- Drew Pilchard
- Avery Brock- Our Client
- Alejandro Salas - CS lead for NASA

## Meeting Minutes:

- **[3:29 PM] - Call to Order**
- **[3:30 PM] - Introductions to members on the call**
  - Alejandro Salas can answer our CS questions and will be around for us as a resource
- **[3:34 PM] - Iridium 9523 schematic breakdown**
  - LT3959 Boost Circuit will need to be redesigned
    - Starts to hiccup when it pulls 1 amp
  - Shouldn't need to touch the board with a soldering iron
    - [Images.shoutwiki.com/mindworks/e/ea/Iridium\\_Carrier\\_Schematic.pdf](https://images.shoutwiki.com/mindworks/e/ea/Iridium_Carrier_Schematic.pdf)
  - Avery will throw together a zip file to make sure we have everything
    - NAL Research is where we get the Iridium modem from
- [4:00 PM] - Questions
  - Difference between internal and external mosbet?
    - [Webench.ti.com/power-designer/](http://Webench.ti.com/power-designer/).com
- 4:03 PM] - Gantt Chart
  - Gantt Chart is created, we need to plug in our high level tasks, determine time length, and determine if tasks are parallel or not.
  -

## Action Points:

- Read sections of documentation for board specs and encryption/decryption
- Fill out Gantt Chart tonight!

# 5th Meeting

Thursday, October 8, 2020 3:26 PM

## Attendance:

Taegan Williams - **Scribe**  
Grace Rosenvall - **Team Manager**  
Andrew Pilchard - **Treasurer**  
Lillian Mortensen  
Cosette King  
Feng Li - **Team Instructor**  
Harrison Thomsen  
Robert Goes  
Avery Brock - **Team NASA Consultant**  
Joe Dennison  
Finan Bryan - Primary Client Contact

## Goals for Meeting:

- Prep for Snapshot #1 (Assign the following action items) – Targeting 1-3 slides per group
  - Slide(s) for 9523
  - Slide(s) for ADCS
  - Slide(s) for AI in the Sky?
- Final portfolio items
  - Make sure all reference items are in the OneDrive for easy access
- Discussion of workshop days
  - These are gonna be a time where we can work on capstone stuff in an informal way. Not required, and I'm looking for 2-3 days of the week where we have groups of people who can meet.

## Meeting Minutes:

### [3:31 PM] - Call to Order

### [3:32 PM] - Prepping for Snapshot 1

- Each group has 1-3 slides on steps and as a launch point for what our project is
- ADCS - Lillian, Grace
  - Slide on Components
- 9523 - Joe
  - Slide on problem definition
  -
- AI in the Sky - Robert
  - 1 slide on the problem definition
- Grace will create a folder for a single location
- At least 1 person in the room per project, come back to the room to make sure things are okay

### [3:40 PM] - Final Portfolio Items

- Keep all items in the one drive folder
- We need to prepare logos on our slides, Idaho's - Grace wrote down the other 2

### [3:43 PM] - Workshop Days

- We will try and get times for people to work together tomorrow to make the slides

### [3:46 PM] - Close Meeting

**Action Items:**

- Get the slides done!
- Prepare and review the slides before Tuesday
- Turn in Logbook and Portfolio Review

# 6th Meeting

Friday, October 23, 2020 3:26 PM

## Attendance:

Taegan Williams - **Scribe**  
Grace Rosenvall - **Team Manager**  
Cosette King  
Feng Li - **Team Instructor**  
Harrison Thomsen  
Robert Goes  
Avery Brock - **Team NASA Consultant**  
Joe Dennison  
Lillian Mortensen

## Goals for Meeting:

Snapshot 1 Reflection  
Updates from Subteams  
Naming of the Wiki-master (if you're interested in doing this, send me an email!)  
Design Validation Plan Work needed?  
Value Proposition

## Meeting Minutes:

### **[3:31 PM] - Call to Order**

### **[3:33 PM] - Snapshot 1 Reflection**

- Lacking group goals and explanation of why we are working on this project
- More background of what we are working on
  - What is an Iridium, what are we using it
- Team members what went well/ needs improvement
  - We need to have a practice session before snapshot day
- Only 1 slide on next snap shot

### **[3:40 PM] - Updates from Subteams**

- 9523
  - Cs will be able to work on dev board and Joe is able to connect to the board
- ACDS
  - Narrowing in on components to use
  - Working on design matrix for components to further narrow down the list
- AI in sky
  - No real update yet

### **[3:45 PM] - Naming of the Wikimaster (if you're interested in doing this, send me an email!)**

- Taegan Williams - wiki master

### **[3:45 PM] - Design Validation Plan Work needed?**

- Turned in yesterday

### **[3:46 PM] - Value Proposition**

- Due next Thursday
- One paragraph total for all teams
- 3 sentences max to describe each sub team

### **[3:58 PM] - Avery Information**

- Not held to deadline of December for 9523
- We won't receive the RUDICS for a while
  - Will need to find a way for UI to fund the SIM Card

- Stay the course

**Action Items:**

- 4 weeks left till Thanksgiving - let's get to work!
- Joe and Grace will wrap up Value proposition
- Taegan will go to wiki-master meeting

# 9523 - 4th Meeting

Wednesday, October 28, 2020 3:31 PM

## Agenda for this meeting:

- Power Converter Details
  - Topology Recommendation
  - Input Requirements
- University of Minnesota Collaboration Effort
- SIM Card Purchase updates?
- Update 9523 schedule

## Attendance:

- Cosette King
- Harrison Thomsen
- Joe Dennison
- Robert
- Taegan
- Drew Pilchard
- Avery Brock- Our Client
- Feng Li - Our instructor

## Meeting Minutes:

- **[3:34 PM] - Call to Order**
- **[3:35 PM] - Update Design Validation with new deadlines**
- **[4:02 PM] - SIM Card Purchase updates?**
  - Feng said that the SIM card could be pretty expensive might have word next week if the school will help us fund the SIM for our project.
  - University of Minnesota is working on with a 9523
    - Parallel development to us
- **[3:35 PM] - Power Converter Details**
  - Will need to go to fly back
    - Through Wurth or coil craft
    - Pick turns ratio we are looking for
      - Anything above a 10/1 is going to be hard to find 5/1 is high as we want to go
      - Pchannel if we can, nchannel if we must

## Action Points:

- CS team will be meeting to setup samd51 this Saturday
- Team name will be decided Thursday
- 9523 engineers will determine power converter details soon



# 7th Meeting

Thursday, October 29, 2020 3:32 PM

## Attendance:

Taegan Williams - **Scribe**  
Grace Rosenvall - **Team Manager**  
Cosette King  
Feng Li - **Team Instructor**  
Robert Goes  
Avery Brock - **Team NASA Consultant**  
Joe Dennison  
Lillian Mortensen  
Drew Pilchard

## Goals for Meeting:

- Upcoming Dates:
  - Value Proposition due 10/29!
  - Draft Wikipage next week!
  - Start prepping for Concept Design Review
- Subteam Updates
- Wiki Support discussion – How can we help Taegan
- Value Proposition discussion – Overview of draft

## Meeting Minutes:

### [3:33 PM] - Call to Order

### [3:33 PM] - Upcoming Dates

- Value Proposition - Dr. Li said we can submit it tomorrow
- We will get people to work on that today and tomorrow
- Draft wiki page/ Concept Design Review

### [3:38 PM] - Subteam Updates

- Some of 9523 will be meeting on Saturday 12 - 4 for a workshop
- ACDS are creating a weighted table to decide on what components to use
  - Focusing on the fly wheel system

### [4:05 PM] - Wiki Support discussion

- Wiki Name - Attitude Determination Control and Design with AI
- There will be a documented created for content creation

### • [4:11 PM] - Value Proposition

- Do as one project - dedicate enough space for each sub task

## Action Items:

- Robert, Joe, and Grace will focus on Value proposition tomorrow
- Wiki Page due next week - Taegan, Lily, Drew/Harrison, Robert
- Grace will email Avery possible dates for value proposition review
- Will talk to people from 9523 to steal to ADCS
- Will need to schedule design review with the class.

# 8th Meeting

Thursday, November 5, 2020 3:31 PM

## Attendance:

Taegan Williams - **Scribe**  
Grace Rosenvall - **Team Manager**  
Cosette King  
Feng Li - **Team Instructor**  
Robert Goes  
Avery Brock - **Team NASA Consultant**  
Joe Dennison  
Lillian Mortensen  
Drew Pilchard

## Goals for Meeting:

## Meeting Minutes:

### [3:33 PM] - Call to Order

### [3:33 PM] - Update from sub teams

- **9523** - Joe recently we have been able to port Fire teams code to the dev board
  - ECE will be meeting soon in person to work on the schematic for the dev board
- **ACDS** - weighted table to decide on what components should be used
  - Should have a solid one for our Consultant presentation
- **AI in the sky** - we will be working to get AI in the sky off the ground
  - We will need to make sure we can accomplish 9523

### [3:36 PM] - Wiki Draft

- Will generate content as it comes in
- Fill out the Form on personal information for the wiki page by the end of the week

### [3:40 PM] - Idaho Design Review

- After design review we will have a post mortem prior to break
- We will have 3-4 people present and all of us there next Thursday at 3:30PM
  - Those 3-4 will be meeting to practice and prepare the presentation
- Want more background of the project not technical details

### [3:42 PM] - NASA Design Review

- More technical details - part numbers etc.

## Action Items:

- **Design review is next Thursday at 3:30pm.**
- **Get Google form filled out by next week**
- **Log books are due next Friday**

# 9523 - 5th Meeting

Wednesday, November 11, 2020 3:41 PM

## Attendance:

- Cosette King
- Harrison Thomsen
- Joe Dennison
- Robert
- Taegan
- Drew Pilchard
- Avery Brock- Our Client

## Meeting Minutes:

- **[3:34 PM] - Call to Order**
- [3:40 PM] - Avery Meeting
- **[3:52] - Where are we at**
  - Joe has a list
    - Can we take hardware home with us over break?
      - Yes, no worries, just bring it back to campus at some point
  - Avery would like the board design done before break so we can board made when we get back
  - Harrison what's the progression on the boost converter?
    - Hoping to get the converter done by thanksgiving, currently working on the mosvet
    - For buck boost, just use the Texas instrument tools, if you want to send Avery first dev board, he can provide some feedback
  - Robert current status of the CS side
    - AES256 - with the current library will work
    - Team Fire's code has stuff missing so we are working on getting it working
    - Robert was working on splitting the code in two
  - What's the thoughts on the co-processor
    - The co-processor won't work as it has issues with asymmetric and symmetric encryption

## Action Points:

- Get Slides done for tomorrow's presentation

# 9th Meeting

Thursday, November 19, 2020 3:28 PM

## Attendance:

Taegan Williams - **Scribe**  
Grace Rosenvall - **Team Manager**  
Lillian Mortensen  
Andrew Pilchard - **Treasurer**  
Cosette King  
Feng Li - **Team Instructor**  
Harrison Thomsen  
Jacob-Cobi Brower - **Team TA**  
Robert Goes  
Avery Brock - **Team NASA Consultant**  
Joe Dennison  
Finan Bryan - Primary Client Contact

## Goals for Meeting:

Subteam Update  
Schedule Update (could be combined with subteam update as needed)  
Presentation Debrief  
Action Items to prepare for the PDR and other over break

## Meeting Minutes:

### [3:33 PM] - Call to Order

- Team member citizenship is due soon
  - Really only need subteams, but get more team members if you can
- Dec. 3 Nasa Design review
- Dec.4 Snapshot 2

### [3:36 PM] - Update from sub teams

- 9523
  - Robert has been working on researching open source code for iridium carrier
    - Found multiple breakthroughs for code
    - Over break, will use emulator to run and test for code
    - Avery - what will the rudics library be doing?
      - ◆ Don't think we will need the rudics library
      - ◆ If it works, lets see where this takes us
  - Drew and Harrison have great progress on boost converter
    - Should be done by the end of the semester
  - Be ready for Avery to make the board by the end of the semester
- ACDS
  - Have a list of parts to order before break

### [3:41 PM] - Schedule update

### [3:44 PM] - Presentation Debrief

- Nasa Presentation - We won't need Team management stuff or budget to much, really just specifications
  - Should be very detailed, why we chose items, libraries, etc.
- University Presentation - Feng - we did an great job for the size of the team we have. The slides looked nice and the visual aids were helpful
  - Get more photos from the subteams

- University Presentation - Avery - Title Slide per section, everyone associated with that section pipe in and introduce everyone. Put a team picture at the end
- 2nd snapshot will be a little bit different, we should have sub sections divided into hardware software development. Consider dividing things up by device for ACDS.
- Nasa Presentation - Don't worry about slide count worry about slide content. Spend some time talking about last year's teams progress. How we are building off of it.

**Action Items:**

- **Keep working with sub teams for development**
- **Grace will setup dates for workshops so we can work towards Nasa Design Review and Snapshot 2**
- **Grace will pull information from University Design review for a board**

# 9523 - 6th Meeting

Wednesday, December 2, 2020 3:28 PM

## Attendance:

- Cosette King
- Harrison Thomsen
- Joe Dennison
- Robert
- Taegan
- Drew Pilchard
- Avery Brock- Our Client
- Alejandro Salas

## Meeting Minutes:

- **[3:30 PM] - Call to Order**
- **[3:40 PM] - Avery Meeting**
- **[3:52PM ] - NASA Design Review Finalization**

## Action Points:

- Get Slides done for tomorrow's presentation

# 9523 - 7th Meeting

Wednesday, December 9, 2020 3:25 PM

## Attendance:

- Cosette King
- Harrison Thomsen
- Joe Dennison
- Robert
- Taegan
- Drew Pilchard
- Avery Brock- Our Client

## Meeting Minutes:

- **[3:34 PM] - Call to Order**
- **[3:35 PM] - Update on Sub parts of 9523**
  - Power Converter
    - Harrison Timeline for Power Converter
    - Once Done, they will transition for ADCS
    - Avery meeting tomorrow at for Power Converter
  - CS
    - Robert says the PowerPoint was a huge help in understanding RUDICS
    - Iridium IO, during break to catch up the rest of the team
  - Funds
    - Keep working like we are going to get RUDICS
    - Keep preparing the ground server like we will get a ground server
- **[3:52 PM] - Update on AI in the SKY**
  - No real deadline, we have time.
  - Priority is 9523, however, there is interest in the radiation shielding
- **[3:54 PM] - Start thinking of timeline.**
- **[3:56 PM] - Project Portfolio**
- **[4:00 PM] - Wiki Page**

## Action Points:

- Get Sections done on the paper on the Wiki Folder on OneDrive
- Project Portfolio assignments in

# 9523 - 8th Meeting 2

Wednesday, January 20, 2021 3:27 PM

## Attendance:

- Cosette King
- Harrison Thomsen
- Joe Dennison
- Robert
- Taegan
- Andrew Pilchard
- Avery

## Meeting Minutes:

- **[3:31 PM] - Call to Order**
  - 99 days till expo
  - Couple weeks till engineering release presentation
- **[3:35 PM] - Update on Sub parts of 9523**
  - **Ground Server - Taegan and Cosette will manage**
    - Reach out to Feng to see if ITS is working on server hookup
    - Reach out to ITS to try to get a hookup
    - Raspberry pi is all we need
    - Web hosting \$5 a month
    - Requirements that Avery told us about for the server
  - EE Progress
    - Boost converters 30 volts, little bit of progress
    - Buck boost final design for it, won't pass transient input simulation
      - Higher voltage needed
      - Working on schematic for boost converter
  - Firmware and Encryption
    - First working code from team FIRE
    - Figured out how to put zeffer on the Arduino
      - Provides framework and error protection
    - We need to rebuild the encryption from ground up
      - Will need to look at the slideshow from Avery to see
      - <https://transport.sri.com/projects/rudics>
      - <https://www.unavco.org/projects/project-support/polar/remote/comms/comms.html>
- **[3:45] - Avery Update**
  - Go check the Virgin Flight - test 7 was a success
  - We need to be flight ready by April, We might be elfing the hardware
  - Because of the accelerated timeline, EE's might move over to the ACDS
    - What is our minimum viable product?
  - Would only need to run a techedsat and wouldn't need the buck boost
    - Makes life easy enough it might not be worth working on so EE's could move to ACDS
  - For CS, what is our minimum viable product to get our product working
    - What's holding us up is Mark, testing, and funds
    - Look at what is the absolute bare bones code to have serial code parsed and send it out
  - Could spin a dev board if Mark approves a dev board then will send our way
  - Minimum Requirements



- <https://documentcloud.adobe.com/link/review?uri=urn:aaid:scds:US:c62cc0cc-09fa-4926-8930-85ff099c4888>
- Ones we need:
  - SBD messages and be able to switch into RUDICS
  - Accept messages and send it back down
  - Ground Server needed for testing, won't be able to port things over to NASA's stuff
    - ◆ Won't need requirements, just make it work!
- Test 10 failed a few weeks into orbit, radios broadcast exactly at 3rd harmonic of primary gps with 12 watts of power. IT killed the GPS. **Turn off GPS on phones when testing**
- Operate under the assumption that Avery will ship us flight hardware in February

Action Points:

- For Engineering Presentation - we need schematics, working ground server
- Look into Zepher - watch how it works and setup
- Harrison, Andrew - Attend the ADCS meeting to transition
- Flyback Converter Spec

# 10th Meeting

Thursday, January 21, 2021 3:31 PM

## Attendance:

Taegan Williams - **Scribe**  
Grace Rosenvall - **Team Manager**  
Lillian Mortensen  
Andrew Pilchard - **Treasurer**  
Cosette King  
Feng Li - **Team Instructor**  
Harrison Thomsen  
~~Jacob Cobi Brower - **Team TA**~~  
Robert Goes  
Avery Brock - **Team NASA Consultant**  
Joe Dennison  
Finan Bryan - Primary Client Contact  
Mark - Head of Tech SAT

## Goals for Meeting:

**Talk about schedule**

## Meeting Minutes:

### [3:32 PM] - Call to Order

### [3:36 PM] - Update from sub teams

- Registration - Pre Registration has been filled out
  - Clarification on Power for the EXPO - we will need power
  - Explain what we are working towards in simpler terms for a brochure
    - Key portions - commercial available, Control systems, orientation, if we can get AI good if not scrap, shielding to enable more advanced processors
  - Don't say Iridium, don't name processors, don't say ACDS people will pick it up we got to dumb it down.

### [3:41 PM] - Schedule update

- We should have sub team updates in the schedule by next meeting

### [3:34 PM] - Avery Updates

- 9523 we need a minimum viable product by April
  - Funding is low, operate like we need our project ready in April.
- Avery is going to do the hardware requirements and cut some of the requirements for hardware so we can focus on software
- ACDS need the flywheel ready by April to launch in space.
- Visit to AIMS does not look like it will happen

### [3:50 PM] - 9523 Project Updates

- Split into two subgroups to focus on Zepher and the Ground server

### [3:51 PM] - ACDS Project Updates

- Fly wheel seems probable and in our meeting next week we will set everything up. The team meeting will be Wednesday at 1:30

**[3:51 PM] - Upcoming Deadlines**

- Snapshot 3, not until a while focusing on our current deadlines
- Engineering Release review on February 19th

**Avery** - Abandon senior design schedule - focus on crashed schedule to put resources in place.

Quote of the meeting - "**we can always do a presentation late, we can't be late strapping something on the rocket**"

**[4:00 PM] - Meeting Adjourned**

**Action Items:**

- We should have schedule updated by next meeting

Pair and alex can help with the ground server

Server:

# 11th meeting

Thursday, January 28, 2021 3:25 PM

## Attendance:

Taegan Williams - **Scribe**  
Grace Rosenvall - **Team Manager**  
Lillian Mortensen  
Andrew Pilchard - **Treasurer**  
Cosette King  
Feng Li - **Team Instructor**  
Harrison Thomsen  
~~Jacob Cobi Brower - **Team TA**~~  
Robert Goes  
Avery Brock - **Team NASA Consultant**  
Joe Dennison  
Finan Bryan - Primary Client Contact

## Goals for Meeting:

- Brief overview of schedules
- Updates from subteams (9523, ADCS)
- Any update from Avery?

## Meeting Minutes:

### [3:32 PM] - Call to Order

- We need to sit down and discuss budget next semester

### [3:32 PM] - Brief overview of schedules

- No written up schedule yet
- Goals for next week

### [3:35 PM] - Updates from subteams (9523, ADCS)

#### 9523

- Ground server and schematics are going well

#### ACDS

- Working on the fly wheel
- Lily is working on a fabrication plan for the radiation shielding

### [3:45] - Questions for Server

- Feng will setup a digital ocean server

### [3:47] - Avery Update

- We are on standby for funding for the project. Maintain course

## Action Items:

- **Setup schedule by next week**
- **Email if you would want to be a part of budget meeting - will be after next all team meeting**
- **Get Virtual Iridium to communicate SBD next week**

# 12th meeting

Thursday, February 4, 2021 3:26 PM

## Attendance:

Taegan Williams - **Scribe**  
Grace Rosenvall - **Team Manager**  
Lillian Mortensen  
Andrew Pilchard - **Treasurer**  
Cosette King  
Feng Li - **Team Instructor**  
Harrison Thomsen  
~~Jacob Cobi Brower - **Team TA**~~  
Robert Goes  
Avery Brock - **Team NASA Consultant**  
Finan Bryan - Primary Client Contact  
Joe Dennison

## Goals for Meeting:

- Update on Schedule Crash from Avery
- Next Steps
- Budget Meeting with Feng – Outlining expenses in this semester

## Meeting Minutes:

### [3:32 PM] - Call to Order

- We need to sit down and discuss budget next semester

### [3:36 PM] - Sub Team Updates

#### 9523

- Working on the hookups

#### ACDS

- Landed on an accelerometer

#### Budget Discussion

- We have about 1000 left after RUDICS and ground server

## Action Items:

# 13th meeting

Thursday, February 18, 2021 3:29 PM

## Attendance:

Taegan Williams - **Scribe**  
Grace Rosenvall - **Team Manager**  
Lillian Mortensen  
Cosette King  
Feng Li - **Team Instructor**  
Harrison Thomsen  
Robert Goes  
Avery Brock - **Team NASA Consultant**  
Finan Bryan - Primary Client Contact  
Joe Dennison

## Goals for Meeting:

- Sub team updates
- Engineering Release Review logistics

## Upcoming deadlines:

- Engineering Release Reviews (need to watch 2 and make an entry into your logbook for each)
- Logbooks DUE (Friday)

## Meeting Minutes:

### [3:32 PM] - Call to Order

- 

### [3:32 PM] - Sub Team Updates

#### 9523

- Avery got funding for dev boards
- Robert and Joe are making a diagram for software
- Waiting on RUDICS plan to start testing ground server
- Joint meeting planned with a team that has a ground server available

#### ACDS

- Steady progress
- Reaction wheel done, more schematics on the way
  - Waiting on motor driver situation
- Working on a test stand for expo

### [3:34 PM] - Engineering Release Review logistics

- Can we push Engineering release out 3 weeks?
- Should we split engineering release for 9523 and ACDS?
  - March 9th is snapshot 3
- Sub-teams will schedule the engineering releases,

## Action Items:

# 9523 - 12th Meeting

Wednesday, March 3, 2021 3:33 PM

## Attendance:

- Cosette King
- Joe Dennison
- Robert
- Taegan
- Avery
- Feng

## Meeting Minutes:

- **[3:00 PM] - Call to Order**
  - Update Feng
- **[3:30 PM] - Call to Order again**
- **[3:35] - Avery Update**
  - Attend meetings on Friday and give the other university something to do
  - Should have some time on the schematic next week.
- We need to determine a time for Engineering Release
- We will finish our Engineering Release Poster by the weekend

## Action Points:

- Meeting Friday at 1 to test SBD and finish the poster
- Will hold a rehearsal on Monday for Tuesday Snapshot

# 14th Meeting

Thursday, March 4, 2021 3:31 PM

## Attendance:

Taegan Williams - **Scribe**  
Grace Rosenvall - **Team Manager**  
Lillian Mortensen  
Cosette King  
Feng Li - **Team Instructor**  
Harrison Thomsen  
Robert Goes  
Avery Brock - **Team NASA Consultant**  
Finan Bryan - Primary Client Contact  
Joe Dennison

## Goals for Meeting:

- Sub team updates
- Engineering Release Review logistics

Upcoming deadlines:

- Engineering Release Reviews (need to watch 2 and make an entry into your logbook for each)
- Logbooks DUE (Friday)

## Meeting Minutes:

**[3:32 PM] - Call to Order**

**[3:32 PM] - Sub Team Updates**

### **9523**

- Flyback is created
- RUDICS is ordered
- Testing SBD communication tomorrow

### **ACDS**

- Steady progress

**[3:34 PM] - Snap Shot 3**

- 9523 will be at 3:30
- ACDS will be at 3:50

## Action Items:

- **ACDS is working on poster today**



# 9523 - 13th Meeting

Wednesday, March 10, 2021 3:06 PM

## Attendance:

- Cosette King
- Joe Dennison
- Robert
- Taegan
- Avery
- Feng

## Meeting Minutes:

- **[3:00 PM] - Call to Order**
  - Feng Review on Snapshot
- **[3:01 PM] - WikiPage**
  - Taegan is working on it
- **[3:05] - RUDICS Update**
  - RUDICS ordered on the way
- **[3:05] - Engineering Release Wednesday after break**
  - Spend time working on code and detailed material for the presentation
  - Meetup on Monday to work on presentation
  - Spend time working on code and detailed material for the presentation
  - Meetup on Monday to work on presentation
- **[3:13 PM] - Meeting Adjourned**

## Action Points:

- Turn in Citizenship on Friday