FALL 2013 SEMESTER

Meeting 1 - September 12, 2013

TODAY'S MINUTES

- Team members introduced to Jason Bjur (done previous research)
- Discussed different meeting time (current time does not work with Wayne, Bjur, Assefi)
- Added Bjur, Eld, Petersen to shared Google Drive folder "Senior Design"
- Bjur (last semester)
    - Online code combined with circuit to measure signal frequency
    - Suggests talking to Wayne
- Decided Perry is team photographer
- Decided Kitchen is team website manager
- DO NOT edit documents in the shared Google Drive folder without legitimate reason
- Please name all documents you create with a meaningful title

GOALS FOR NEXT MEETING

• Upload schedules to "Team Member Availability" folder	All	
• Assefi, Oudrhiri schedules		Slater
• Decide better meeting time for Assefi, Wayne, Bjur		All
• Update and edit team formation document (contract)		Perry
• Notify team members to review		Perry
• Print and sign at next meeting		All
• Create individual biographies for website and supervisor	All	
• Make working table of contents for meeting minutes document	Perry	
• Create Gantt chart		Perry
• Bring camera to everything here on out		Perry
• Deliver Team Name/Member document to Assefi	Slater	
• Learn how to protect Google documents based on ownership		Perry
• Attend RISE meeting		All (Slater)

Student Mentor Debrief - September 16, 2013

Wayne

- GRILL Gravity Recovery and Interior Laboratory
- MSL Mars Science Laboratory
- Proof of concept for radio science on Earth, for eventual use on Mars
- Radio science (Link here…)
    - Electromagnetic waves have amplitude, phase, frequency
    - Studies difference in any of the magnetic wave characteristics
    - Ultra-stable oscillator crystal used to transmit precise signal
    - Receiver records received signal
    - Compare transmitted and received signal
    - Study external forces separately
        - Gravity
        - Atmosphere (intervening media)
    - Doppler shift
    - Intervening media affects polarization, amplitude, frequencies
        - Ionosphere blocks some frequencies
- $6,000 budget accessed through Kamal and Sammi

Objective

- Use doppler shift (force-based method, kinematics relative to two objects)
- Find alternative to ultra-stable crystal oscillator (expensive)

Blue shift - higher frequency
Red shift - lower frequency

Three systems of measurement

- Radio science
- Wind measurement (instrument?)
- GPS for tracking balloons (some system functionality blocked above 60,000 feet)
    - Chinese GPS systems? (cheap, disable function not implemented?)

Closed loop - small bandwidth
Open loop - larger bandwidth (used most often)

Experience with Link Budget

Bjur

- Last semester did work for Atkinson
- Find inexpensive way to measure frequencies
- Used Arduino Uno (16 MHz crystal) frequency counter library

        - Need something to measure in the multi GHz range
        - Some methods scale down higher frequencies
            - How to know difference between scaled down and actual low frequency
    - Connected function generator to digital pin, measured max of 8 MHz
    - Collected data

Design

- Broadcast antenna with 360° capability
- FCC dislikes broadcasting large powers over certain frequencies
- 6 pound weight limit per capsule
- 12 pound limit per balloon
- Are there spatial limitations?
- Build a copy of hardware for testing/reliability purposes
- Temperature sensors inside and outside
    - Temperature regulation for circuit components (crystal)

Dr. Young

- Antenna modeling software
- Good resource for this project

Electromagnetic spectrum (page 4)

Client Meeting 1 - September 16, 2013

TODAY'S MINUTES

- Assefi met Kitchen, Petersen, and Eld
- Discussed meeting next thursday with Kamal
- Assefi discussed his goals for the team
    - Have good time
    - Good technical work
    - Great team mechanics/environment
- Reviewed team formation contract
- Reviewed mission statement
- Discussed specifications for cube device with Eld
- Discussed team deadlines being a week before official deadlines

GOALS FOR NEXT MEETING

• Attend RISE meeting in EP tomorrow 2013 September 18	All	
• Create Gantt chart		Perry
• Start team member citizenship		All
• Start portfolio	Perry	
• Schedule shop orientation with Eld	Slater, Perry	
• Upload record of team formation document signed	Perry	
• Update client interview questions by Thursday September 19		All

Meeting 2 - September 19, 2013

TODAY'S MINUTES

- Learned how to use teleconference triangle
- Met Kamal Oudrhiri and Dave Atkinson via telephone
- Introductions
- Desire to meet one hour each week
    - Thursdays at 11:00 in GJ ECE Conference Room
- Discussed client questions
- Discussed client expectations for project
- Slater deemed "Project Manager"

GOALS FOR NEXT MEETING

• Reserve room Thursdays GJ ECE Conference Room 11:00	Slater
• Schedule machine shop orientation	All
• Review class requirements, student roles	All

Meeting 3 - September 24, 2013

TODAY'S MINUTES

- RISE flight is scheduled for Saturday, October 5
- Antenna modeling software in BEL 314B
- Remember, cite all sources for paper in spring, make it easy
- Begin developing plan
- Discussed resources
    - Dr. Young - antennae, frequency
    - Dr. Sullivan - simulations
- Discussed ME and EE responsibilities, tasks
- Discussed task distribution

GOALS FOR NEXT MEETING

- Research structural development with RISE Structures Team Lead — Petersen
- Develop heat transfer model — Kitchen
- Discuss broadcast frequencies, antennae, FCC with Dr. Young — Perry, Slater
- Portfolio :S
- Team Member Citizenship :S

Client Meeting 2 - September 26, 2013

TODAY'S MINUTES

- Acquired RISE information from Petersen
    - Foam type
    - Good seals (glue)
    - "Tag" capsule with business card
    - Kibbie Dome drop tests, parachute deployment
- Acquired Dr. Young information from Perry
    - Not willing to devote time
    - Does NOT know any software
    - Does not have any current contacts who know software
    - Antenna Handbook by Jasik Volakis
- Reference Jason and Stephen
- Developed more in-depth plan of development

GOALS FOR NEXT MEETING

• Develop a more specific plan of action	Perry, All
• Acquire antenna handbook	Perry
• Research frequencies, prepare briefing	Slater, Perry
• Call FCC??	Slater
• Send preliminary schedule/plan to Kamal, get feedback	Slater

Meeting 4 - October 1, 2013

TODAY'S MINUTES

- Discussed information gathered last week
    - Avoid 1616 - 1626.5 MHz range
    - Balloon will be launched in good weather
- October 5

GOALS FOR NEXT MEETING

• Develop semi-formal meeting agenda for 10/3		Slater
• Develop progress presentation for 10/3		All
• Hand in logbooks on Monday, October 7	All	
• Start portfolio!!!		Perry

Client Meeting 3 - October 3, 2013

TODAY'S MINUTES

- Discussed presentation entitled "Progress…"
- Misuse of the term "CubeSat"
- Discussed frequency bands
    - Consider 100 - 400 MHz

GOALS FOR NEXT MEETING

- For October 31, prepare a design review presentation a week in advance (due Friday, October 25)
    - Allows for professional review
    - Allows for editing
- Meet with RISE/VAST communications team — Slater
    - Bring Stephen and Jason
- Learn about antennas — Perry, Slater
- Learn maximum height and horizontal distance traveled — Slater

Meeting 5 - October 8, 2013

TODAY'S MINUTES

- RISE launching Saturday, October 12, 2013
- Discussed additional wind speed measurement apparatuses
    - Coriolis effect (spelling?)
    - Pitot tube

GOALS FOR NEXT MEETING

• Continue learning about antennas	Perry
• Start second presentation for Thursday, October 17	All
• Determine licensing requirements for 100 - 400 MHz amateur radio	All
• Determine orientation and number of antennas	ECE
• Compile list of hardware that could be used for 100 - 400 MHz band	ECE
• Give physical dimensions and heat production of components to	ME
• Build model of cube (with antennas and harness)	ME
• Ask Jason for documentation on summer work (software)	Slater

Meeting 6 - October 10, 2013

TODAY'S MINUTES

- Prepared for Snapshot 1
    - Reviewed presentation
    - Designed poster

GOALS FOR NEXT MEETING

• Can we use budget for radio licensing	Petersen
• Detailed information for Snapshot 1 poster	All
• Refer to Google Drive	
• Develop preliminary website	Kitchen, Perry
• Learn more about antennas	Perry
• Mathematics for calculating doppler effect	Perry

Client Meeting 4 - October 17, 2013

TODAY'S MINUTES

• Reviewed progress report

GOALS FOR NEXT MEETING

• Create short bullet-point questions about radio science topics for Kamal and Dave	EE
• Create specifications for internal space of cube	ME
• Finalize design review next week on Friday, October 25	

Meeting 7 - October 22, 2013

TODAY'S MINUTES

- Reviewed design review goals
- Philip has been working on 3D printing a model

GOALS FOR NEXT MEETING

• Work on design review presentation	All
• Practice presentation during meeting on 10/29	All
• Determine communications system hardware	EE

Meeting 8 - October 7, 2013

TODAY'S MINUTES

• Reviewed design review presentation

GOALS FOR NEXT MEETING

• Compliance matrices	Perry, Petersen
• Call manufacturer of WBX hardware	Slater
• Gather information, get data sheet	
• If sufficient, use as an option and include in presentation	
• Gantt chart (timeline)	Slater, (Perry)
• Specifics - tasks, goals (by month, more frequently?)	

Meeting 9 - December 3, 2013

TODAY'S MINUTES

- Discussed Snapshot 2 requirements
    - Friday, December 6, 2013
    - 8:30 am - 10:30 am in the power lab
    - Poster
        - Project title
        - Team name
        - Sponsor
        - Updated problem statement
        - Table of specifications (compliance matrix)
        - Results of project learning to date
            - Literature findings
            - Calculations
        - System level design
        - Project plan (gantt)
        - Unresolved issues (risks)
    - Logbooks (turn in after snapshot)
    - Team portfolios
    - Dress professionally

GOALS FOR NEXT MEETING (Friday's Snapshot)

- Have everything ready for Friday's Snapshot 2

SPRING 2014 SEMESTER

Meeting 1 - January 15, 2014

TODAY'S MINUTES

Meeting Canceled - Monday January 20, 2014 for MLK Day

To Do:

EEs

- Finish link budget
- Select and order transceiver
- Power disapation
- Transceiver testing plan

MEs

- Order insulation foam
- Antenna mounting and release mechanism
- Structure testing plan
- Analysis of carbon fiber and 3D printer material

All

- Research independent wind measurement

Slater

- Talk to VAST about licensing
- Send out possible meeting times

Meeting 2 - January 21, 2014

COMPLETED TASKS

- Insulation Foam Purchased
- Link Budget Complete & Accepted

TODAY'S MINUTES

Additional Faculty Advisor – Dr. Amrit
April/March Trip to JPL Canceled

To Do:

EEs
- Select and order transceiver
- Power dissipation
- Transceiver testing plan

MEs
- Antenna mounting and release mechanism
- Structure & Cold Chamber testing plan
- Analysis of carbon fiber and 3D printer material

Kitchen
- Update & Resign Team Contract for Spring Semester

Slater
- VAST Permission for capsule on balloon (New Lead)

All
- Research independent wind measurement

Meeting 3 - January 27, 2014

COMPLETED TASKS

- Team Contract Spring Revision

TODAY'S MINUTES

Wikipage Review (EP 122) @ 16:30 Tomorrow, January 28, 2014

- Attendants: Kitchen, Slater

No Wednesday Client Meeting - This Week & Next Week
Client Meeting Date Change - Tuesday February 4, 2014

Alternate Wind Measurement:
Client Question

- Will the alternate method verify the doppler or will the doppler verify the alternate method?

Sensor Option
How far must the sensor be to get the actual wind speed?
Wind Tunnel - Sensor Research
Primary Sensor on arm
Secondary Sensor on Cube for Air Flow Comparison

Fabricate Two Carbon Fiber Cubes

To Do:

EEs

- Select and order transceiver
- Power dissipation
- Transceiver testing plan
- Create & Post Summary Report Spring Semester

MEs

- Cold Chamber Test @ 15:30
- Post Testing Plan, Procedure & Results on Drive
- Summary Report Spring Semester
- Antenna mounting and release mechanism
- Structure & Cold Chamber testing plan
- Analysis of carbon fiber and 3D printer material

Petersen

- Use Monday meeting minutes for updates before Tuesday meeting due to course conflict

All

- Research independent wind measurement

Client Meeting 1 - January 28, 2014

COMPLETED TASKS

- Team Contract Spring Revision

TODAY'S MINUTES

Not enough carbon fiber to fabricate 2 Cubes, but there are alternatives

Atkinson present
Wikipage Review (EP 122) @ 16:30 Tomorrow, January 28, 2014
- Attendants: Kitchen, Slater

Next Client Meeting Date - Tuesday February 4, 2014

Client Review:
Alternate wind measurement will be redefined later
Brief electronic selection inputs
Cold chamber testing plan objectives
Future lab testing for antenna
Ending Remarks - satisfied with Spring progress so far!
Progress Report Due: Friday, January 31, 2014

To Do:

EEs
- Select and order transceiver
- Power dissipation
- Transceiver testing plan
- Create & Post Summary Report Spring Semester

MEs
- Cold Chamber Test - New Date TBD
- Post Testing Plan, Procedure & Results on Drive
- Create & Post Summary Report Spring Semester
- Research alternative Antenna mounting and release mechanism
- Structure & Cold Chamber testing plan
- Analysis of carbon fiber and 3D printer material

All
- Research independent wind measurement

Client Meeting 2 - February 4, 2014

COMPLETED TASKS

- ME & EE Spring Summary Report & Testing Plans Complete

TODAY'S MINUTES

Atkinson present
Next Client Meeting Date - TBD

Wikipage Review (EP 122) @ 16:30 Today February 4, 2014

- Attendants: Kitchen, Slater

To Do:

Wayne

- Bio & Photo for Wiki page

EEs

- Select and order transceiver
- Power dissipation Test & Requirements

MEs

- Perform Cold Chamber Test
- Fabricate Cube Exterior Walls
- Research alternative Antenna mounting and release mechanism
- Analysis of carbon fiber and 3D printer material

All

- Research independent wind measurement

Meeting 4 - February 10, 2014

COMPLETED TASKS

- Power Requirements
    - No limit for Power @ selected band

TODAY'S MINUTES

Next Client Meeting Date - TBD
Detailed Design Review - w/ Kamal (TBD after Feb. 25th)
Log Books Due - Feb. 17th

To Do:

Wayne
- Bio & Photo for Wiki page

Kitchen
- Update Wikipage

EEs
- Select and order transceiver
- Power Dissipation Test

MEs
- Perform Cold Chamber Test - Wednesday, Feb. 12th (Prep)
- Fabricate Cube Exterior Walls
- Research alternative Antenna mounting and release mechanism
- Analysis of carbon fiber and 3D printer material
- Research Sensor for independent wind measurement

Client Meeting 3 - February 11, 2014

COMPLETED TASKS

- Transceiver selected

TODAY'S MINUTES

BHX2 Transceiver & receiver set ($135 x 2 = $270)
Detailed Design Review w/ Kamal - 3:30pm, Feb. 25th (ISG conference room)
    Backup Date - TBD
    Antenna Chamber (Jeff Young) & Test Plan
    Cold Chamber Test Results
    Presentation Due - Feb. 21st
3rd wind speed measurement - placed on hold

To Do:

Wayne
- Bio & Photo for Wiki page

Kitchen
- Update Wikipage - Mar. 13

Slater, Petersen
- Purchase transceiver & receiver set

Slater
- Double check ISG conference room hardware works for Detailed Design Review

All
- Logbooks & Portfolio due to Amrit after Design Review - Feb 25th by 5pm

Meeting 5 - February 18, 2014

COMPLETED TASKS

- Transceivers & receivers purchased
- Detailed Design Review location & time set
    - Tues. Feb. 25th @ 3:30 pm in Civil Engr Conference Room (BEL 111)
- Initial Cold Chamber Testing Complete
    - Results in Google Docs

TODAY'S MINUTES

Cold Chamber Test (CCT) results review and improvements
    Adding hand warmers to next tests
    Lowering testing duration
Next CCT on Wednesday, February 18th.

Detailed Design Review Set - Presentation Due Friday, February 21st.

Antenna Design Post Meeting
General Session Today - Design Expo Registration, Snapshot Expectations

To Do:

Wayne
- Bio & Photo for Wiki page

Kitchen
- Update Wiki Page - Mar. 13

All
- Design Review Presentation
    - Compliance Matrices
    - Timeline
    - Risks
    - Supporting Documents
    - Testing Procedures/Results - Kitchen
    - Budget - Petersen
- Logbooks & Portfolio due to Amrit after Design Review - Feb 25th by 5pm

Client Meeting 4 - February 25, 2014

COMPLETED TASKS

- Wayne Bio & Photo for Wiki page
- Design Review Presentation
- Logbooks

TODAY'S MINUTES

VAST Launch Date - March 29th
Design Review Presentation with Atkinson present
Unable to add Kamal to call

Spring Break - Mar. 15th - 23rd

To Do:

All

- Complete testing and other design parameters by Mar. 14th

Meeting 6 - March 3, 2014

TODAY'S MINUTES

1st Launch Date - March 29th
Aaron Kitchen - Gone @ NSBE Convention March 26th - 30th

Next week's Tuesday meeting (Mar. 11th) moved to Thursday (Mar. 13th)
Otherwise Tuesday meeting will be held without Slater & Wayne

To Do:

Kitchen

- Update Wiki Page - Mar. 13
- Complete Cold Chamber Testing by Friday Mar. 7th

Petersen

- Complete cube Interior fabrication by Mar. 5th
- Cube exterior structure fabrication

Meeting 7 - March 4, 2014

COMPLETED TASKS

- Carbon Fiber walls machined

TODAY'S MINUTES

Logbooks Returned

Cold Chamber Testing - Wednesday & Friday, Mar. 5th & 7th
Multiple cube insulation fabrication in progress

Antenna Fabrication

Next Tuesday meeting, Mar. 11th, tentative

Team Member Citizenship form due Tuesday, Mar. 11th

To Do:

Kitchen
- Update & Polish Wiki Page - Mar. 11th
- Complete Cold Chamber Testing by Friday Mar. 7th

Petersen
- Complete cube Interior fabrication by Mar. 5th
- Add antenna mounting connections to cube exterior structure

Meeting 8 - March 10, 2014

TODAY'S MINUTES

Transceiver not received from manufacturer - factory holding to ship larger load through customs (out of country factory) even though purchased with overnighted shipping

Cold Chamber Tests complete with heat generators, but more need to be conducted to achieve goal results.
Phil is adding cutouts for hand warmers.
Next Cold Chamber Test will be run today, Mar. 10th @ 4:00pm & Wednesday @ 2:30

Snapshot Day @ 3:30pm tomorrow, Mar. 11th

To Do:

Kitchen

- Update & Polish Wiki Page - Mar. 11th
- Complete Cold Chamber Testing by Friday Mar. 7th
- Add EES code & Cold Chamber Testing Graphs for Snapshot

Petersen

- Add antenna mounting connections to cube exterior structure

ALL

- Complete Mid-Term Project summary by tomorrow, Mar. 11th
- Team Member Citizenship form due tomorrow, Mar. 11th
- Add slides to Design Review for Snapshot Poster