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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 Oudhiri 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 | |

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
- Develop progress presentation for 10/3
- Hand in logbooks on Monday, October 7
- Start portfolio!!!

Slater
All
All
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 <ul style="list-style-type: none">• Refer to Google Drive | All |
| • 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 disipation
- 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

Wikipedia 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

Wikipedia 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

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

