EE / CprE / SE 491 –sdmay20-03
NOAA GEOS-R Satellite Receiver
Weekly Report 2

9/23/2019 – 10/12/2019
Client: N/A
Faculty Advisor: Nathan Neihart

Team Members:

Nick Butts — *Software Group*
Rudy Lim — *Software Group*
Jonathan Massner — *Systems and RF Group*
Ted Mathews IV — *RF Group*
Riley Stuart — *ADC Group*
Jordan Tillotson — *ADC Group*

Past Week Accomplishments

- Research RF systems and components- Jonathan Massner, Theodore W. Mathews IV
    - RF components were researched and evaluated based on design constraints
    - Researched Parabolic antenna design and modeling
    - Modeled signal path to determine noise figure and system linearity based on published specifications.
- Research ADC components - Jordan Tillotson
    - Determined multiple possible ADC chips for signal conversion
    - Narrowed coding languages to be used in conversion (C)
- Research potential ADC and DSP integrations - Riley Stuart
    - Determine if we are using DSP or FPGA.
    - Learn more about RF and digital communications.
- Research decoding and file construction procedure - Nick Butts
    - Gathered documentation for each component
    - Decided on Raspberry Pi 4 for processing
- Research into Sampling Theorem and Aliasing - Rudy Lim
    - Looked into sampling using an impulse train
    - Looked into the effects of undersampling and oversampling on a signal

Pending Issues

- Feed horn needs to be modified for target frequency
- Finalize demodulation IC choice so that an ADC can be chosen

Individual Contributions

Team Member	Contribution	Weekly Hrs	Total Hrs
Jonathan Massner	RF research and system diagram	2	20.5
Nick Butts	Software research	10	25
Ted Mathews IV	Presentation creation, Subteam goal setting, Antenna simulation and modification planning, I/Q demodulator research	12	30
Jordan Tillotson	System Design, ADC	5	19
Rudy Lim	Software Research	3	19
Riley Stuart	RF, ADC, Software Research	5	20

Plans for Coming Week

- ADC/DSP - Jordan Tillotson
    - Pick specific ADC chip to be used
    - Build Spice simulation
    - Determine interfacing method for Signal Processing
- ADC/DSP - Riley Stuart
    - Provide options for ADC.
    - Provide options for both DSP and FPGA.
    - Determine integration methods of ADC system.
    - Continue research into RF and digital communications.
- RF Simulation - Jonathan Massner
    - Create a simulation of the RF portion in Matlab/Simulink
    - Determine integration method for RF and ADC system
- Software - Nick and Rudy
    - Gain base level understanding of all components of decoding and file construction
    - Get Raspberry Pi configured
- RF Design - Ted Mathews IV
    - Create antenna model in HFSS for planning new feed design.
    - Begin planning signal path for RF section and narrow parts selection.
    - Create presentation for weekly meeting.