NAKUJA INTERNSHIP AVIONICS PROGRESS REPORT WEEK 7

TASKS COMPLETED THIS WEEK

- [# issue112] : ground station and onboard antenna design
- [# issue 103]: build wi-fi amplifier
- [# issue 113] : integration of redundant pressure and altitude sensors
- [#122] : Move from Soc to IC
- [#121] : Implement wi-fi amplifier
- [#119] : Develop ground station and test stand software
- [#120] : Test the test stand and ground station software
- [#124] : induction to Avionics

WI-FI POWER AMPLIFIER

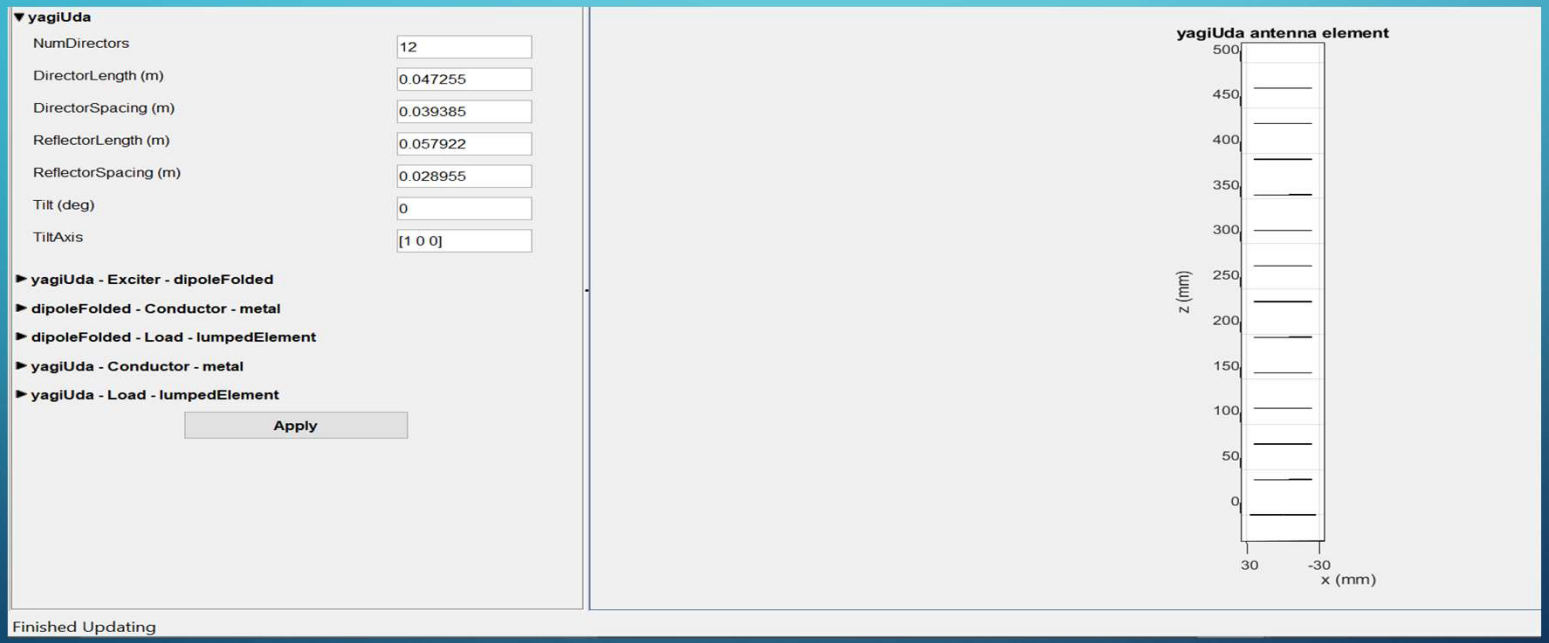
- We decided to go with a store bought power amplifier SKY65405-21 which is an ultra-low-noise amplifier (LNA) intended for 2.4 GHz wireless receiver applications
- https://www.skyworksinc.com/-/media/SkyWorks/Documents/Products/501-600/SKY65405_21_201446I.pdf
- The power amplifier above will be incorporated onto the pcb.

GROUND STATION AND ONBOARD ANTENNA DESIGN.

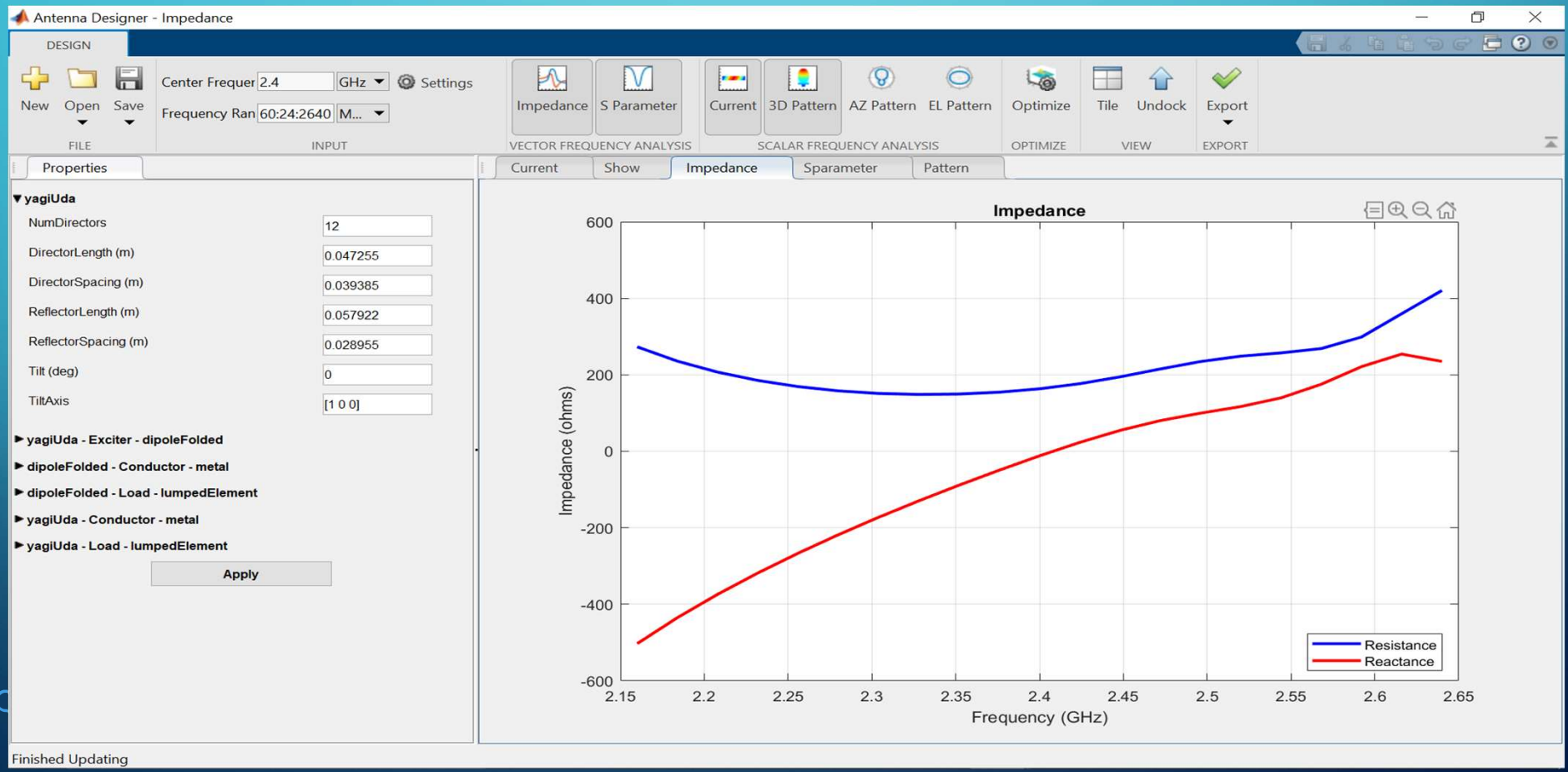
- The task is to design and fabricate an antenna for the ground station (receiving antenna) and an antenna to be used by the onboard system in the rocket(transmitting antenna)
- For the receiving ground station antenna we decided to go with a Yagi Uda antenna operating at a frequency of 2.4GHz
- For the rocket antenna we decided to use a patch antenna which will be mounted on the surface of the rocket.

YAGI ANTENNA DESIGN

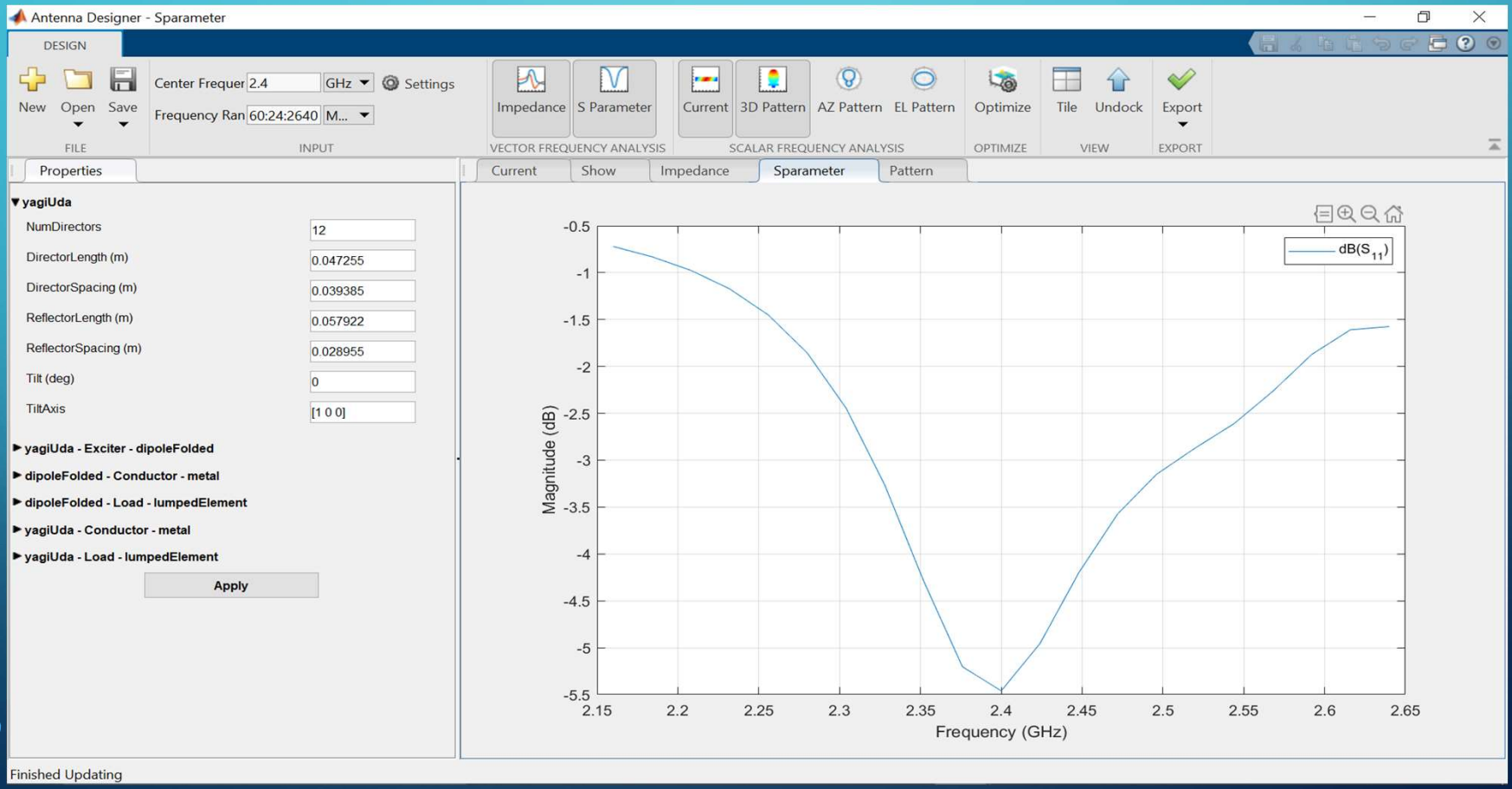
- We were able to design and simulate a Yagi Uda antenna with matlab operating at 2.4GHZ.



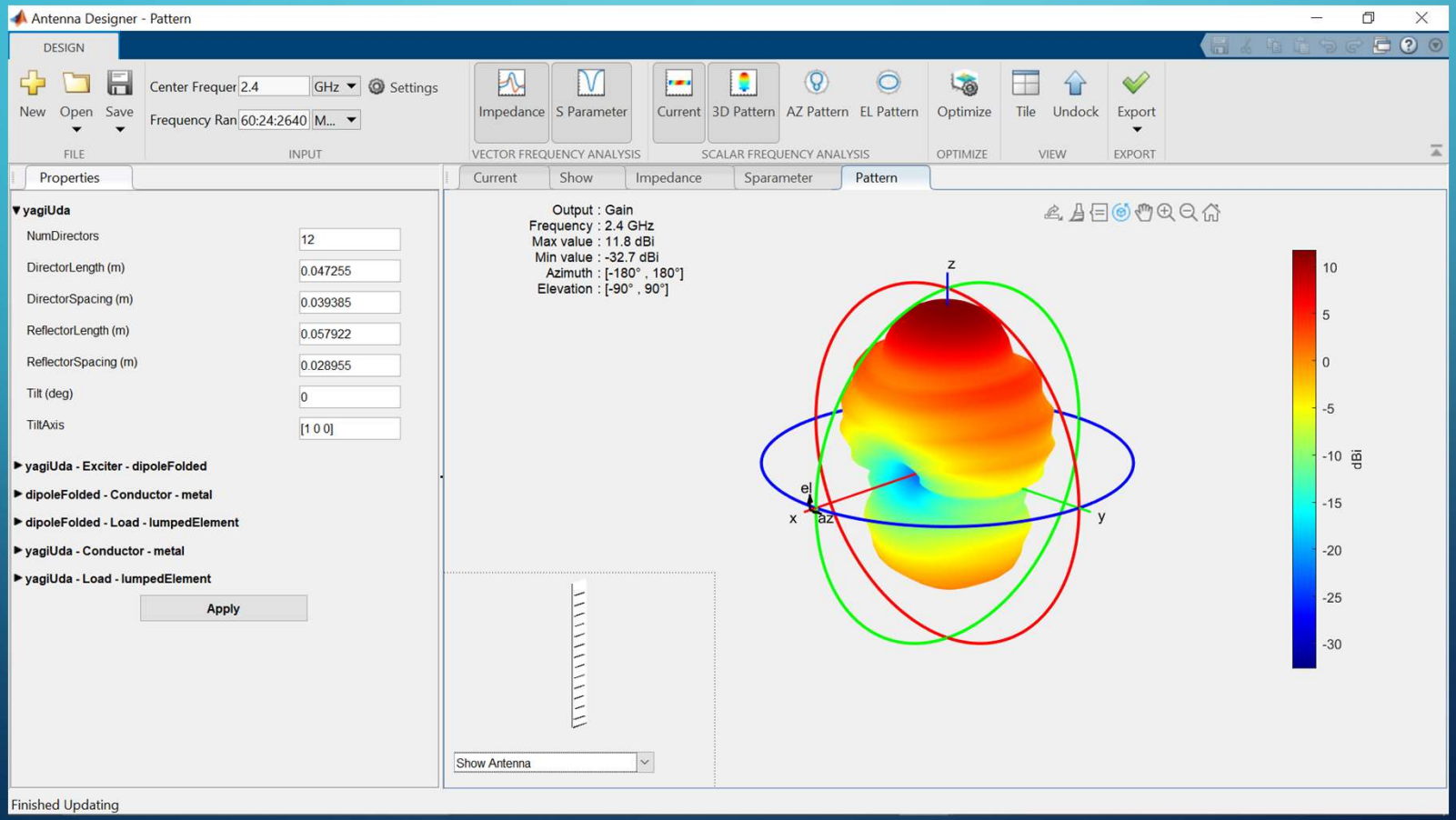
IMPEDANCE PARAMETERS



S11 PARAMETERS

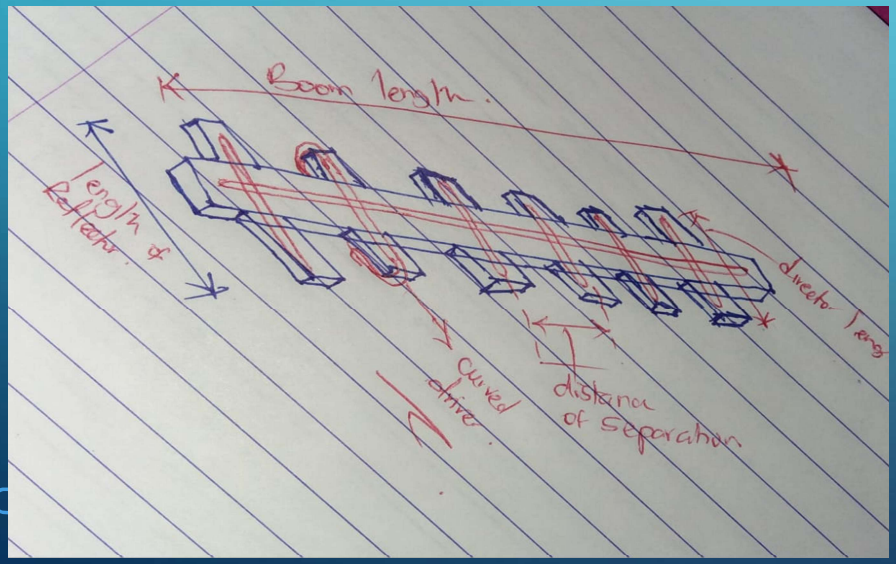


RADIATION PATTERN



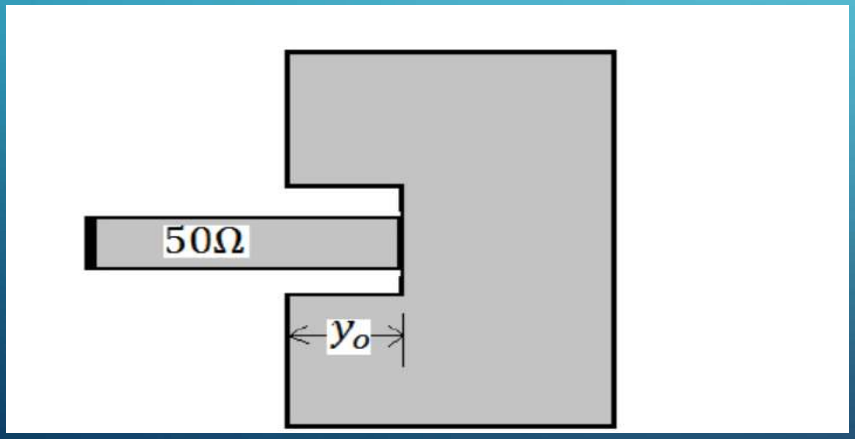
FABRICATION

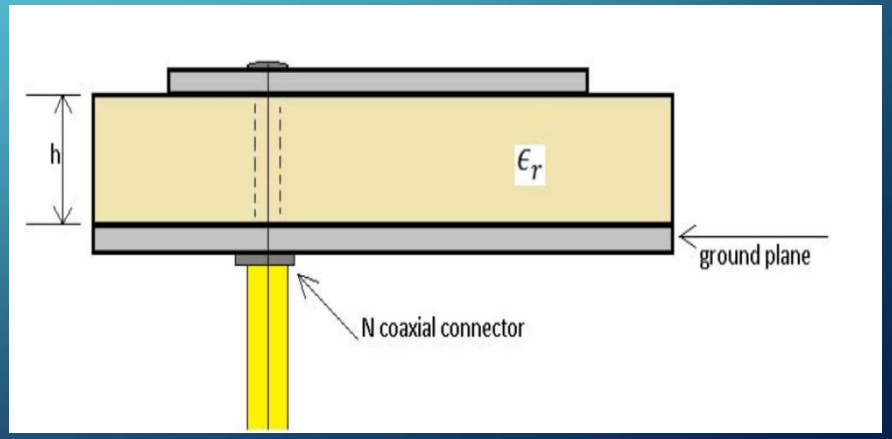
- We want to use copper cables(1-2mm diameter) for fabrication of the Yagi-Uda antenna with the supporting base being a 3D-printed plastic support for rigidity.



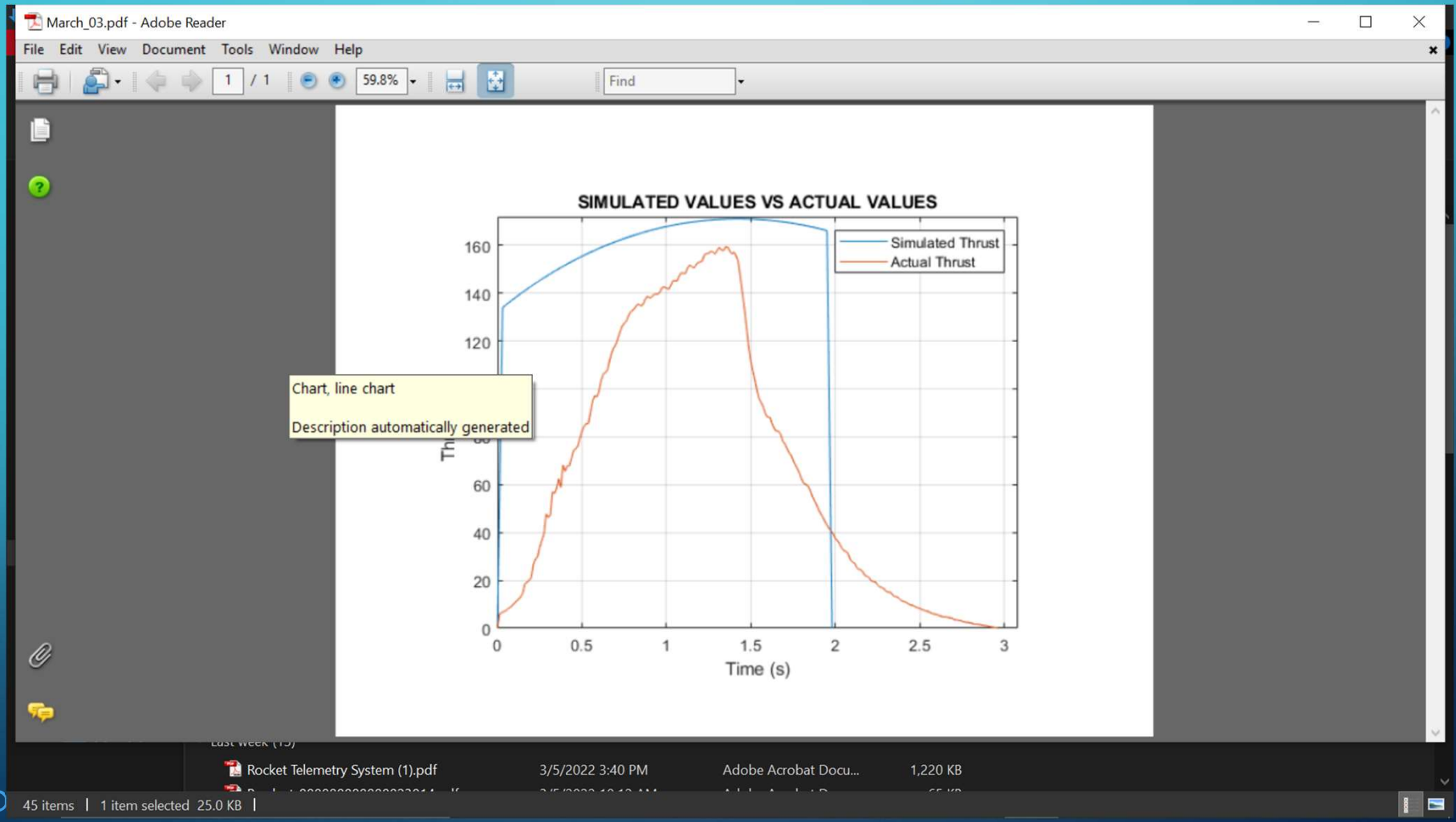
PATCH ANTENNA DESIGN

- For the patch antenna design we are going to use either the microstrip feed line patch antenna or the coaxial feed line patch antenna.
- Design of this is currently underway.





[#120] : TEST THE TEST STAND AND GROUND STATION SOFTWARE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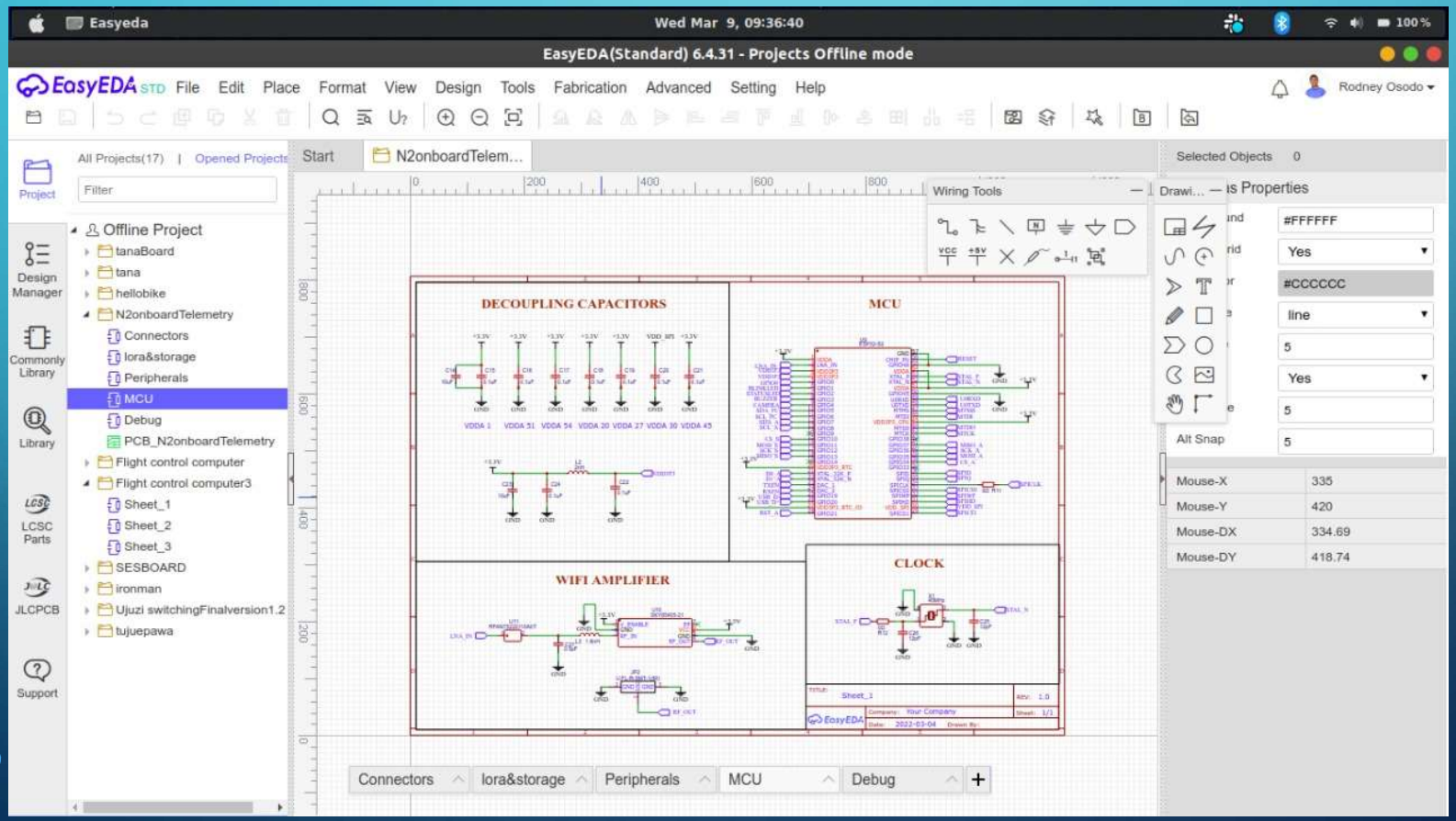
[#122] : MOVE FROM SOC TO IC



#113 Alternative pressure and altitude sensors

- Schematics drawn, awaiting to be pushed to GitHub
- -we are still contemplating on whether or not to include another set of sensors for redundancy
- -while the sensors provide for accuracy and consistency (provide a reference for the first set incase of inconsistency);
- - the challenge with computational complexity since we have to initiate another instance of the Kalman filter for the redundancy sensors

- Next, I will be working on establishing the communication between sensors and the MCU i.e

AVIONICS BOARD

Read & write to I2C

TELEMETRY BOARD

Read from I2C, save to SD & Flash

TASK THIS WEEK

- [#112] : ground station and onboard antenna design
- [#77] : esp32 wi-fi range test
- [#123] PCB review
- [#118] : Design architecture for ground station and test stand software