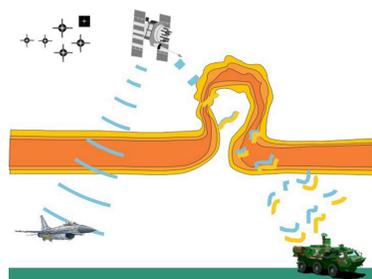
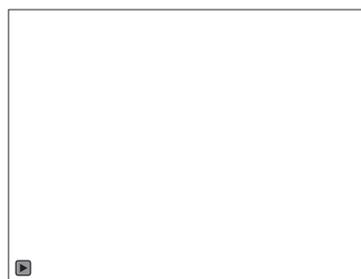


Project

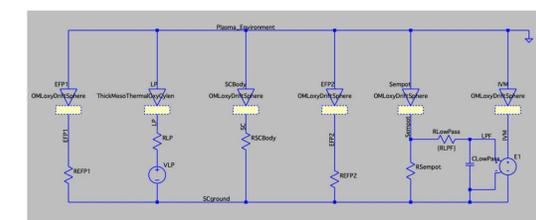
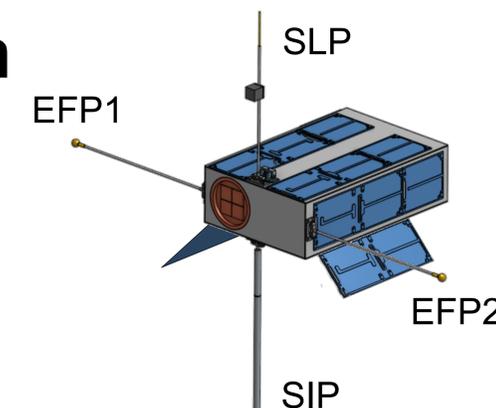
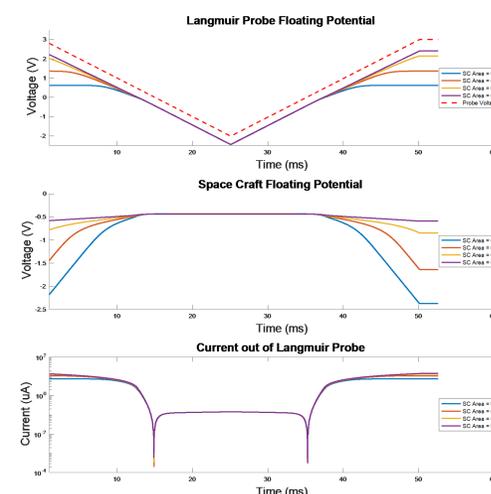
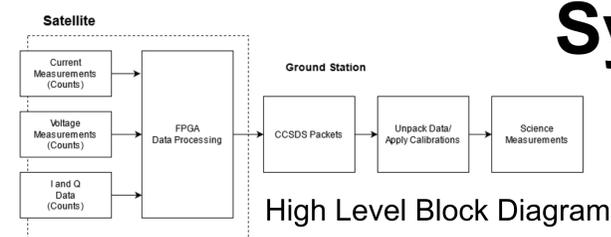
Problem:
Ionospheric plasma bubbles distort radio waves, causing disruptions with satellites to ground stations

Solution:
The objective of SWP is to understand the preconditions leading to plasma bubbles

- This is accomplished by measuring the electron density, n_e , of the plasma environment in the Earth's ionosphere
- Previous iterations of this project have been designed at the CSE (Most recently SPORT). This design attempts to improve upon those designs.



System



Electrical Model of SPORT

Methods

SWP improves the power efficiency of the SPORT design by doing the following:

- Control SWP with a FPGA alone instead of a microcontroller alongside an FPGA
- Use enable pins that allow us to shut down analog components when not in use
- Use new low-noise amplifiers at the front end of each probe along with a higher 7-volt rail
- This also takes SPORT out of the saturation region in the transimpedance amplifier, increasing the region of support for making measurements

Conclusion

Development at the CSE is ongoing. Due to the complexity of the project, the complete design was not able to be accomplished in two semesters. By working on this project, however, we were able to make significant progress on the project, as well as develop greater technical skills required for such a project.

- We learned KiCAD for PCB design and went through the process of having boards printed
- We learned how to use Simulink to implement a high-level design into a hardware description language like VHDL
- We created a theoretical design that is ready to be built and tested