

CubeSat Flight Control Software

Vermont Technical College - 2012



Project Goals

1. Test our Ada SPARK software control systems.
2. Test our various electrical and hardware subsystems.
3. Test our Ada SPARK implementation of GEONS.

Why Ada SPARK?

“Ada SPARK is a formally-defined computer programming language based on the Ada programming language, intended to secure and to support the development of high integrity software used in applications where predictable and highly reliable operation is essential”

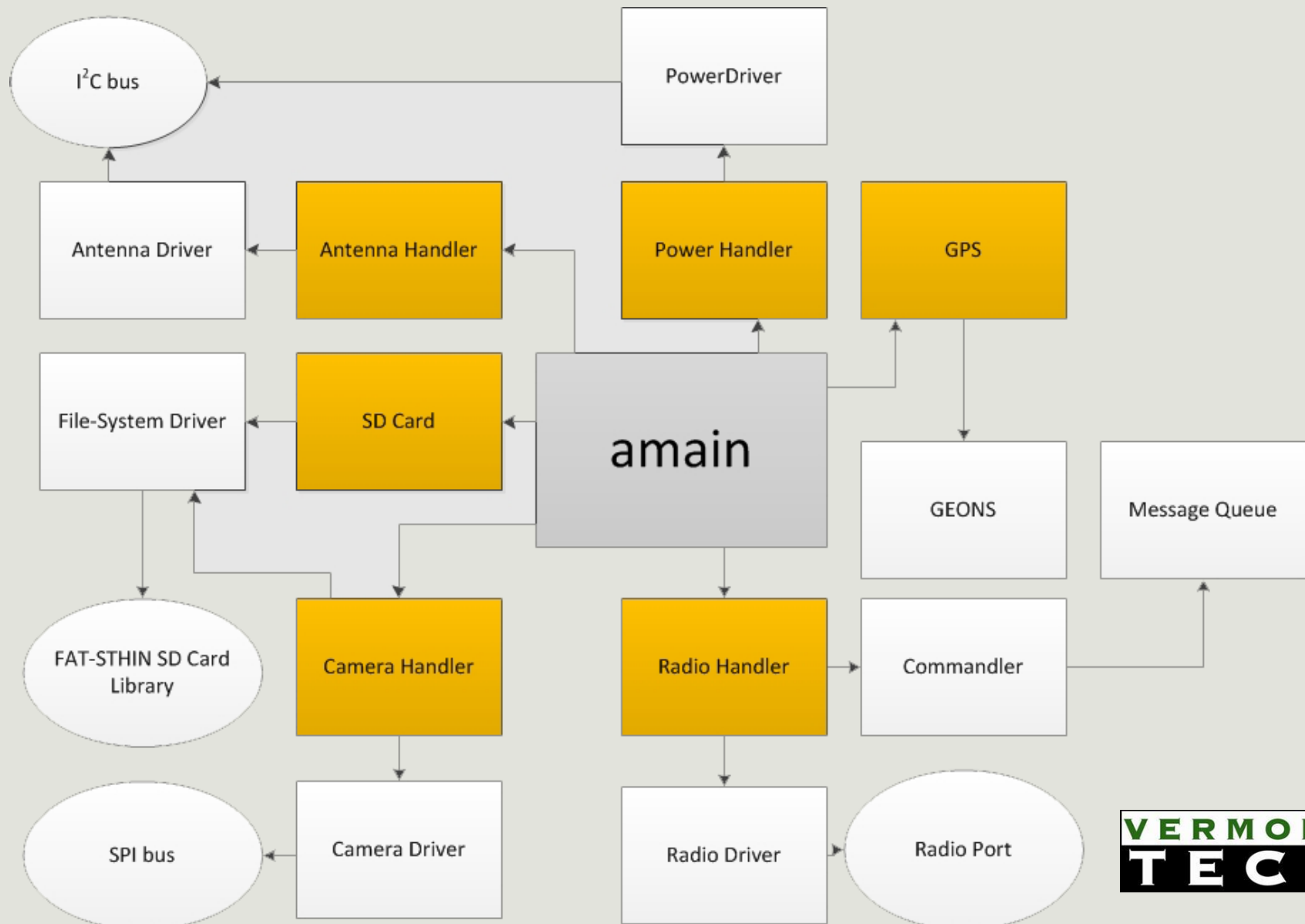
-- Wikipedia (SPARK programming language)

Compilation Process

There is no Ada compiler for the Texas Instruments MSP430 series of processors that we are using in our CubeSat build. The AdaMagic compiler is used to produce ANSI C code, which is then run through the Rowley Cross-works compiler to produce object code for the MSP430.



Control System Design



GEONS

“Provides onboard orbit determination and control in real time, with higher accuracy, without human intervention, and while requiring minimal onboard computing resources. It substantially improves definitive and predictive accuracy of Global Positioning System (GPS) receiver point solution fixes, achieving accuracies of at least 20 meters and 3 cm/sec.”

Benefits: Increases accuracy, improves reliability, reduces mission cost, enables satellite formation flying, reduces computing requirements, improves stability.

-- NASA.GOV

A composite image featuring a satellite in the upper left, the moon in the upper right, and a green aurora over a planet's horizon at the bottom. The background is a starry space.

What is Next?

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TECH**