The Design of the ChargerSat-1 RTOS

Mason Manning, Electrical and Computer Engineering Department

Overview

The ChargerSat-1 Real Time Operating System (RTOS) was developed to control all on-orbit operations of ChargerSat-1: UAHuntsville’s first CubeSat.

- Dynamic scheduling system
- Mission operations state machine
- Can complete primary mission objectives autonomously
- Full control of all satellite operations available from the ground station
- Main systems are modular by design

Scheduling System

- Almost all satellite operations occur via this system
- 16/32-bit RTC based
- Can schedule events with 1 second resolution
- Automatic priority sorting

Mission Operations State Machine

- Controls progression through the deployment phases autonomously
- Decides when to proceed based on sensor information
- Performs error checks and defers to manual override in the case of a fatal error

Key Findings

Impact

- Provides a starting platform for possibly future ChargerSat missions, allowing for faster development time and more stable operation
- Provides a platform with which student engineers can learn about satellite and embedded systems operations/development from a software perspective

Explanation

The ChargerSat-1 RTOS seeks to enable future space and science exploration through the completion of the ChargerSat-1 mission, as well as the development of a system which can be reused for future missions.

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