Homework 5
System Design: Functional Decomposition

Practicum Team 7

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11/14/2019

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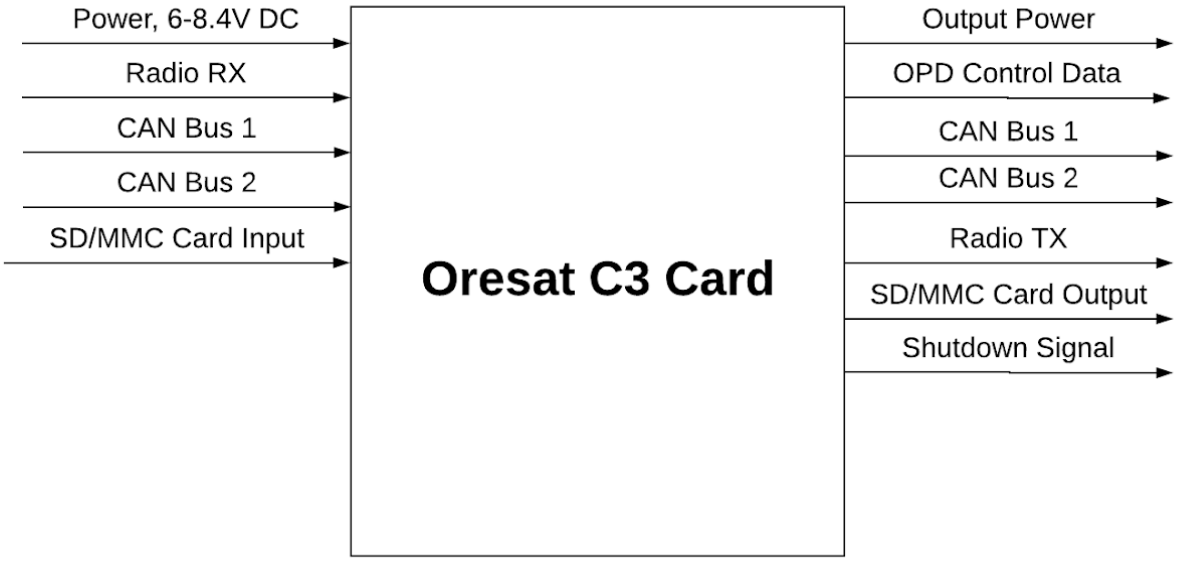
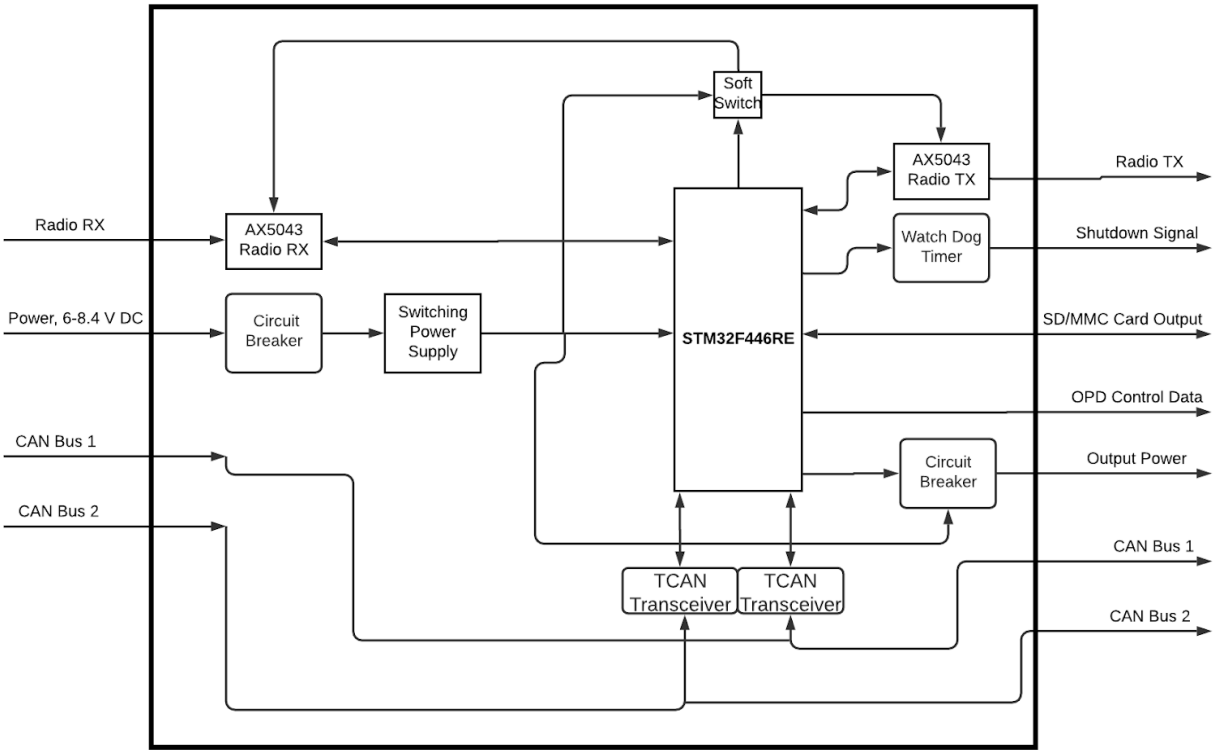
Oresat C3 Board: Level 0

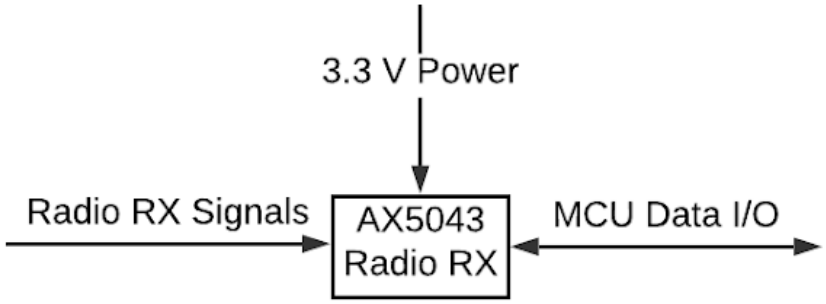


Module:	Oresat C3 Card
Inputs:	Power (6-8.4 V DC) Radio RX signal(L Band and UHF Band) CAN Bus 1 CAN Bus 2 SD/MMC Card Input
Outputs:	Output Power (3.3 V, 200mA max) OPD Control Data (I2C) CAN Bus 1 CAN Bus 2 Radio TX(L Band and UHF Band) SD/MMC Card Output Shutdown Signal
Functionality:	Receive 6-8.4 V power from solar array. Receive commands from ground station via Radio RX signal. Step down power to 3.3 V limited current power supply for all subsystems. Control Power to each subsystem via OPD Control Data. Communicate with critical mission subsystems via CAN 1. Communicate with lesser mission subsystems via CAN 2. Transmit mission data via Radio TX signal. Store mission data in SD/MMC Card. Shutdown entire system power in case of MCU single event latchu-up via Shutdown Signal.

Oresat C3 Board: Level 1

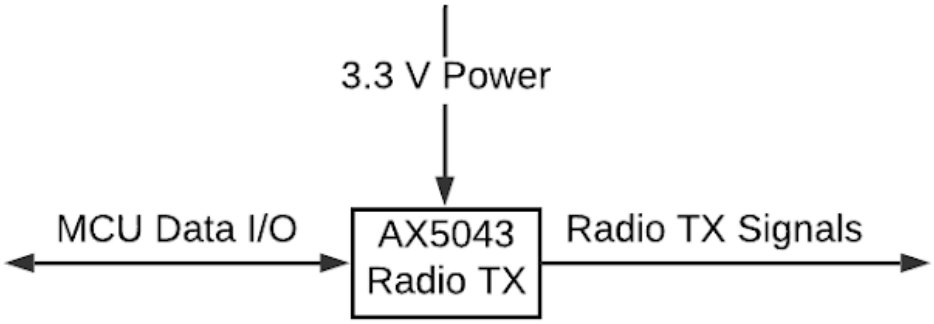


AX5043 Radio RX: Level 1



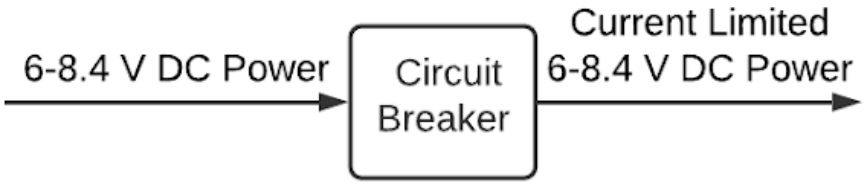
Module:	AX5043 Radio RX
Inputs:	Radio RX Signals(L Band, UHF Band) Microcontroller Data 3.3 V Power
Outputs:	Microcontroller Data
Functionality:	Receive L Band and UHF signals from ground station. Convert analog RF signals into SPI output for Microcontroller. Receive SPI data from Microcontroller. Gives ground station commands to microcontroller.

AX5043 Radio TX: Level 1



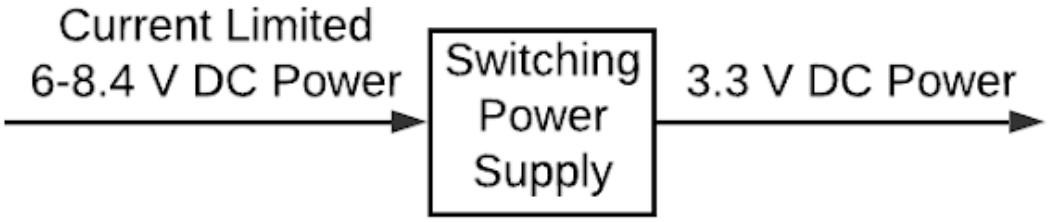
Module:	AX5043 Radio TX
Inputs:	Microcontroller Data 3.3 V Power
Outputs:	Radio TX Signals(L Band, UHF Band) Microcontroller Data
Functionality:	Receive SPI data from Microcontroller. Transmit system health and mission data to ground stations(L Band, UHF band)

Circuit Breaker: Level 1



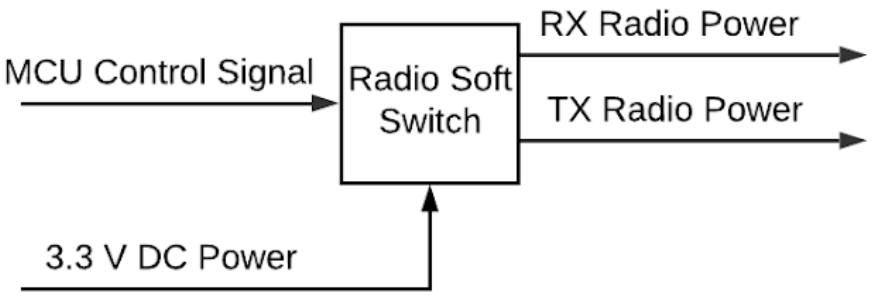
Module:	Circuit Breaker
Inputs:	6-8.4 V DC Power
Outputs:	Current Limited 6-8.4 V DC Power
Functionality:	Limit current to protect downstream systems from overcurrent damage. Break circuit if current threshold is reached.

Switching Power Supply: Level 1



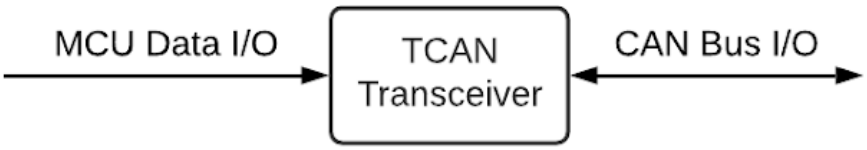
Module:	Switching Power Supply
Inputs:	Current Limited 6 - 8.4 V DC Power
Outputs:	3.3 V DC Power
Functionality:	Step down current-limited power supply from 6-8.4 V DC down to 3.3 V DC for use by all subsystems.

Radio Soft Switch: Level 1



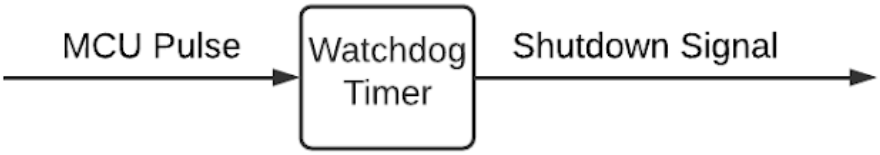
Module:	Radio Soft Switch
Inputs:	Microcontroller Control Signal 3.3 V DC Power
Outputs:	RX Radio Power (3.3 V DC) TX Radio Power(3.3 V DC)
Functionality:	Receives control signal from microcontroller, determines whether or not to provide power to RX Radio or TX Radio individually.

TCAN Transceiver: Level 1



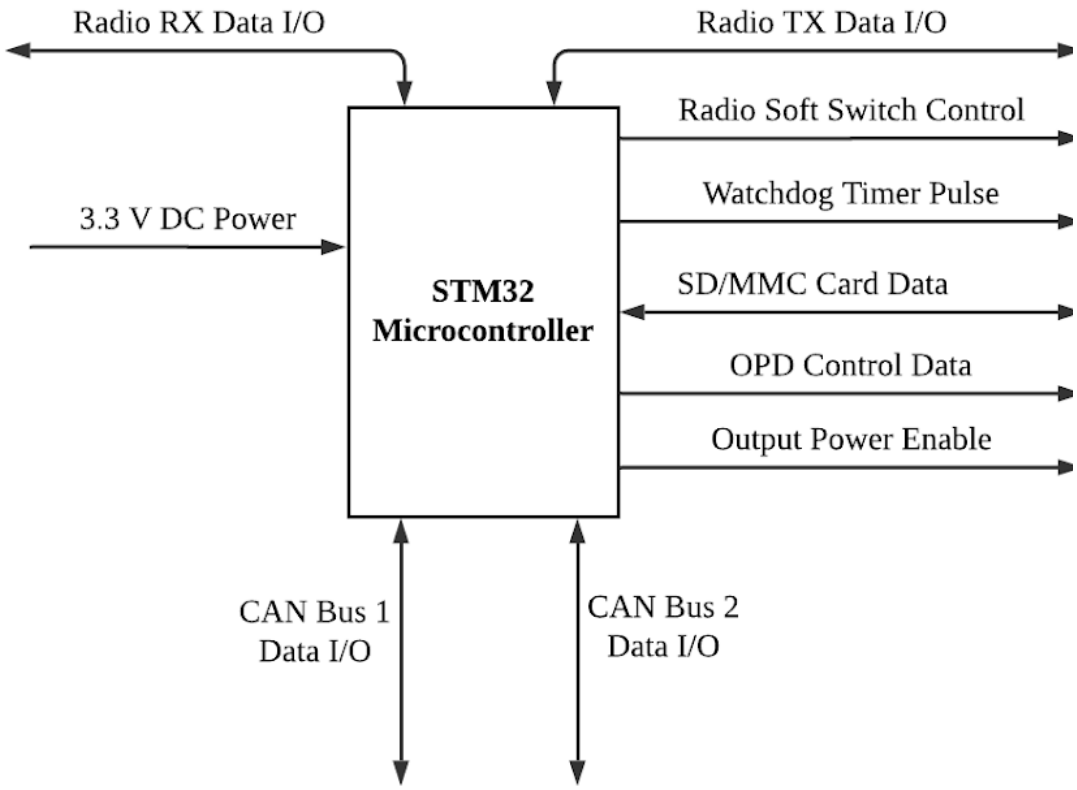
Module:	TCAN Transceiver
Inputs:	Microcontroller Data CAN Bus Data
Outputs:	Microcontroller Data CAN Bus Data
Functionality:	Receives data from microcontroller, sends down CAN bus. Receives data from CAN bus, sends to microcontroller.

Watchdog Timer: Level 1



Module:	Watchdog Timer
Inputs:	Microcontroller Pulse Signal
Outputs:	Shutdown Signal
Functionality:	Receives pulse in regular timed interval from microcontroller indicating system is in good health. Enables shutdown signal if pulse not received, thereby shutting down power to entire Oresat system and resetting.

STM32 Microcontroller: Level 1



Module:	STM32 Microcontroller
Inputs:	3.3 V DC Power CAN Bus 1 Data CAN Bus 2 Data Radio RX Data Radio TX Data SD/MMC Card Interface
Outputs:	Radio RX Data Radio TX Data Radio Soft Switch Control Watchdog Timer Pulse SD/MMC Card Interface OPD Control Data Output Power CAN Bus 1 CAN Bus 2
Functionality:	Communicates with all critical subsystems through CAN bus 1.

	Communicates with all mission subsystems through CAN bus 2. Controls power for all subsystems through OPD Control Data line. Reads and writes memory to and from SD/MMC card. Kicks watchdog to indicate system health. Controls power to Radio TX and RX. Receives commands from ground station through Radio RX line. Transmits mission and system health information through Radio TX line.