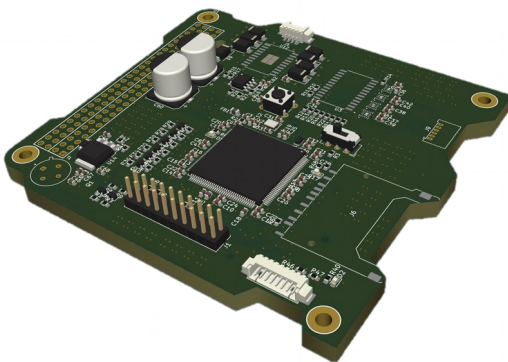


## UPS-X bus @ Virginia Tech

The UtProSat-X is a Virginia Tech bus for SmallSats. Its current version comprises a modular structure and an onboard computer. This bus leverages flight heritage from multiple VT CubeSat missions throughout the last five years, and it is an ongoing development. Future versions of this bus will incorporate a VT-GPS module, a VT-UHF deployable antenna, and other components.

The Virginia Tech's Payload Control Module (VT-PCM) is a space-graded onboard computer (OBC) printed circuit board (PCB) designed and manufactured at Virginia Tech. Leveraging the STM32F4 microprocessor, an Arm Cortex-M4, it is designed to operate multiple payload experiments for a single mission architecture. VT-PCM is also ready for inter-board connector standard: PC/104, facilitating the combination with a broad number of commercial off-the-shelf components of different vendors.



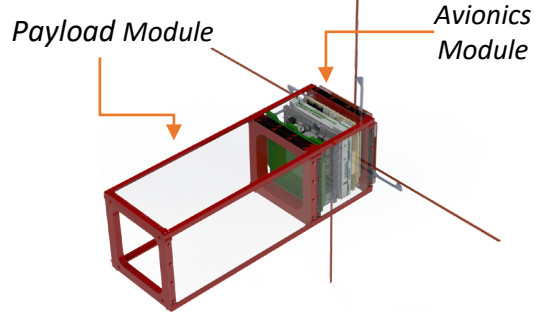
The VT-PCM features:

- Power Lines: 3.3V, 5V, and 8.4V
- 1x UART (PC104)
- 1x UART for an extra payload PCB
- 1x CAN (PC104)
- 3x embedded IMU Units (BMI270)
- 1x SDIO 32GB SD Card
- 1x 8.4V Stepper Motor Driver
- Other Peripheral Connectors: 2x Servo Motors, 1x Encoder, 2x Cameras
- Embedded Software Architecture: RTOS, AX25
- Spacecraft Software Implementations: Power and Data Management; Radio-Key Authentication

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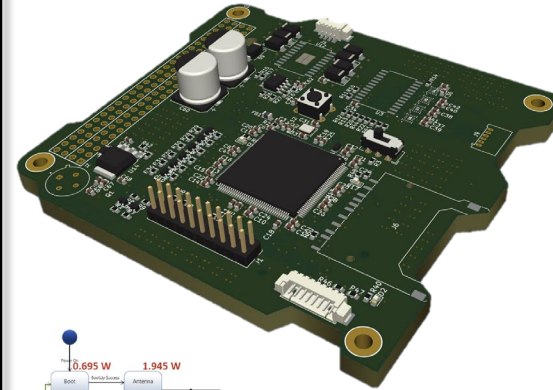
# Ut ProSat-x BUS

## 3U Implementation:



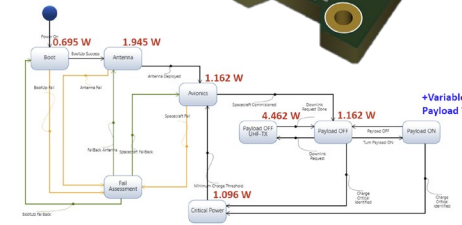
## Customizable Modular Structure

- Standard format: 1 Avionics Module + 1 Payload Module
- Can scale from 1U-27U form factors
- Components can be customized to adapt to payload & CubeSat Dispenser requirements.
- Can be utilized to allow 2 different missions to fly as 1 (i.e. a VT 2U mission + a 1U ODU mission)
- Downloadable CAD for local workshop fabrication

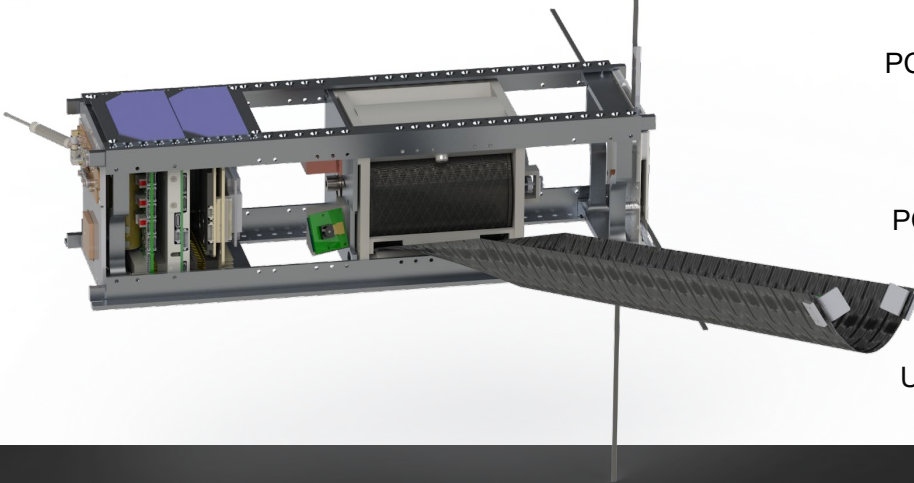


## VT UPS-x On Board Computer

- STM32F4xxxx MCU - JTAG/SWO Ready
- Power Lines: 3.3V, 5V, and 8.4V
- 1x UART (PC104)
- 1x UART for an extra payload PCB
- 1x CAN (PC104)
- 3x embedded IMU Units (BMI270)
- 1x SDIO 32GB SD Card
- 1x 8.4V Stepper Motor Driver
- Other Peripheral Connectors: 2x Servo Motors, 1x Encoder, 2x Cameras
- Embedded Software Architecture: RTOS, AX25
- Spacecraft Software Implementations: Power and Data Management; Radio-Key Authentication



## VT Satellite Development Team Launch Flight Heritage



2020 – VCC  
PCB Design and Integration  
(MSP430 + RTOS)

2022 – ThickSat  
PCB Design and Integration  
(STM32F4)

2023 – Ut ProSat-1  
UPS-x On Board Computer  
(STM32F4 + RTOS)

## Ready to most of COTS Components



- Can operate with a combination of commercially of the shelf (COTS) Modules and VT Modules.
- Electrical Power Systems: 20-70 W
- Onboard Computers
- Radios: UHF, S-Band
- Antennas: UHF, S-Band
- GNSS Modules
- Standard: PC104