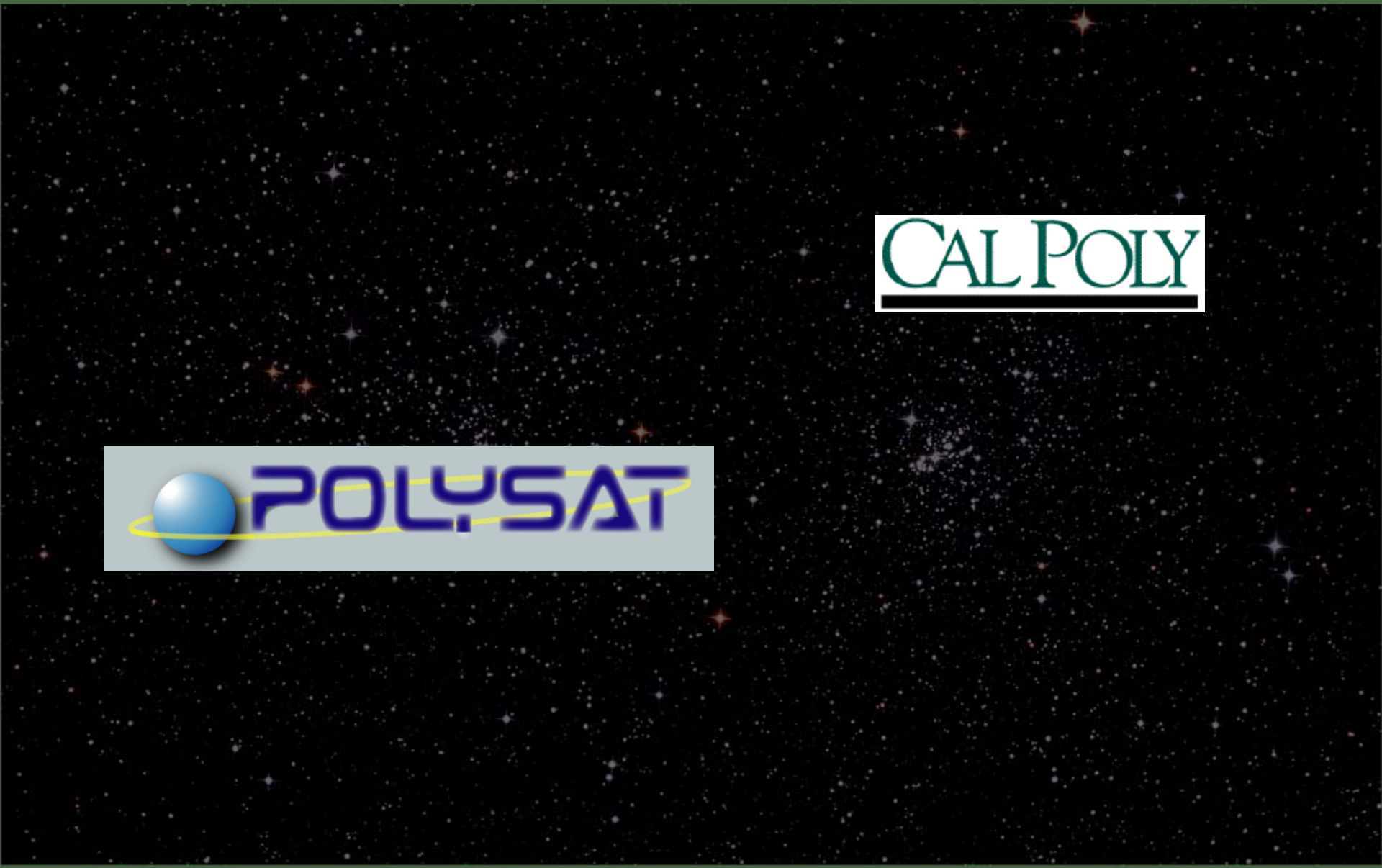
Electronics systems design on CP2



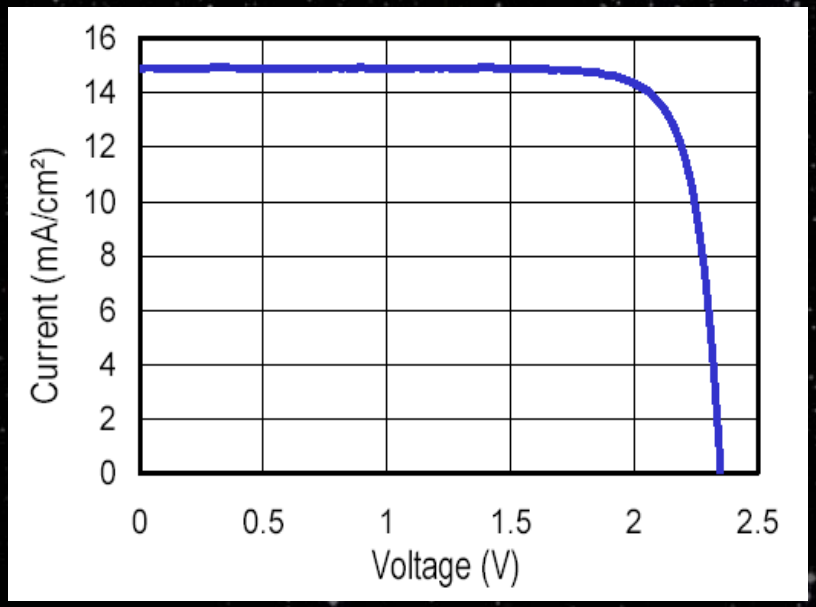
Electronics systems design on CP2

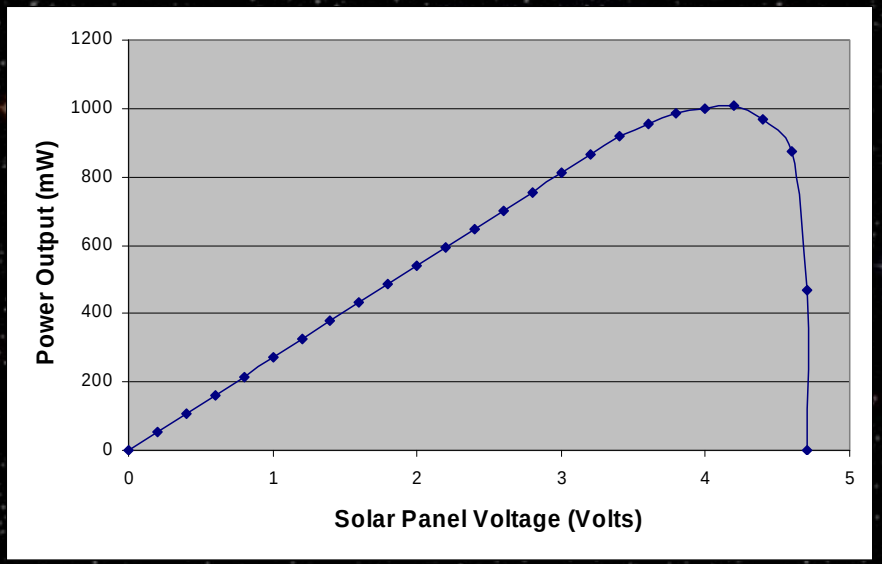
CP2 Innovations:

- Software TNC
- Redundant Communication Systems
- Maximum Power Point Tracking
- Power Distribution Failure Isolation
- Robust I^2C Architecture

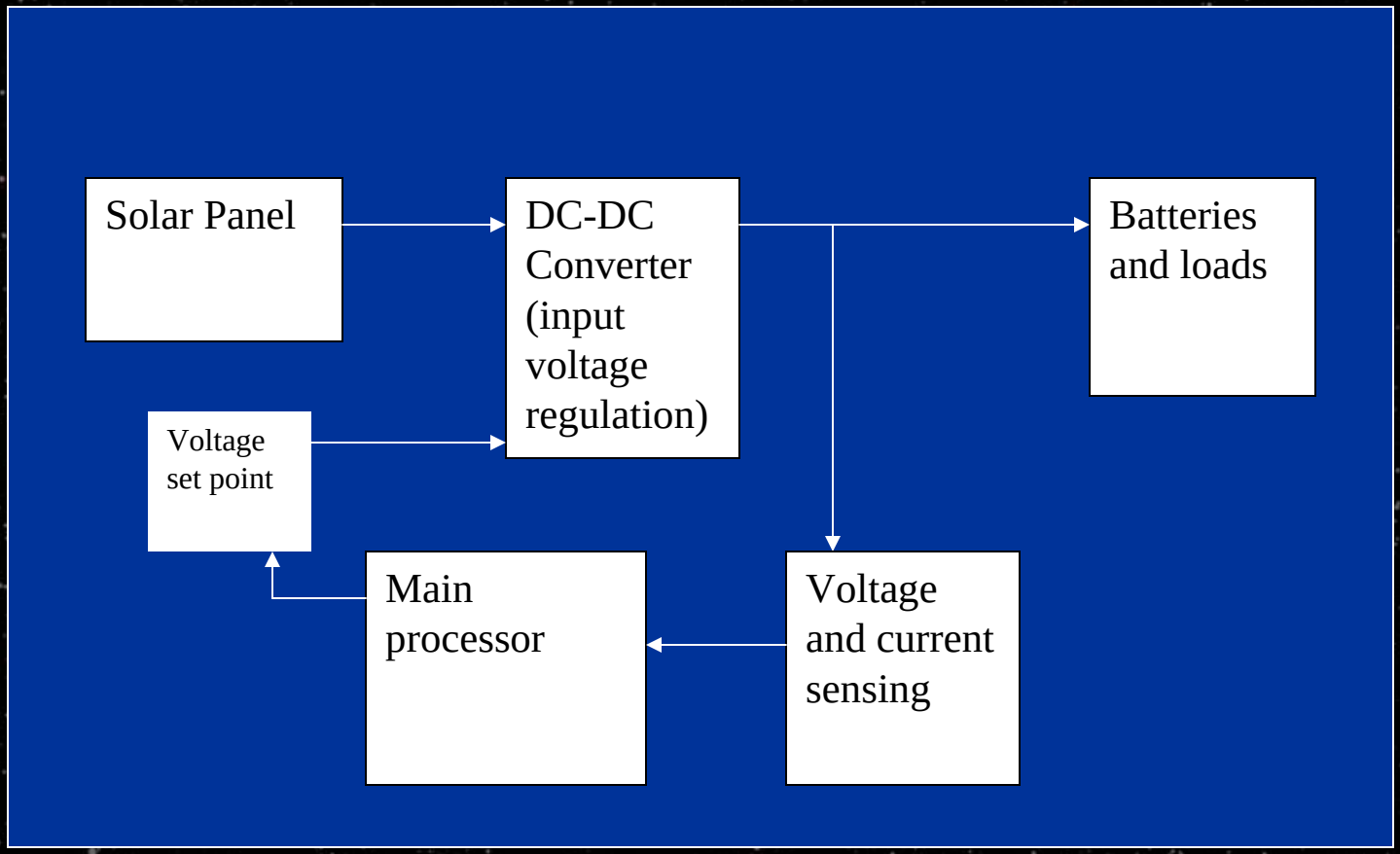
Maximum Power Point Tracking

- Solar Panel Characteristics
  - GaAs Dual Junction, 21.5% eff. From Spectrolab



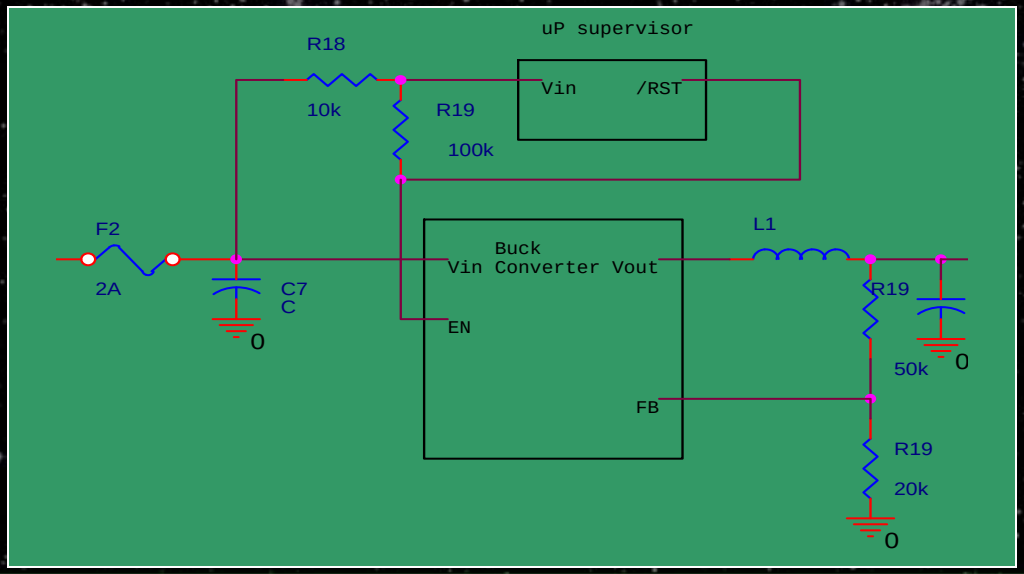


Maximum Power Point Tracking



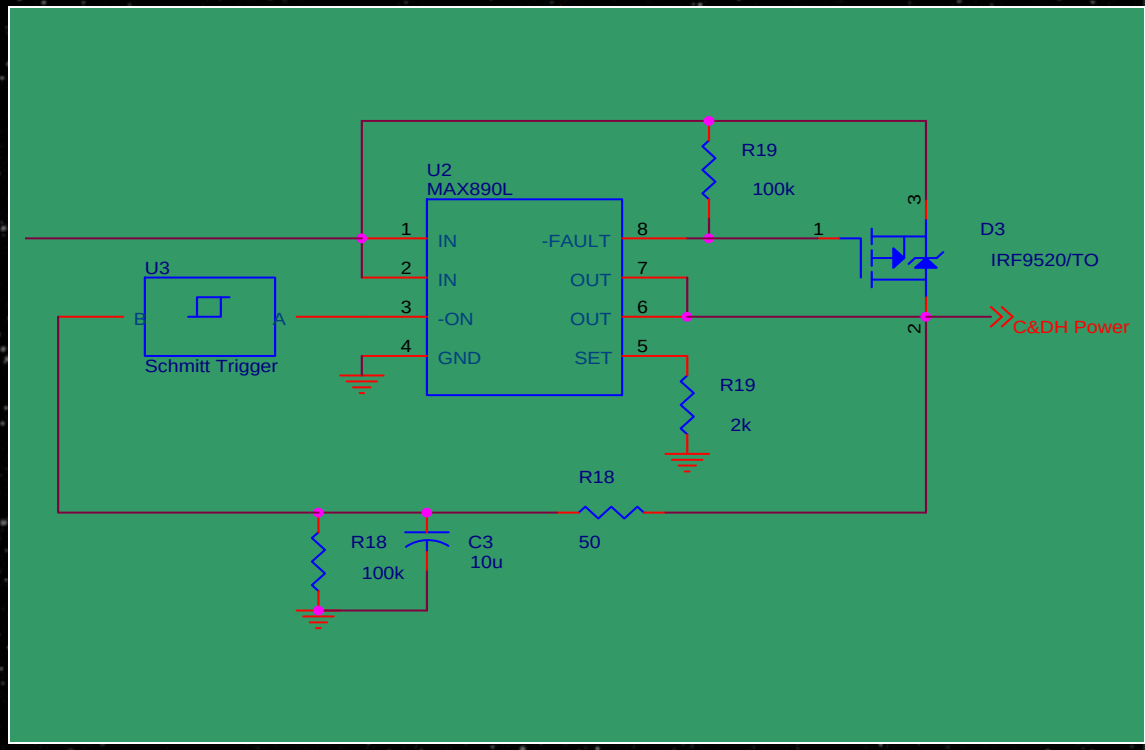
Load Power Conditioning

- Under-Voltage Shutoff (with hysteresis)
  - Uses a uP Supervisor IC
  - Low voltage set point set by uP Supervisor
  - Hysteresis set by resistors that reduce voltage "seen" by the uP Supervisor



Load Power Conditioning

- Smart fuse
  - Designed around the MAX890L
  - Limits current flow to the load devices
  - Shuts off power if current flow reaches
    limit for a given period of time
  - Re-enables power for a brief period to test for continued fault condition



Energy Storage

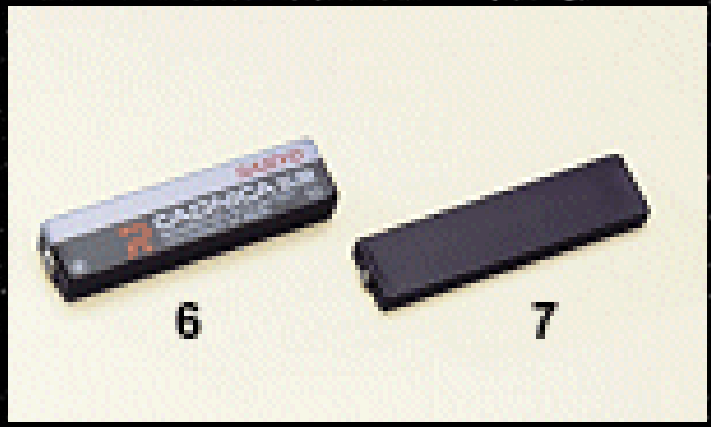
- Li-ion vs. Ni-Mh
  - Energy density
  - Space Shuttle requirements
- For maximum power density and Space Shuttle compatibility, CP2 will be able to accommodate both types of batteries
- For redundancy, 2 batteries and battery protection circuits will be used

Energy Storage

- Batteries selected:
  - Li-ion: PolyStor Corp. 3.7V, 1200mAh
  - Ni-Mh: GP Batteries, 3.6V, 700mAh

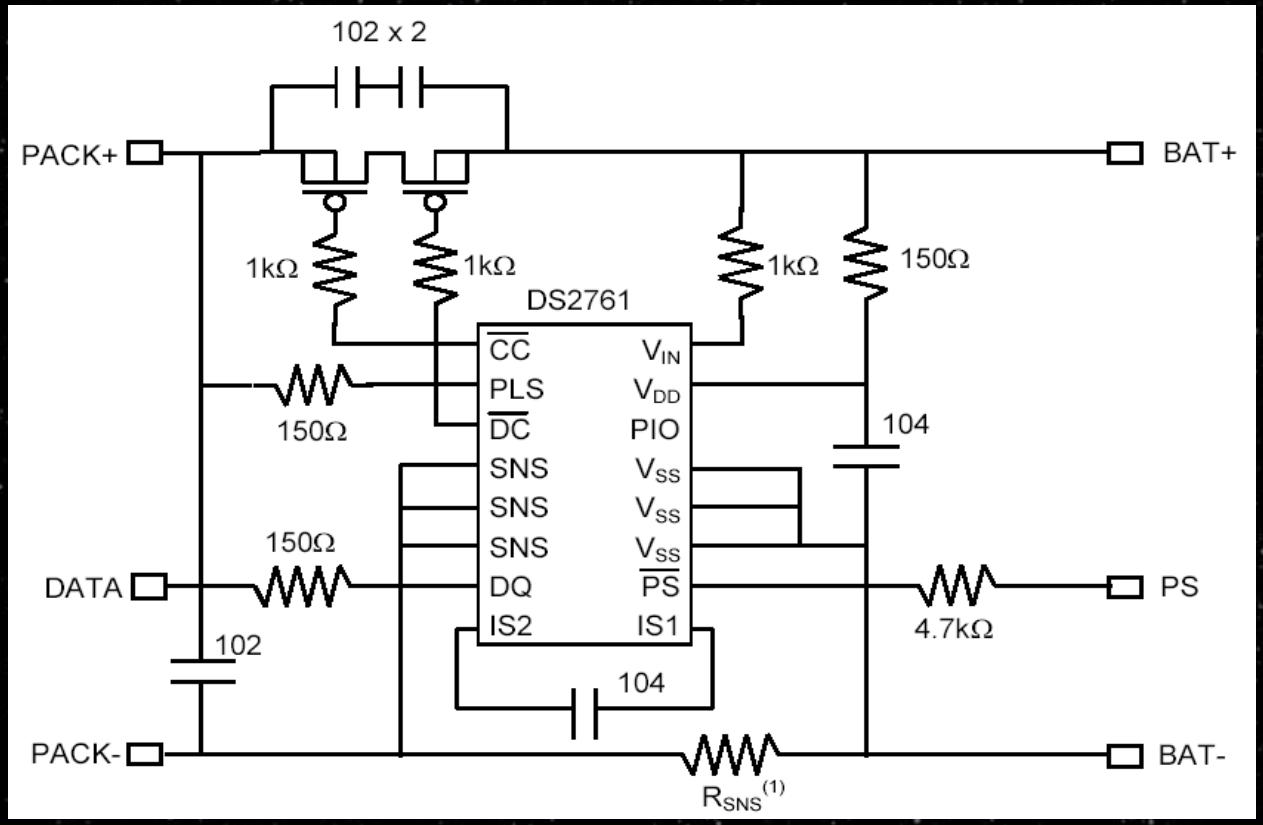
Li-ion

Ni-Mh



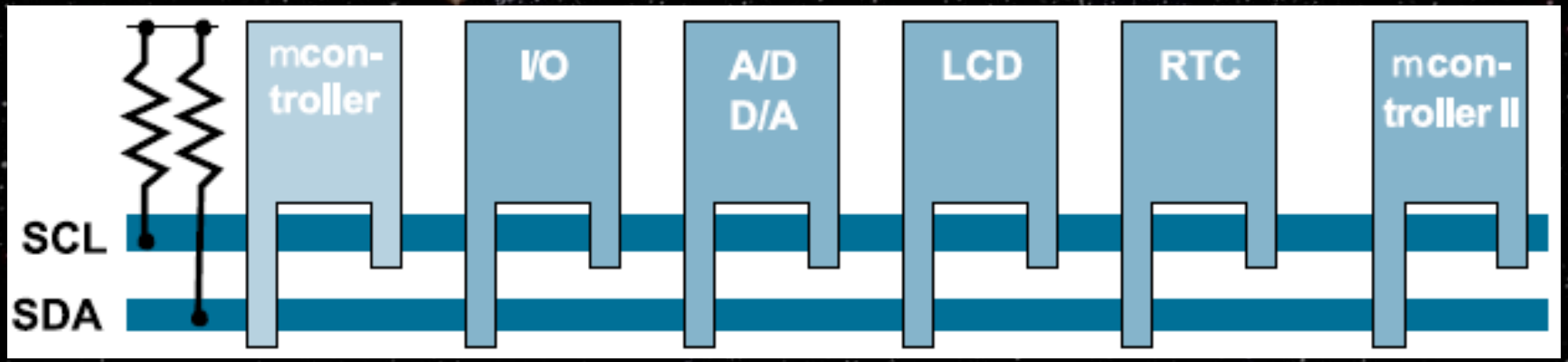
Energy Storage

- Battery monitor and protection circuitry



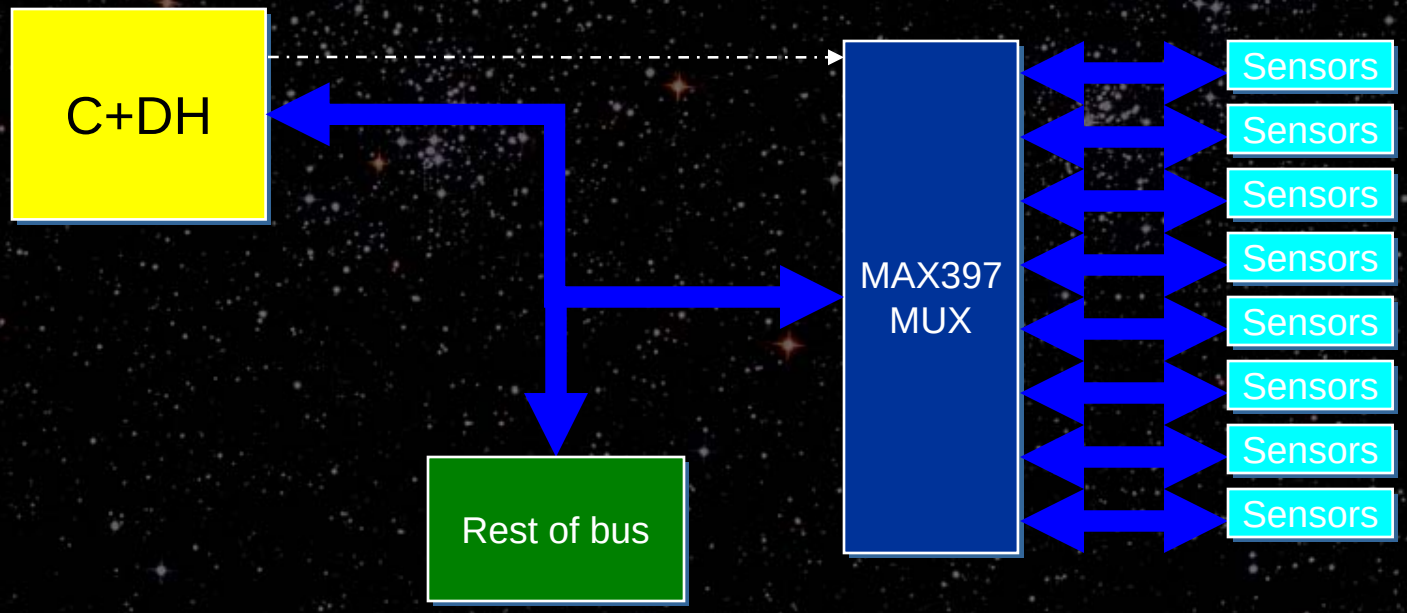
I²C Protocol

- Only 2 wires required
- Many devices use it
- Multiple masters can use the bus
- Address limitations
- Single point failure!!!!!!



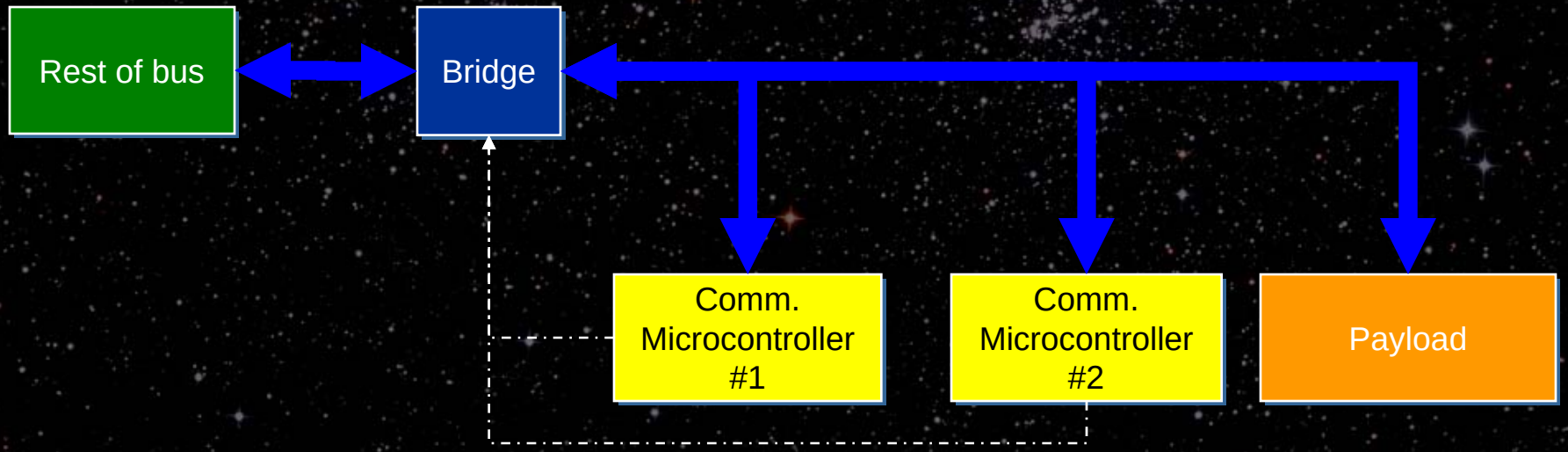
I²C MUX system

- Allows selection between 8 I²C bus branches
- Each side of CP2 is given a different branch
- Prevents failure on any branch from crippling entire system
- Several devices with the same I²C address can be used



I²C Bridge and Contingency Mode

- Enabled in the event of a main bus or C+DH processor failure
- Isolates all but the communications system and the payload for minimal functionality



Design Questions?