

MicroNode

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Space systems traditionally use a small number of centralised computing nodes. This inherently dictates that sensors and actuators are architecturally separate and are typically connected by harnesses using a central star topology, with significant impact on the overall system mass and harness length. A new approach based on a decentralised computing architecture based on the concept of divide to conquer is studied. Accordingly, a key element of this approach is the "MicroNode" that would pave the road for a distributed Platform and Payload Sensor/ Actuator Bus Node. Creation of a modular MicroNode architecture adaptable to many on-board control processes. This modular architecture MicroNode based makes it adaptable to a number of common spacecraft housekeeping functions, reducing mission costs and development times. Beside the harness reduction aspects linked to this architecture, localised control also has shorter sensor interfaces and source driver paths which improves the signal to noise ratio and EMC emission.

For example, a MicroNode configuration of a system heating element could be remotely controlled using thermal PID control, acquiring thermistors and pulsing the heater output power lines, with the OBC setting the temperature limit and being informed if any temperature alarm states occur. This approach reduces the computing consumption of the OBC and also the data flow on the link, thus reducing the overall system power usage. New low-power operations modes for hibernation or safing of the spacecraft can also be realised.