

How to Build a NanoRacks Payload



NANORACKS



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Step 1: Know Your Design Space – Your NanoLab Module

Volume

1U = 10cm x 10cm x 10cm

2U = 20cm x 10cm x 10cm

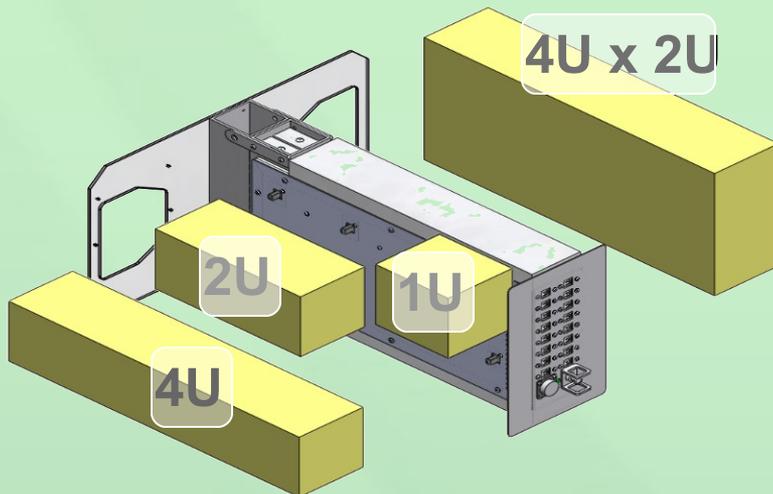
3U = 30cm x 10cm x 10cm

4U = 40cm x 10cm x 10cm

2x2U = 20cm x 20 cm x 10cm

2x3U = 20cm x 30cm x 10cm

2x4U = 20cm x 40cm x 10cm



Data

- Each 1U NanoLab has a USB Type B female connector that supplies 5VDC, 400 mA and USB data connectivity

- Collected data is transferred to a laptop computer in near real time

- Commanding files can be transferred from the ground to laptop to payload

Mass

1U = 1kg

2U = 2kg

Up to

8U = 8kg

Power

1U = 2W max (5VDC, 400mA)

2U = 4W max (5VDC, 800mA)

Up to

8U = 16W max (5VDC, 3.2A)



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Step 2: Come up with a payload for your NanoLab Module

Space Research Areas

Microgravity

- Fluid Science/Fluid Handling
- Soil Mechanics Science
- Metal Solidification/Alloys
- Vapor/Liquid Phase
- Combustion Science
- Life Sciences
- Plant Growth
- Microbiology
- Small animal/insect research
- Crystal Growth
- Protein Crystal Growth
- Astronaut Tools
- Low gravity research

Space Environment

- Radiation measurement
- RF studies
- Magnetic fields

Spacecraft Hardware Qualification

- In-space testing of components
- In-space testing of systems

Suggested USB Devices You Can Use in the Box

- Microcontroller
- Flash memory

Sensors

- Camera
- Spectrophotometer
- Microphone
- Accelerometer
- Gyroscope
- Temperature Sensor
- Humidity Sensor
- Air Flow Sensor
- Pressure Sensor
- Capacitance
- RF Sensor
- Resistance
- Magnetic

Actuators

- Magnetic Motor
- Solenoid
- Piezoelectric
- Thermal
- Capacitive
- Speaker
- LEDs/LCDs
- Flag indicators
- Galvanometer
- Valves
- Heater
- Peltier cooler

Keep the Mass Low

Box is aluminum or polycarbonate

Keep the Power Low

Use the Crew to do things

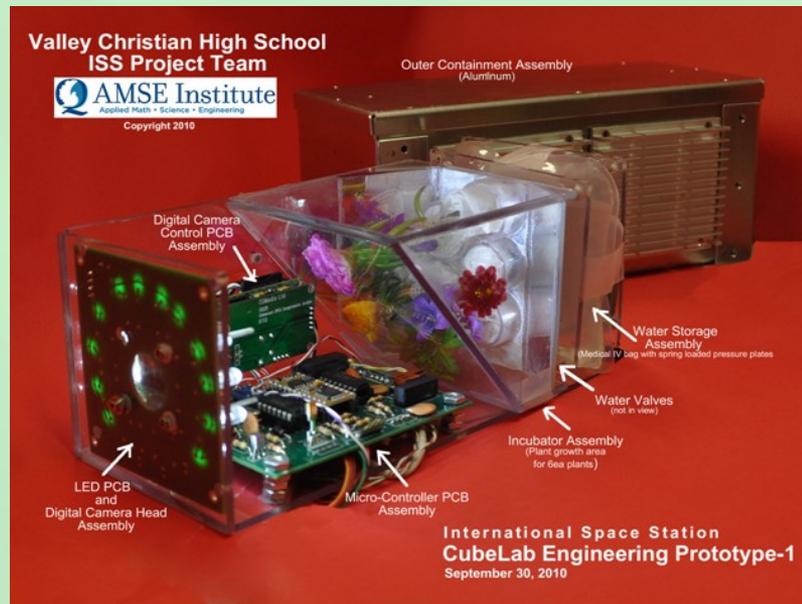


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Step 3: Jam your payload into a NanoLab Module

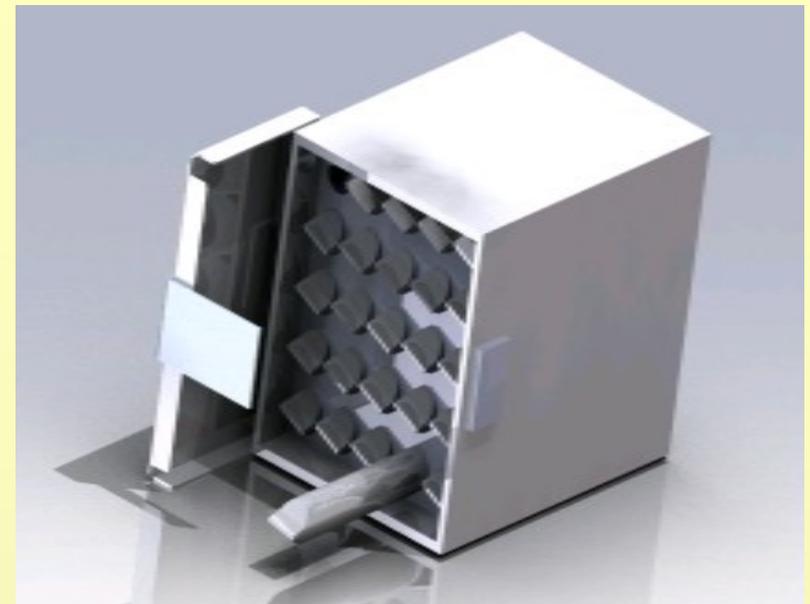
Example 1: Valley Christian High School

2U Plant Growth System. (USB
Microcontroller driven, crew downloads data)



Example 2: OSU

2U Crystal Growth Experiment
(No power, 24 crew activated lightstick-like units)



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Step 4: Show NanoRacks your NanoLab Module Payload Design

Step 5: Make final design modifications

Step 6: NanoRacks performs NASA Safety Review and Verification Activities

Step 7: NanoRacks flies and helps you operate your payload

Step 8: You get your data and/or your payload back from space

Step 9: Repeat!



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For further details on the form factor and dimension options, power requirements and other details for NanoLabs, please email us at:

info@nanoracks.com

Or tell us about your requirements at:

<http://nanoracks.com/submit-customer-payload-information/>

