RENSSELAER

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ADvanced
Autonomous
**MU**ltiple
Spacecraft laboratory

The Experimental Platform in 10 points

- Accommodating various types of nano-satellites
- The Simulation Platform can dynamically achieve 6 DOF motion
- The Simulation Platform is composed by a lower stage and by an interchangeable upper stage
- The current setup uses a S/C simulator powered by a set of 12 cold gas thrusters
- The Simulation Platform moves almost frictionless over a flat epoxy surface
- Indoor navigation achieved using the LED & camera based PhaseSpace ® System
- Mass balancing of the attitude stage achieved with three linearly moving masses
- The lower stage can move almost frictionless over a flat epoxy floor thanks to three linear air bearings (2 DOF guaranteed)
- The upper stage is connected to the lower one with a spherical air bearing (3 DOF guaranteed)
- The gravity-free vertical motion of the upper stage is achieved using a mass balancing system based on air bearing pulleys, giving the additional 1DOF

Render of the Upper Stage

1 Interchangeable Upper Stage
2 Spherical Air Bearing
3 Air Bearing Pulleys
4 Lower stage
5 Counter-Balancing Masses
6 Compressed Air Tanks for the air bearing pulleys and for the spherical air bearing
7 Compressed Air Tanks for the linear air bearing
8 Linear Air Bearings
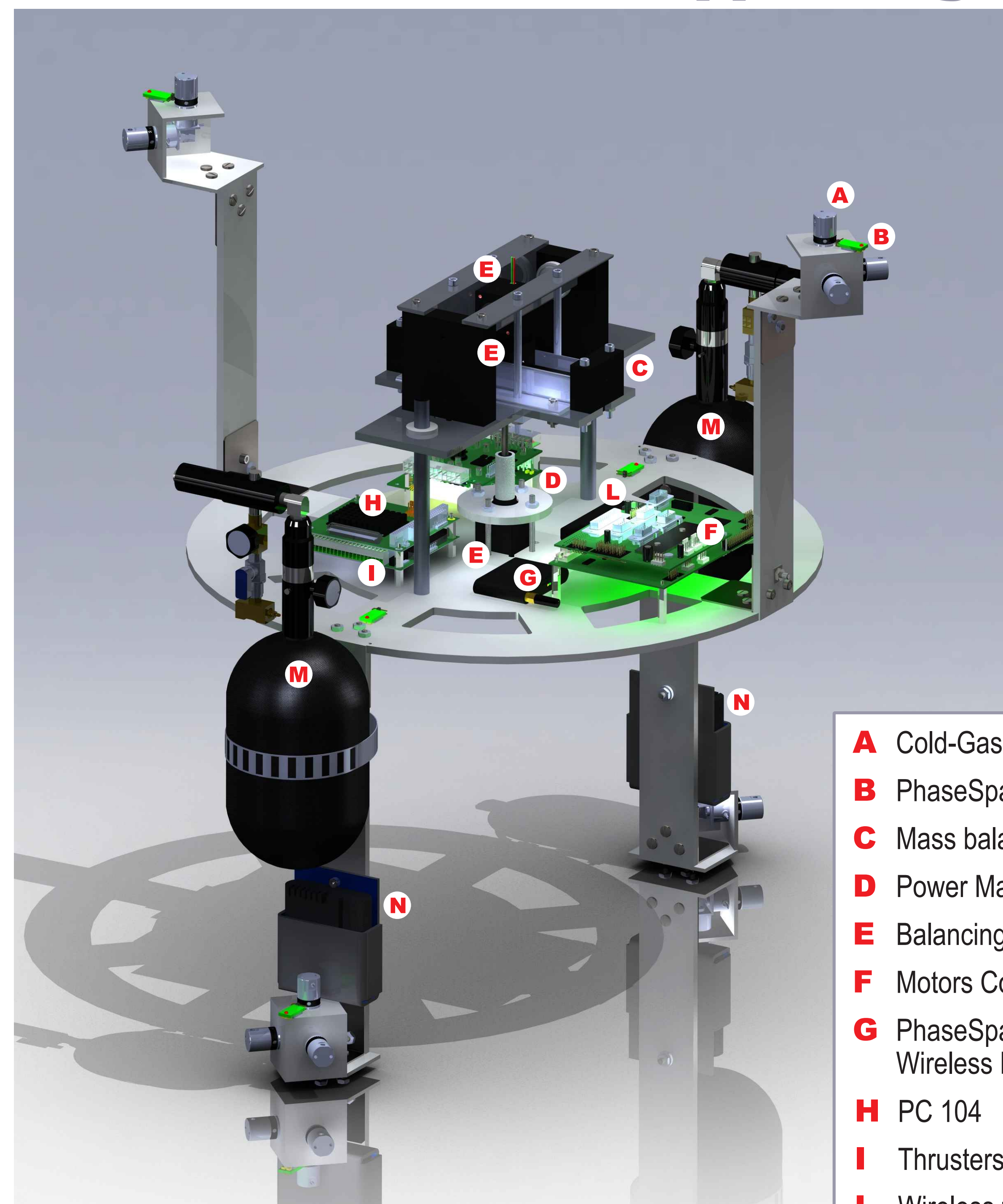
A Cold-Gas Thrusters (12)
B PhaseSpace ® LEDs (6)
C Mass balancing Platform
D Power Management System
E Balancing System Motors
F Motors Control Card
G PhaseSpace ® Wireless Receiver
H PC 104
I Thrusters Relays Board
L Wireless transmitter/receiver
M Compressed Air Tanks for thrusters air supply
N Battery

Assembly Progress

On the left the current configuration of the upper platform.
On the right, the configuration of the lower stage

Future Work

- Complete the assembly of the experimental platform
- Test the mass balancing system and vertical gravity-free system
- Preliminary GNC tests
- Build a second platform for rendezvous operations