Student and teacher questions about projects

VR Lunar Habitat

I had a question I was hoping you could help answer about an aspect of the lunar habitats that NASA will be using on the moon. Will the walls of the habitat go vertically for a couple of feet before going into a dome or will it start doming straight from the ground. I was just asking because that would effect what I could put right up against the wall.

If you want to give it a short vertical segment of 1 ft or so, I think that could still be accurate but if it were much taller than that, I think there would be some issues with the dirt that is placed on top starting to have buckling problems.

We spoke briefly on August 24th about the VR Lunar Habitat project I am working on. According to the project slides, I need to include ECLSS racks in my design. However, I'm not clear on how many I need and where they need to be placed across the habitat. I understand ECLSS are composed of four racks. Do I only need one place for the 4 racks? Or do I need to incorporate multiple sets of racks in other areas as well? If you could find the time to get back to me, I would greatly appreciate it. Thank you!

Dave

One set of racks is sufficient, you might want to locate them adjacent to where the bathroom is for the water reclamation unit.

Glenn

Good comments Dave. Being close to each other would save space. The racks do not need to be right next to each other but expect to have hose or piping connections between them. Exchange of water or gasses between them. Oxygen Generating System, Carbon Dioxide Removal System, Water Reclamation System 1, Water Reclamation System 2.

Multi-tool Badge Holder

I am writing to you both to inquire about the badges NASA will be using. specifically if these badges will be using magnetic strips or rfids. also if they are using rfids are those sensitive to magnets in any way. Thank you for your time. I can't, wait to hear back from you.

Our badges have both magnetic strips and ID chips. I think I would be very careful about having magnets close to the chip as well as the magnetic strip. If you are wanting to use a magnet for something close to the card, you may have to think about the spacing and the strength of the magnet.

I was wondering if there was a document anywhere or if you could send me one on what the judges will be looking for at the PDR?

I'm currently working on a rubric for each of the projects I will send them out or put them on the website in the very near future.

We are having difficulty formatting the badge holder to include a USB drive, which we think is the most important feature second to the ruler. Are the constraints set in stone, or can we go slightly beyond them?

I'm trying to keep the badge holder from growing too much and becoming a big shield. Unless there is something specific that is needed I'm going to keep the size dimensions the same. If we come across something that pushes it bigger, I'll consider.

Have you looked at removing the shell of your thumb drive? Many are much smaller than the exterior shell. You may be able to 3D print your badge holder to include the shell for the thumb drive.

Kwadropus Duster—Mobility Arm

My team has decided to pursue the mobility arm on the robotic space duster project. One of the recommendations/qualifications for the design stated is to use "as few rigid parts as reasonable." We had planned to construct and connect multiple Stewart platforms together for the arm mechanics. If we are able to wrap the stewart platforms in a soft material like silicone or latex, would we meet that requirement?

The exterior material definitely needs to be some kind of soft material so it isn't scratching up surfaces. A Stewart platform is an interesting direction I hadn't considered. I'm not sure you would get much curl like an octopus arm but you would get a lot of movement for the tip. Are you thinking hydraulic, pneumatic or electric actuators?

Kwadropus Duster-- Controls

1. How do the arms move the robot?

Does the robot rotate about a single arm or move like a snail or slug with extension and contraction?

That will depend on the type of motion that the arms have. In the kwadropus artwork, each of the arms moves in a different fashion. That was to help students work with spreading out their ideas. I don't know what kind of arms we will have so I'm not sure what the over-all motion of the robot will be. I suspect that the final robot will have 3 arms all the same but we may be learning from the first few versions.

2. How does the robot actually clean?

Does it slowly move across the floor/wall releasing and moving the arms and actuating the suction cups continuously? Yes. I suspect it will be a combination of suction cups and the arms holding onto handrails.

Or does it have a move, clean, move, clean, process where it stops to clean and then finds a new place to move to? I don't think it will have to stop to clean. I think it will clean continuously.

3. When are the arms searching independently and how does this fit within the larger process of the general movement of the robot?
Here's a thought because I don't have it worked out—we are exploring this together. It seems like each arm should be trying to get a hold of something (handrail, suction onto surface) continuously but once it has a hold on something, it should stay attached for say,….10 sec and then search for another location. This is to allow for the duster to clean then to switch to another arm's attachment. The 10 sec. also allows for the robot to pivot to go in a different direction.
As teams are developing these ideas, do you have suggestions for what the control team should implement? Right now, it is difficult to develop a concept for a program without knowing how the robot operates.

Set up your Arduino to control at least 3 motors and receive input from sensors (attached or not attached). (what kind of sensors—pressure switches, resistance in the motor)

Set up your Arduino to relay information from motors and sensors to the central brain.

Set up central brain to have sensors (attached to wall or not) and to control the motor that activates the propulsion

How should the kwadropus know where it is?

Should there be some kind of reflectors in a module so it can locate itself?

Should it have some kind of object recognition so it can maneuver around inside the module?

Should it just move blindly?

Lunar Art

I just had a quick question about my project on lunar art. I was just wondering if the supplies being sent to the moon contained a good amount of paper and if there would be a lot of recycled material?

There will be some printed papers and they will have printers for printing new documents or experiments. NASA is and will be moving to using less paper in the future but I expect there will always be some things that are always printed. I am sure they will try to reuse many of their common materials. Of course there won't be any recycling facilities on the moon and sending it back to Earth will probably too expensive. I'm expecting there will be quite a bit of trash—probably lots of packing materials.