SUITS Frequently Asked Questions 2022-2023
Updated October 15, 2022

General:

1. What should be included in the CONOPS section?
   a. The Concept of Operations section should specify how your design addresses each of the challenge requirements by detailing how the design evaluator interfaces with your device during each step of the procedure outlined in the mission description. Be as specific as possible about how your device displays telemetry and other information throughout.

2. Can we attach videos to our proposal via YouTube links?
   a. Assume the people reviewing your proposal will not watch them. However, you may include a video as an additional way to communicate your proposal. Advice: keep it short.

3. Are international students able to participate in this challenge?
   a. International students can participate and contribute at their institution. However, they cannot be badged to enter NASA's Johnson Space Center in Houston. Last year we had many of our events at neighboring Space Center Houston, and those were open to all; however, the SUITS team has not yet determined **if we will host events off-site from Johnson Space Center in May 2023**.

4. Is there a team size limit?
   a. No, we have had teams range from 2-70 people. Most teams include 8-15 people. Each team member should contribute within a defined role on their team.

5. Do you want system architecture flowcharts in UML 2.0, SysML, etc.?
   a. Use whatever your team feels best describes your architecture.

6. Can students under the age of 18 participate?
   a. No, unfortunately all participants must be 18 to sign the Statement of Rights.

7. If we have previously had a proposal for NASA SUITS, can we extend this or should we start from scratch?
   a. If aspects from your previous design can carry over to this year's challenges, then you can use that. Make sure you are addressing this year's specific requirements first and foremost. We want to see unique ideas.

8. Are international students allowed to be team leads?
   a. This is a little tricky. STEM Gateway limits team leads to U.S. Citizens. However, we are happy to interact with and help anyone contacting us. So you could have co-leads, one a citizen, and one that is an international student.

9. Does our faculty advisor have to be from our institution or an active faculty member?

a. Yes, your faculty advisor is acting on behalf of the university, so they need to be in a position recognized by the university. You can get advice from anyone, so you may have more than one faculty helping you.

Technical/Devices:

10. What is in the VISION kit and what does it do?
    a. Virtual Instrument for Simulating Inertial Objects (VISION) kits are a Raspberry Pi equipped with global positioning system (GPS) tracking unit, inertial measurement unit (IMU), and a magnetometer. GPS position in local and world coordinates, heading, and bearing will be streamed via the telemetry stream server (TSS).

11. When will the VISION kits be sent to teams?
    a. The SUITS team's goal is to send VISION kits to selected teams by mid-January.

12. Will each team get a rover for testing?
    a. No, however we will provide the rover specifications as soon as we have them.

13. Are there any simulation tools provided for the rover?
    a. Not currently. Teams will send position commands via telemetry stream server (TSS). The rover will be equipped with the necessary operating system and navigation components to accept the commands received through the TSS and navigate accordingly. The rover will stream data to the telemetry stream via its own VISION kit. Teams will receive access to the telemetry stream when VISION kits are sent out which can be used to simulate position data and sending commands to the rover.

14. Can our team use additional devices, such as a VR HMD?
    a. The SUITS team strives to be device agnostic. Some former teams used a design that involved interfacing between a Quest and a HoloLens2.

15. What language is the telemetry stream server (TSS) in?
    a. JSON, JS(ES6) NodeJS. The NASA SUITS team will provide a Unity Library that you can import to the project to send and receive messages from the server in both the Unity Editor and in a Universal Windows Platform build for the HoloLens. Please contact the NASA SUITS team if you plan to use a development engine other than Unity.

16. Can phones be used as peripheral devices?
    a. Teams need to state all peripheral devices their design includes and any requirements they might need from the NASA SUITS team (internet, time outside of the scheduled testing for set-up, etc.) during the design review in the spring. Approval will either be granted for the devices, or the SUITS team may contact teams for additional follow-up before allowing the external devices on-site. Peripheral devices will most likely have to connect directly with the head mounted device, rather than via the TSS.

17. Can you explain the Spectrometer RFID?

a. We will use a mockup of an X-ray fluorescence (XRF) spectroscopy scanner for geologic study that will utilize Radio Frequency Identification (RFID). Teams will scan rocks tagged with RFID throughout the rock yard. The provided scanner will transmit data from the scan via the telemetry stream.

18. Can we design our own custom hardware interface?
    a. Yes, be sure to include a mock-up of the design and how it interfaces with the augmented reality device in the proposal. If accepted, at the spring design review, teams will be required to present all external devices before receiving approval from the NASA SUITS team to bring them on-site.

19. What does ROVER look like, what does it collect, and how exactly does it function?
    a. ROVER specifications will be released later. It will run on a version of Robot Operating System and will share VISION kit data like other VISION kits (IMU, GPS, Magnetometer). Teams are only responsible for sending navigation commands (in the form of destination coordinates) to ROVER via the telemetry stream. The NASA SUITS team will ensure ROVER is appropriately equipped for navigation through the rock yard.

20. Does the rover know where home is?
    a. The rover will use coordinates from the VISION kit's GPS data to get to its home (which will be a local origin)

21. Is accessing rock info related to ROVER tasks and requirements?
    a. No, ROVER tasks and the geology tasks are not interconnected. ROVER's VISION kit data and the RFID geology scan data will be separate models in the telemetry stream. Teams are required to determine how best to interface with the telemetry stream to send commands to the ROVER and display read-outs from the geology scans.

22. What does the airlock look like, and what kind of switch are we dealing with in the UIA?
    a. More info on the switch orientation and the airlock will be provided later.
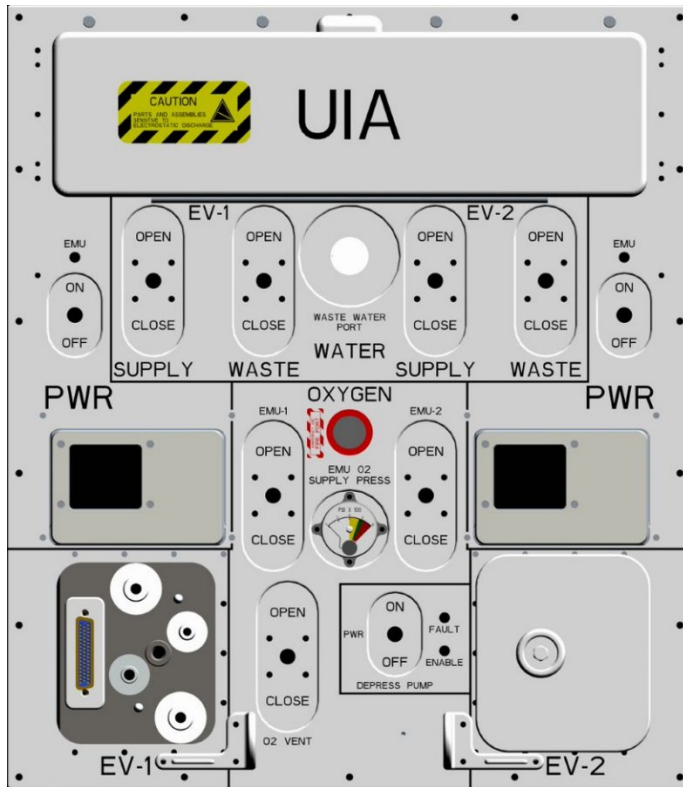
23. Do we need to confirm the switches, and do we need a press here or tutorial for the switches?
    a. That is up to your team, whatever you feel like works the best is what we're interested in seeing! Data relating to the status of umbilical interface assembly (UIA) switches will be streamed via the TSS.

24. For the spectrometer, do we place the point of interest, or are they given when the astronaut returns to the airlock.
    a. As the design evaluators navigate back to the "airlock" following the waypoint trail they left earlier in the test event, there will be RFID tagged rocks placed along the path. They should stop and scan those rocks throughout the return navigation portion of the challenge. Having the ability to tie the geology data to the location of the sample would be a useful feature.

25. How should our proposals be framed around the external devices such as VISION, ROVER, and the spectrometer?
    a. Data from VISION and ROVER will be streamed via the telemetry stream. Explain how your user interface plans to represent data received from the TSS and send messages to the TSS. Additionally, show the system architecture of the communication between your augmented reality head mounted device and the TSS.
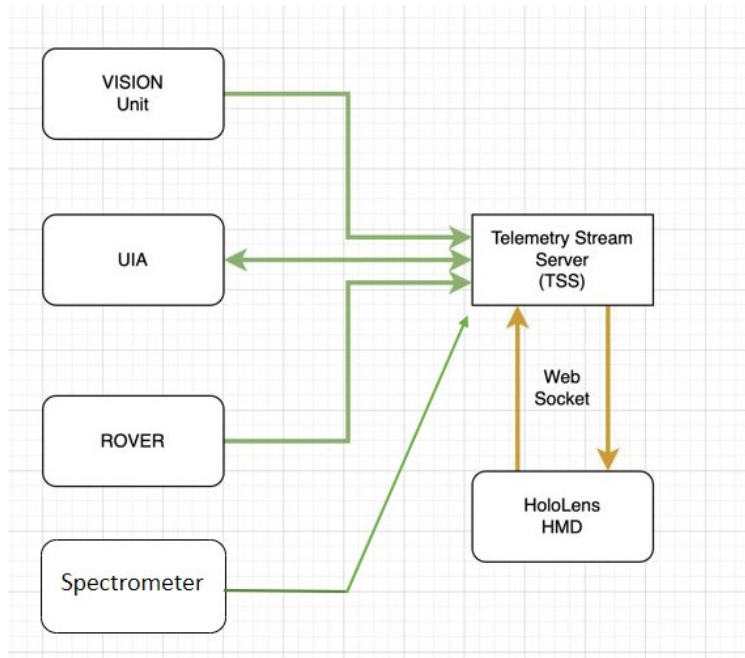
b.

26. When will the telemetry stream become available?
    a. The SUITS team's goal is to provide the telemetry stream to selected teams in early January. Teams will receive access to the telemetry stream and Unity Package when they receive their VISION kits.