PROPOSAL GUIDELINE
NASA Spacesuit User Interface Technologies for Students

Date: August 26, 2019

National Aeronautics and Space Administration

Lyndon B. Johnson Space Center

Houston, Texas 77058

Team Name

Optional Team Logo

Academic Institution Name
Address

Team Contact
Student Name
Email Address
Phone Number

Team Members
(Please list ALL team members)
Team Member Name --- Role
Email Address --- Academic Year / Academic Major
Team Member Name --- Role
Email Address --- Academic Year / Academic Major
Team Member Name --- Role
Email Address --- Academic Year / Academic Major
Team Member Name --- Role
Email Address --- Academic Year / Academic Major
Team Member Name --- Role
Email Address --- Academic Year / Academic Major

Faculty Advisor
Name
Email Address
Phone Number

Faculty Advisor Signature   Date

Table of Contents

*(Note: **A limit of 12 pages enforced for the Technical Section**. Include enough pictures within those 12 pages to describe your tool. If you want to submit a large number of pictures, use an Appendix. Other sections and appendices **will not count against your 12 pages.**)*

1. Introduction

The Human Integrated Vehicles and Environment (HIVE) Lab and the Office of STEM Engagement at NASA's Johnson Space Center is proud to host another year of the NASA Spacesuit User Interface Technologies for Students (SUITS) Design Challenge.

This document serves as a resource and reference to help all potential SUITS challengers with the requirements to enter and succeed. Included are important steps to the challenge and required components of an official proposal. Please also review the eligibility requirements for SUITS at our website https://go.nasa.gov/nasasuits.

2. Letter of Intent

Please **submit a Letter of Intent by <u>September 27, 2019</u>** indicating the team's intention to submit a written proposal. The Letter of Intent should follow the format below and be written in the body of an email. Send the email directly to NASA-SUITS@mail.nasa.gov.

a. Provide a Team Contact information – this should be a student team member
   a. Sample: Doe, John (DoeJ@institution.edu) Sophomore / Software Engr
b. Provide the academic institution (military academy, technical college, community college, or university) your team will represent. Your team should represent one institution even if members come from different institutions.
c. State: *"NASA SUITS Challenge Letter of Intent"* in the subject line and body

3. Proposal Requirements

- Each team must submit 1 electronic copy of an original proposal using the <u>Apply Now</u> link on the website: https://go.nasa.gov/nasasuits
- Each proposal must be submitted in a three-section format containing the required sections in the following order: Technical, Outreach Plan, and Administrative
- Sections or components shall not be skipped/omitted under any circumstance
- The Technical section shall not exceed 12 pages including the title page
- The report body shall use 12-point font
- All information on the title page must be complete
- Figures shall be labeled and referenced within the text

- Tables shall be labeled and referenced within the text

4. Technical Section

The technical section should cover the design the team is proposing. This section should include any information that a technical reviewer might find informative or instructive in understanding the aims and goals of the design. Evaluators ranking the proposal for its scientific merit will read only this section, so teams should address all relevant factors as listed below.

   a. Abstract

The abstract should be a brief (up to 300 words) summary that touches upon the elements of the proposed prototype design.

   b. Design Description

Include a brief, but detailed description of the proposed display, written such that a practicing engineer or scientist can understand the design of the user interface (UI). Present goals along with a description of the expected results. Showing conceptual UI design ideas (portrayed via wire frames, visuals, etc.) and innovative display interaction methods/technologies are strongly preferred.

   c. Concept of Operations (CONOPS)

Describe the overall high-level concept of how the user interface will meet the expectations and requirements. Describe the system from an operational perspective (the viewpoint of the astronaut) to help facilitate an understanding of the system goals.

   d. Human-in-the-loop (HITL) testing

Student teams shall discuss any pilot, user experience, human-in-the-loop, or human factors studies planned. A written HITL test plan should include a test protocol, possible metrics/measures, feasible subject pools, and the expected population/demographics of test subjects.

   e. Team Project Schedule

Provide an outline of the team's development plans with any internal key milestones. Use a Gantt or similar chart. Teams are strongly encouraged to plan time to test their code before traveling to NASA Johnson Space Center for test week.

   f. Technical References

Cite referenced works in text and in a "References" section using APA format.

5. Outreach Section

The outreach section of the proposal will include the team's plan for disseminating the results of their experiment/experience to the public. Information contained in this section should focus on the outreach activities the team intends to implement and the target audience to address. The outreach plans must be original to the team. **Do not post original proposal documents on any social media platforms or channels.**

A plan is an organized way to achieve a specific objective. Random activities, even good random activities, do not constitute a plan. An outreach plan should have two major components:

The PLAN – a description of the team's objectives and goals; what activities are planned for the upcoming year; where and when the activities will take place; what audience will be targeted, etc.

The ACTIVITIES – what will the team do when they get there? What materials will they refer to? What are the main points that they will make?

For maximum point value, the plan should include the following:
- The team's objectives for each outreach activity
- A description of the outreach audience (K-12 class or school groups, undergraduate research symposiums, university outreach to local schools, informal groups such as Boy/Girl Scouts, after school clubs, church groups)
- Specific plans for activities (strengthened by alignment to state or national standards that will help a K-12 teacher, use of the 5E Model, or use of age/grade appropriate language during the activity)
- Letters or agreements from institutions who have accepted your invitation to address their group
- A press and/or social media plan
- A connection between curriculum/activity and NASA SUITS, a NASA Mission, Informatics and Subsystems team at JSC, or the team's code

6. Administrative Section

a. Institutional Letter of Endorsement

This letter must be on the endorsing institution's letterhead and must come from the institution(s) president, dean of college, or department chair. It indicates that the team's institution(s) has knowledge of the team's interest in participating in this activity and endorses the team's involvement. Failing to include a Letter of Endorsement from their institution(s) will result in a rejected proposal.

b. Statement of Supervising Faculty

A statement of support from a faculty member indicating a willingness to supervise and work with the team during all stages of the activity. There will be no consideration for teams working without a faculty advisor. The faculty advisor must also sign off on the cover of the proposal as evidence that he/she has seen the proposal and approves of the submission. The following statement should appear on an institution letterhead and include the signature of the faculty advisor:

As the faculty advisor for an experiment entitled "_____" proposed by a team of higher education students from _____ institution, I concur with the concepts and methods by which the students plan to conduct this project. I will ensure that the student team members complete all program requirements and meet deadlines in a timely manner. I understand that any default by this team concerning any Program requirements (including submission of final report materials) could adversely affect selection opportunities of future teams from their institution.

c. Statement of Rights of Use

These statements grant NASA, acting on behalf of the U.S. Government, rights to use the team's technical data, including computer software, and design concept, in part or in entirety, for government purposes. NASA, acting on behalf of the U.S. Government, may designate for certain tasks under this pilot program that software (including documentation) developed for such certain designated tasks be released as "Open Source" (OS) software, as that term is defined by the Open Source Definition promulgated by the Open Source Initiative on its website (see http://opensource.org/docs/osd). These statements are not required. However, teams with a Statement of Rights of Use will receive greater consideration in the proposal selection. If choosing to include these statements, ALL team members and faculty advisors must sign. The

statements read as follows: As a team member for a proposal entitled " _____ " proposed by a team of higher education students from _____ institution, I will and hereby do grant the U.S. Government a royalty-free, nonexclusive and irrevocable license to use, reproduce, distribute (including distribution by transmission) to the public, perform publicly, prepare derivative works, and display publicly, any technical data contained in this proposal in whole or in part and in any manner for Federal purposes and to have or permit others to do so for Federal purposes only. Further, with respect to all computer software designated by NASA to be released as open source which is first produced or delivered under this proposal and subsequent collaboration, if selected, shall be delivered with unlimited and unrestricted rights so as to permit further distribution as open source. For purposes of defining the rights in such computer software, "computer software" shall include source codes, object codes, executables, ancillary files, and any and all documentation related to any computer program or similar set of instructions delivered in association with this collaboration. As a team member for a proposal entitled "_____" proposed by a team of higher education students from _____ institution, I will and hereby do grant the U.S. Government a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States Government any invention described or made part of this proposal throughout the world.

      d.   Funding and Budget Statement

This section should include a simple columnar layout showing expected expenditures associated with the proposed design (materials, machining, operating, testing, and shipping), transportation to/from Houston, and accommodations/food/transportation during test week in Houston, etc. See Table 1 for an example. It is imperative that teams anticipate all costs involved and actively work to seek funding. List potential sources for funding and can include institutional grants, state Space Grant funds, corporate sponsors, etc.

Teams should also identify a financial representative from their institution (college or department level). Be sure to include the representative's name, title, and email address. NASA SUITS Activity Management will coordinate directly with the identified financial representative if teams receive development stipends.

Table 1 Travel cost

Items	Costs
Flights	$4500.00
Hotel	$3500.00
Ground Transportation	$500.00
Food	$800.00
Miscellaneous	$400.00
Total	$9700.00

  e. Parental Consent Forms

Any team member under the age of 18 accompanying the team to Houston shall submit parental consent forms for general participation. Teams selected to participate onsite will receive the parental consent forms, if applicable.

  f. Proposal Scoring Method

A scoring rubric (Figure 1) with required criteria will evaluate how well a proposal addresses each of the following required components: Technical Merit, Outreach Plan, and adherence to all proposal requirements.
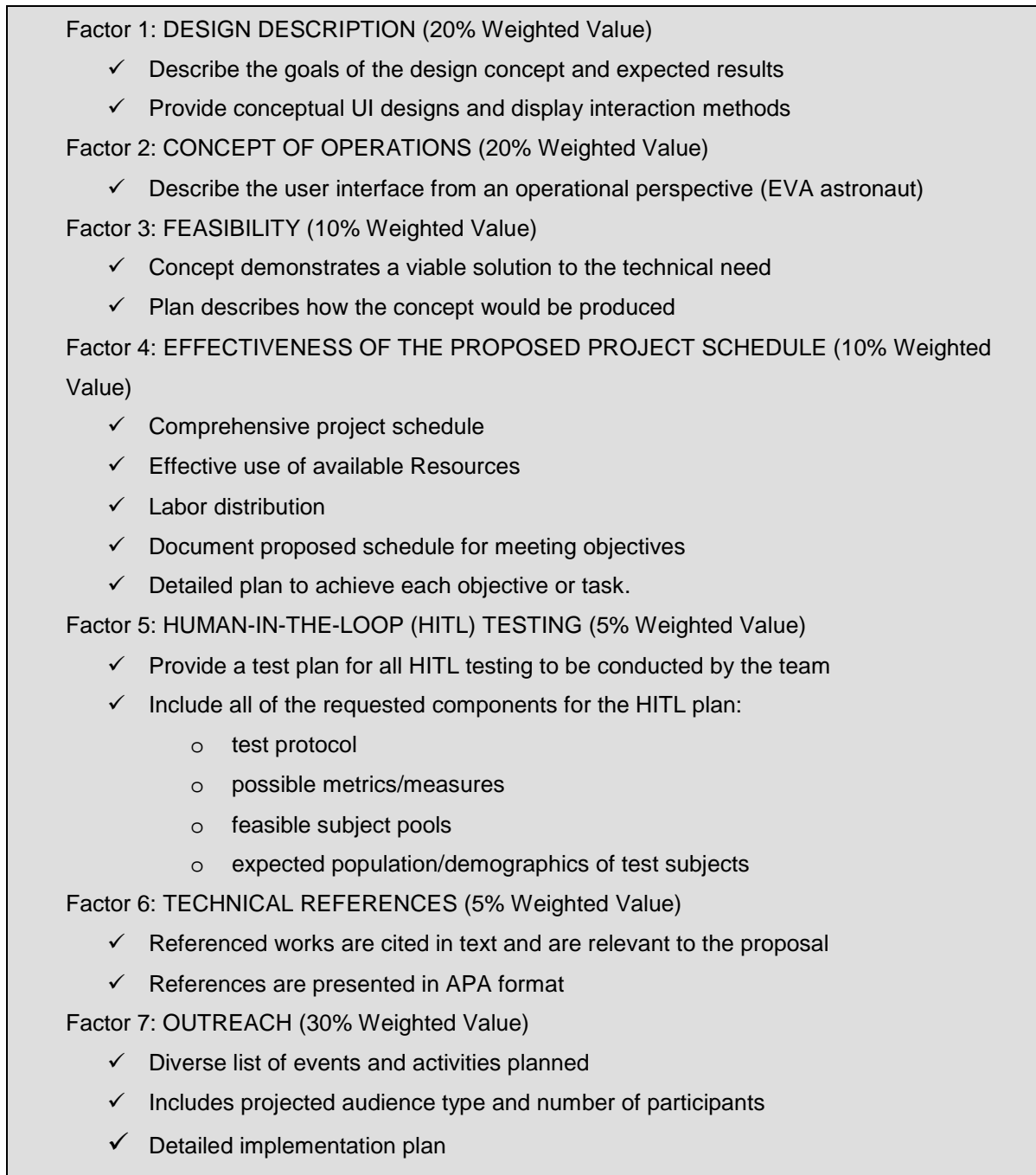
Factor 1: DESIGN DESCRIPTION (20% Weighted Value)

- ✓ Describe the goals of the design concept and expected results
- ✓ Provide conceptual UI designs and display interaction methods

Factor 2: CONCEPT OF OPERATIONS (20% Weighted Value)

- ✓ Describe the user interface from an operational perspective (EVA astronaut)

Factor 3: FEASIBILITY (10% Weighted Value)

- ✓ Concept demonstrates a viable solution to the technical need
- ✓ Plan describes how the concept would be produced

Factor 4: EFFECTIVENESS OF THE PROPOSED PROJECT SCHEDULE (10% Weighted Value)

- ✓ Comprehensive project schedule
- ✓ Effective use of available Resources
- ✓ Labor distribution
- ✓ Document proposed schedule for meeting objectives
- ✓ Detailed plan to achieve each objective or task.

Factor 5: HUMAN-IN-THE-LOOP (HITL) TESTING (5% Weighted Value)

- ✓ Provide a test plan for all HITL testing to be conducted by the team
- ✓ Include all of the requested components for the HITL plan:
  - o test protocol
  - o possible metrics/measures
  - o feasible subject pools
  - o expected population/demographics of test subjects

Factor 6: TECHNICAL REFERENCES (5% Weighted Value)

- ✓ Referenced works are cited in text and are relevant to the proposal
- ✓ References are presented in APA format

Factor 7: OUTREACH (30% Weighted Value)

- ✓ Diverse list of events and activities planned
- ✓ Includes projected audience type and number of participants
- ✓ Detailed implementation plan

Figure 1 Scoring Criteria

Note: Please continue to check the NASA SUITS website for the most-up-to-date activity documents @ http://go.nasa.gov/nasasuits. Please send questions or responses to NASA-SUITS@MAIL.NASA.GOV.