

Abstract

Our team, San Jacinto Flight Crew (S.J.F.C), designed a conceptual augmented-reality (AR) spacesuit interface to support lunar extravehicular activity (EVA) navigation and task efficiency for Artemis missions. The system proposes heads-up guidance, terrain awareness, and contextual tool assistance to reduce cognitive load and real-time suit health and user status displays to reduce cognitive load and enhance safety. Using human-centered design, we developed interface concepts for future prototyping aimed at enhancing astronaut autonomy and mission safety on the lunar surface.

Project Overview

Project Goals

- Deliver an interactive, hands-free AR UI for lunar operations.
- Seamlessly integrate the AR UI with a physical rover for navigation and data.
- Provide real-time status of suit and rover (O₂, power, pressure, temperature, alerts).
- Enable gesture-based commands for camera, measurement, data logging, and follow mode.
- Ensure low-latency, reliable comms and robust operation in field-like conditions.

N.O.V.A. Functions

- 1.) "Camera" : Captures high-quality images and environmental visuals to document mission progress and surface conditions.
 - Bracket hand gesture initiates camera function.
- 2.) "Measure" : Calculates and displays distances between selected points within the astronaut's view for accurate field measurements.
 - Pinching one point of interest with two hands and separating them initiates the Measure function.
- 3.) "Data" : Stores and organizes collected images and measurements for easy access and mission review.
 - Accessed through the main menu.
- 4.) "Follow" : Allows the rover to automatically track and follow the astronaut's position, supporting hands-free Navigation.
 - Raising one arm upwards with index finger erect while twirling in a circular motion initiates the Follow function.
- 5.) "Status" : Displays real-time information on rover and suit conditions, including but not limited to oxygen levels, power, and system health, to maintain astronaut awareness and safety.
 - Accessed through main menu. Also auto displays an overlaying alert when levels are critical.

Design Optimization

- 1.) User-center design
- 2.) Gesture and Hand-Free Interaction
- 3.) Single-Action Navigations
- 4.) Hazard Awareness

Conclusion

The San Jacinto Flight Crew's (S.J.F.C.) modular AR interfaces enhance learning, task completion, and tool use for lunar missions. Having submitted our proposal, we look forward to continuing our work next year when the NASA SUITS challenge begins. Committed to research and development, we support NASA's Artemis mission and will continually refine our design for the challenge.

Acknowledgements

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UI Pictures



Figure 1: Menu collapsed.



Figure 2: Main Menu.



Figure 4: Camera function.



Figure 5: Navigation function.



Figure 6: Data Function.



Figure 7: Suit Status Function.

The buttons in N.O.V.A.'s user interface (UI) design have been carefully curated to prioritize a balance of visibility of surroundings and functional optimization.

We have created a conceptual demonstration using the QR code below. It links to a brief slideshow of our planned UI. The concept illustrates the flow of the UI.

We have also included a QR code for feedback. S.J.F.C. will begin the S.U.I.T.S. design competition in the Spring of 2026 and would greatly benefit from feedback.

N.O.V.A. Feedback:



Conceptual UI Demo:

