



## HOSHI – User Guide & Specifications

Team CLAWS

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## 1. Introduction

CLAWS is a **multidisciplinary team of student designers and developers from the University of Michigan**. Research and design for this application started September 2021, with software development kicking off January 2022.

HOSHI is an **AR-Assistive** application that prioritizes an efficient balance of astronaut safety and autonomy. This application supports navigational, geological sampling & documentation, and search & rescue functions. Our system receives user command/input through an AI voice assistant "VEGA".

HOSHI is a user-friendly application designed with these principles and requirements in mind:

- Safety and autonomy
- Visibility & Accessibility
- Functionality over learnability
- Minimizing cognitive load
- Actionable information

**Primary interactions:** voice control (all interactions can be done through voice)

**Secondary interactions:** physical gestures (finger point & press, hand rays).

Feedback is given through visual & audio cues.

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## 2. Setup

1. Deployment build and instructions:  
<https://github.com/CLAWS-UMICH/HOSHI-2021-2022-Release>
  2. Once deployed on the HoloLens, set up a connection to the telemetry server using this documentation:  
<https://docs.google.com/document/d/1sZtV6cn0Y17ftfb63ZZcgGiP2paYLqA5cxnp1YRgg24/edit?usp=sharing>
- Our application works best just before sunset where lighting is not too bright and not too dark.
  - Bright sun in the afternoon will make it difficult to see the interface.
  - Conversely, extreme darkness at night will cause hand ray interactions to disable, and AR objects to drift (Our application will still work no problem with voice and close hand gestures.)
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## 2. Input Methods

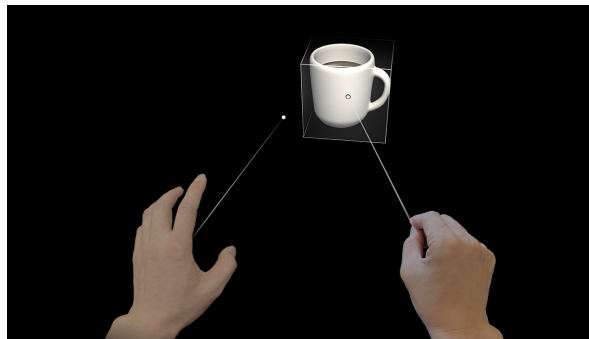
### 2a. Hand Gestures

#### Finger Interactions

- Any buttons on panels can be pressed by using your index finger to press the button.

#### Hand Rays

- For buttons out of reach, the user can use hand rays by raising their hand, palms facing away.



- Hand Rays can be used to
  - Select buttons
    - “Air Tap” by pressing the index finger down into the thumb in a pinching motion and releasing to select.
  - Resize and move panels
    - “Air Tap and Hold” by doing the same pinching motion as the air tap without releasing. With this interaction, you can select a panel and drag it by moving your hand.
    - Use two hands to resize: “Air Tap and Hold” with both hands on a panel, and move hands closer together/further apart to decrease/increase panel size.



## 2b. Voice Commands

VEGA, the system's voice assistant **must be activated by the wakeword "Hey VEGA"**

Voice commands are our primary interaction. Every primary interaction in our system is voice interactable and can be relied on in the case hand interactions are not possible.

### Tips on using the voice commands:

- After a command, Vega will stay listening for an additional 5 seconds:
  - No need to say "Hey VEGA" again for sequential commands
  - Menu button is highlighted with a blue border when VEGA is listening
- "Hey VEGA" + [pause for verification sound] + [voice command]
  - VEGA will still work without pausing in the middle, but waiting for the confirmation sound can make the interaction more straightforward
- Dictate with clear separation between words
- Words/labels in quotes means the action/button can be triggered with voice command
- Voice commands can be found in "Commands" in HOSHI's menu
  - Open/close commands for menu items do not require the "hey VEGA" wakeword, but will still work even with the wakeword activated.

A List of all system voice commands can be found on the last page of this guide.

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## 3. Key Functions

View a video demo of HOSHI's functions here: <https://www.youtube.com/watch?v=7BkKTmulBRY>

### 3a. General

- Panels can be:
  - Moved: "Air Tap and Hold" and move hand to drag panels
  - Tethered in space: Select the "Follow Me" button next to the Close button
  - Resized: "Air Tap and Hold" with both hands and move hands closer or further apart

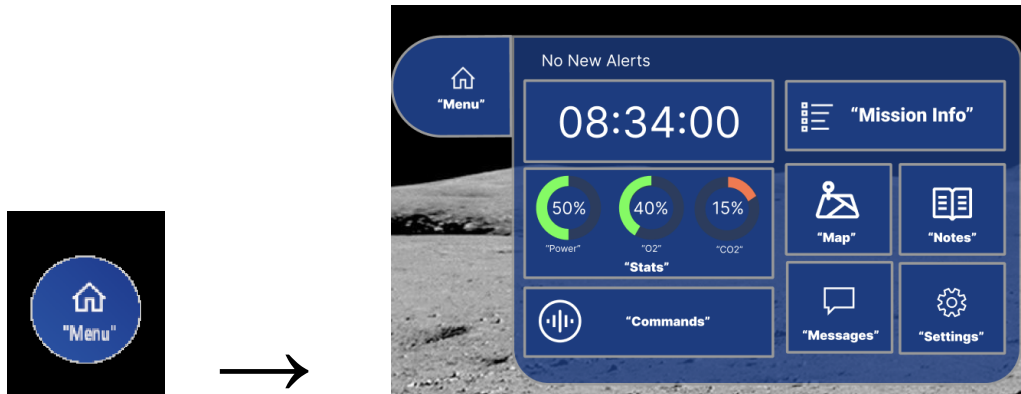


- There are a few voice commands for organizing the UI panels:
  - **"Hey VEGA, Clear view"** (clears/closes all UI)
  - **"Hey VEGA, Call back"** (brings all tethered/lost panels/UI open back into your view)

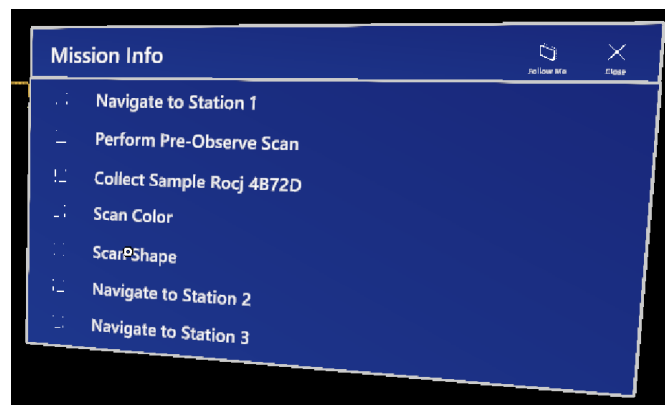
### 3b. Menu

- **“Open/Close Menu”**

All panels that can be opened are shown as widgets in the “Menu”. All widgets can be opened/closed with hand gesture, or by saying “Open / Close \_\_\_ ”



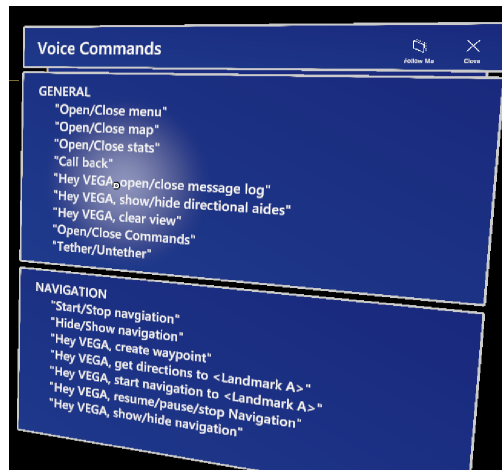
- **Mission Info:** high-level overview/checklist of mission tasks
  - **“Open/Close Mission Checklist”**



- **Settings:** location calibration
  - **“Open/Close Settings”**
  - Refer to this document for instructions on how to calibrate your location and manually re-calibrate if you notice extreme location drift:  
<https://docs.google.com/document/d/1sZtV6cn0Y17ftfb63ZZcgGiP2paYLqA5cxnp1YRgg24/edit?usp=sharing>
  - Note: you should not have to recalibrate/open settings as long as you are not in an extreme dark lighting environment. Our application works best before sunset



- **Commands:** Shows a list of all voice commands able to be used
  - **“Open/Close Commands”**

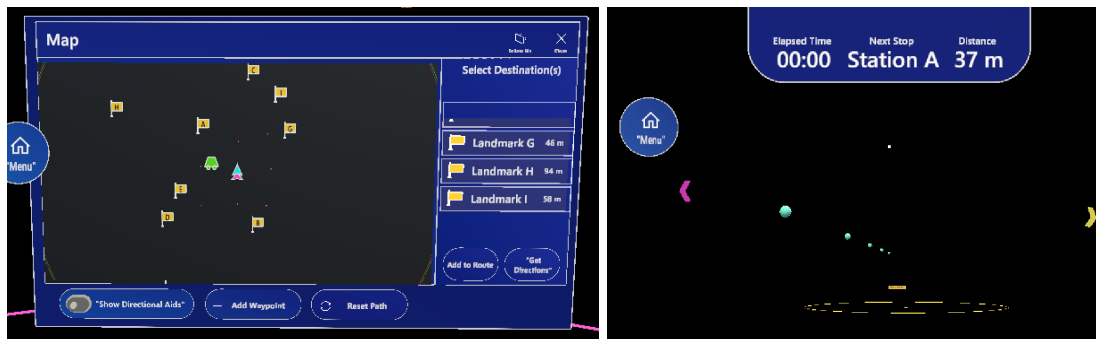






### 3c. Map & Navigation

1. Open maps with "Open Map" or by using the menu.
2. Selecting a landmark in this list will add it to your planned path.
  - a. The right side list of landmarks can be scrolled with a hand ray (air tap and hold and move hand ray up or down).
3. After selecting landmark(s), get directions.
  - a. (you can either "Hey VEGA, Get directions to landmark \_\_\_", or you can use hand gestures to select multiple landmarks and use the get directions button or voice command "Hey VEGA, Get directions").
  - b. For voice commands, you can use the alphabetic (a, b, c) or military alphabet (alfa, bravo, charlie etc).
4. Next, start navigation through the UI or voice command.
  - a. (Navigation can be paused or stopped at any time. )
  - b. A sphere path will guide you to your next immediate destination.
5. You will be informed once you reach your destination.

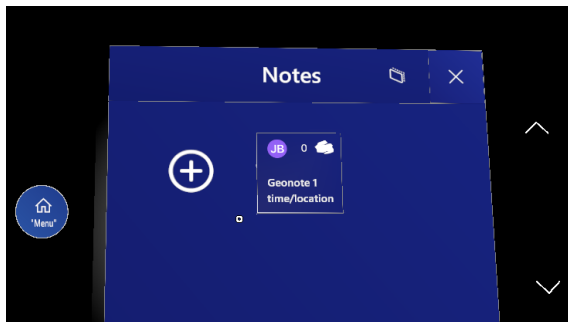


#### Map Voice Commands "Hey VEGA, + "

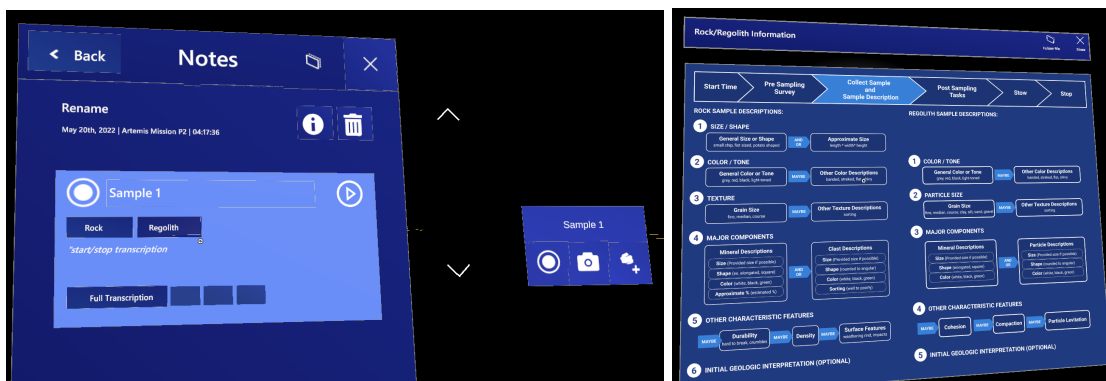
- **"Open/Close Map"**
- **"Get Directions"**
- **"Reset Path"**: *clears routes selected when planning for navigation*
- **"Get directions to [ Landmark \_ ]"**
- **"Start / Pause / Stop Navigation"**
  - **"Affirmative"**
- **"Hide / Show Directional Aides"**: *hides/shows directional arrows which point to landmarks/lander to give a sense of the location*
- **"Create Marker"**
- **"Zoom in / Zoom out"**

### 3d. Geo-sampling

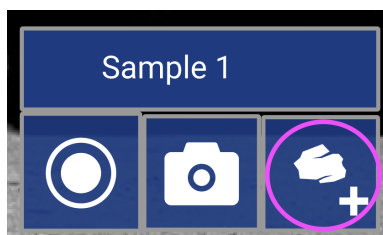
1. Open Notes with “Open Notes” voice command, or by using the menu.



2. Create a note with the “+” button, or “Hey VEGA, create a note” voice command.
3. Select that note to open the note “Select note \_\_”.
4. When the notes open, you can rename it with hand gesture, as well as open a geo-sampling guide using the “i” button:
  - a. Again, panels can be tethered/untethered. By default, the notes panel will be tethered.



5. To get started, add a sample using voice command “Hey VEGA, add a sample” OR, using this button in the right side toolbar:



- a.
6. Once a sample has been created, you can “Hey VEGA, start transcription”, or press the record button and begin talking.
    - a. Transcriptions will automatically stop after a few seconds of silence.
  7. You can also take a picture using the picture button or “Hey VEGA, take a picture”.



8. Transcriptions and photos are stored in whichever sample you have selected in light blue. To select a different note, use hand gestures to select the UI, or “Hey VEGA, Select Sample \_\_ “. Scroll using the ^ and v arrows at the right.

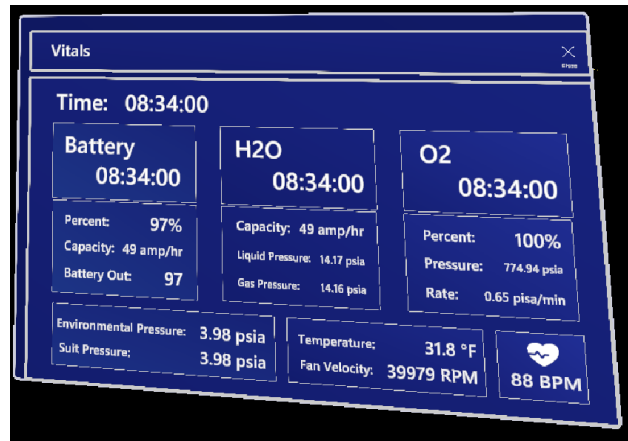
Geosampling Voice commands **“Hey VEGA, + ”**

- **“Open/Close Notes”**
- **“Create a Note”**
- **“Select Note 1”**
- **“Open Info”:** *opens geo-sampling cue card infographic*
- **“Add a Sample”**
- **“Select Sample 1”**
- **“Start Transcription”:** starts transcribing in the currently selected sample
  - Transcriptions stop automatically after a few seconds
- **“Take a Picture”:** triggers camera 3 second timer to snap a picture



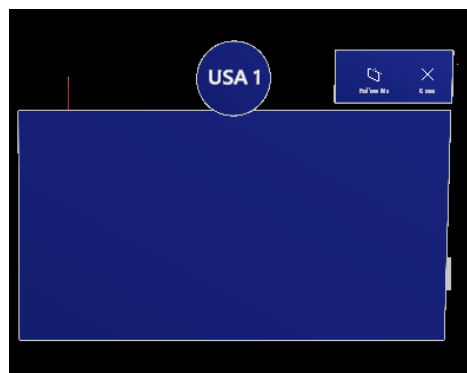
## 4d. Biostatistics

- **“Open/Close Vitals”**



## 4e. Alerts

- **“Open/Close Messages”**
- Alerts/Messaging functions will only appear when Search & Rescue is triggered in the telemetry stream
  - When the messaging function is available, the user can select preformatted messages or write their own.





## 5. Voice Commands

### Menu:

- "Open / Close + "
  - "Menu"
  - "Map"
  - "Notes"
  - "Vitals"
  - "Messages"
  - "Commands"
  - "Mission Checklist"
  - "Settings"

### Panels/UI:

- "Call Back": *brings all open panels into your view*
- "Clear View": *closes all open panels*

### Navigational:

- "Get Directions": *After selecting landmark(s), will show directions & consumption*
- "Reset Path": *clears/resets routes selected when planning for navigation*
- "Get directions to [ Landmark \_ ]": *Shortcut/faster way to get directions*
- "Start / Pause / Stop Navigation"
  - "Affirmative"
  - "Negative"
- "Hide / Show Directional Aides": *directional arrows always point to lander & rover*
- "Create Marker"
- "Zoom in / Zoom out": *zooms in & out of map. Hand gestures to zoom also work.*

### Geo-Sampling:

- "Create a Note": *Creates a new note*
- "Select Note \_ " : *Opens the note*
- "Open Info": *Opens geo-sampling cue card infographic*
- "Add a Sample"
- "Select Sample \_ ": *selects the sample (light blue bg)*
- "Start Transcription": *starts transcribing in the currently selected sample*
  - *Transcriptions stop automatically after a few seconds*
- "Take a Picture": *triggers camera's 3 second timer to snap a picture*