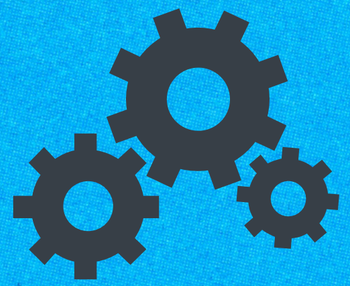


Introduction

Voice Automation Assist. for Navigation

click to global advancement

Voice enabled user interface for geospatial map

-Pradeep Sathapathi

Approach Brief

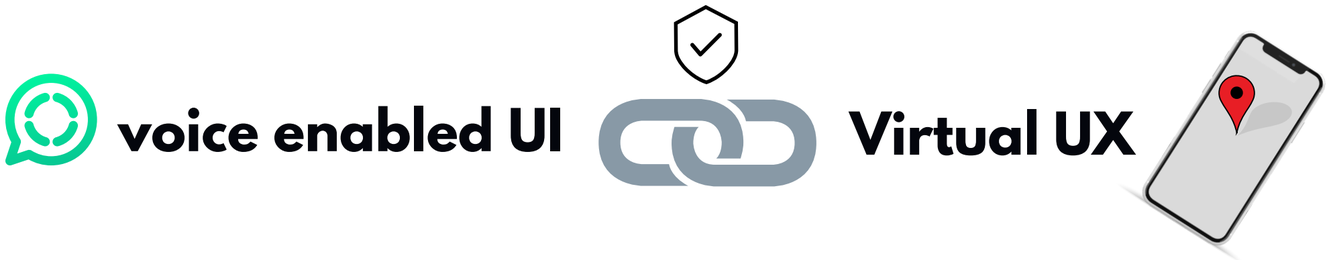
Voice-enabled user interfaces (VUIs) for geospatial map-based web applications leverage speech recognition and natural language processing technologies to allow users to interact with maps using voice commands. This can enhance user experience by making it more intuitive and accessible, especially for those who may find traditional interfaces challenging.

Key Features:

1. Voice Commands for Navigation: Users can speak commands to zoom in/out, pan, and switch between different map views (e.g., satellite, terrain).
2. Search and Query: Users can ask for specific locations, addresses, or points of interest, and the system will respond by displaying the relevant information on the map.
3. Annotations and Markers: Users can add, remove, or edit markers and annotations on the map using voice instructions.
4. Route Planning: Users can request directions and routes by voice, specifying start and end points, preferred travel modes, and even waypoints.
5. Data Layer Management: Users can control the display of various data layers (e.g., traffic, weather, demographic information) through voice commands.

- Voice-enabled interfaces for geospatial map-based web applications are becoming increasingly popular, enhancing the way users interact with and utilize geospatial data.

Not just voice enabled UI also including virtual & augmented technologies in this special development web application for geospatial map and navigation purpose. Additionally adding digital safe techniques for access.



Detailed solution and Approach

Implementing a Voice-enabled User Interface (VUI) for geospatial map-based web applications, integrated with Virtual Reality (VR) for enhanced navigation, involves several key components and a structured approach:

Speech Recognition and NLP Integration:

- Speech Recognition API: Utilize services like Google Cloud Speech-to-Text, Microsoft Azure Speech, or Amazon Transcribe to convert spoken commands into text.
- Natural Language Processing (NLP): Employ NLP frameworks like Google's Dialogflow or Microsoft's LUIS to interpret and understand the context of the spoken commands, enabling more intuitive interactions.

Geospatial API Integration:

- Map Services: Integrate with geospatial APIs such as Google Maps, Mapbox, or OpenStreetMap to display maps, points of interest, and route information.
- Data Layers: Implement functionalities to manage and display various data layers (e.g., traffic, weather) via voice commands.

User Interface Design:

- Voice Command Interface: Design an intuitive voice command interface that provides real-time feedback and suggestions to users.
- Contextual Menus: Develop contextual menus that appear based on user voice commands, allowing for a more dynamic interaction model.

Basic user interaction method

- **Open the Web Application: Access through a web browser.**
- **Start Voice Recognition: Click the "Start Voice Recognition" button.**
- **Issue Voice Commands: Examples include "Zoom in", "Zoom to [location name]", "Show road layer".**
- **Receive Feedback: Check debug messages and observe visual map updates.**
- **Stop Voice Recognition: Recognition stops automatically or can be manually stopped.**
- **Including manual searching optimization to connect the beyond of navigation.**
- **Specifying advanced features in web application for geospatial navigation.**

Enrichment of Voice enabled UI Geospatial web application is an innovative approach towards modern navigation by understanding real time problems and ground reality situations of local areas. Our main vision towards developing this project is used to serve for local users and Technology should be easily accessible to each and everyone through out the corner of the world and our India.

Future Considerations:

- AI and Machine Learning: Integrate AI and machine learning to improve the accuracy of speech recognition and the relevance of responses over time.
- Multi-Modal Interactions: Develop multi-modal interaction capabilities that combine voice, VR gestures, and traditional inputs for a more comprehensive user experience.
- Enhanced Accessibility: Focus on accessibility features to make the application usable by individuals with various disabilities, leveraging the strengths of VUI and VR.

Tools and Technology </>

Mapping Libraries: Used for displaying interactive maps on the web page (Leaflet and OpenLayers).

Voice Recognition (SpeechRecognition API): Enables the application to recognize and process voice commands spoken into the microphone.

Geocoding (OpenStreetMap Nominatim API): Converts textual location descriptions into geographic coordinates (latitude and longitude).

Web APIs (Fetch API): Allows the application to make HTTP requests to fetch data from external sources, like geocoding APIs.

CSS (Cascading Style Sheets): Used to style the visual presentation of HTML elements, including maps and user interface components.

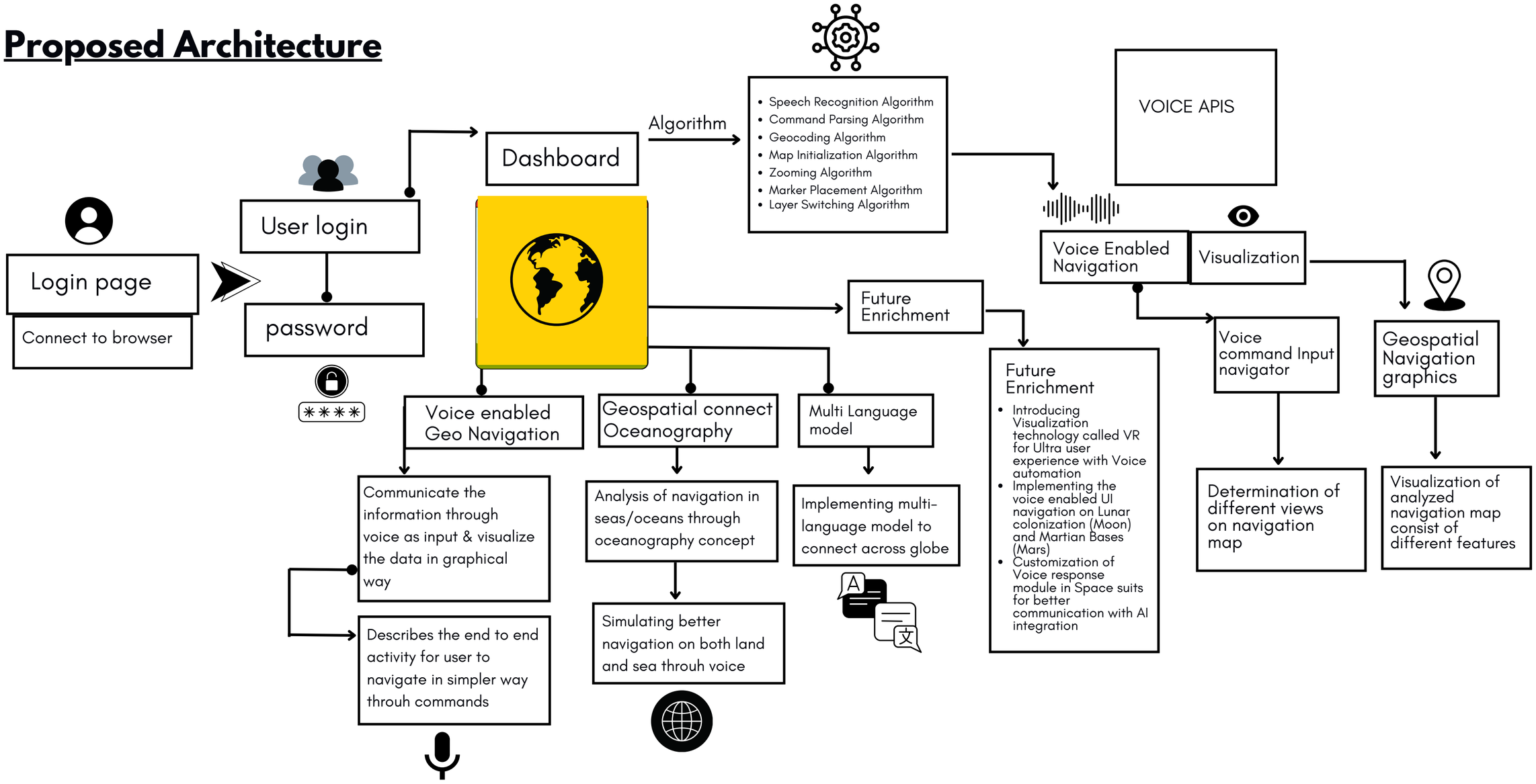
HTML5: Provides the structure and content of the web page, defining elements such as buttons, input fields, and containers.

JavaScript (ES6+): The primary scripting language for implementing interactive functionalities, event handling, and dynamic behaviors.

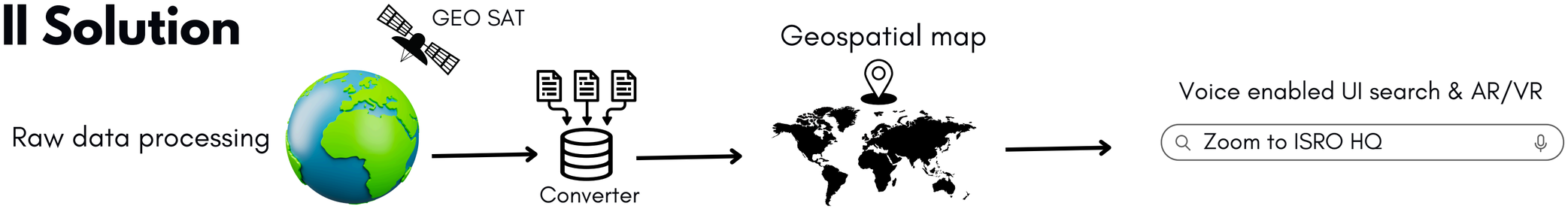
Git: Version control system used for tracking changes in the codebase and collaborating with other developers.

GitHub and CDN (Content Delivery Network): Platforms for hosting and accessing external libraries (e.g., Leaflet, OpenLayers) via URLs in the web application.

Proposed Architecture



Overall Solution



Voice Enabled User Interface is aimed to create better and creative interaction between navigation and user. Current technology consist of many advanced navigation techniques as well as those are used for only special cases. For the 1st time we are introducing a solution for ground reality challenge and user case development called Voice Automation Assist. for Navigation **(click to global advancement)**. Our India is a place of unity includes with diversity and consist of various collaboration technologies that can enrich the growth of India in the new era of digital advancement. **We developed this Voice enabled user interface to create a easy user access of navigation through voice as input** and recognizes in very easy understanding to convey better **communication bridge between user and web.** This project specially designed to produce clear cut information towards navigation with help of AI and other co-technologies. Not only just producing voice enabled system and also implementing advancement concepts like introducing virtual reality technology to demonstrate the navigation in crystal clear way and also used to experience the technological marvel of all times from **ISRO**. This concept includes voice enabled techniques to navigate different places, views and other geographical sites {For example: User can able to get the data of navigated map in views like satellite, terrain and other features included in geospatial navigation and also provides information based on metropolitan places, Scientific spots and primarily focus on roads and transportation facility of user for navigation perspective.} Through voice command without any manual interaction, this results to implement this technology as navigation module in daily life in tracking of navigation systems, delivering real time voice assistance to user in the context of navigation. The other main user case of this project is used to link geospatial date **navigation to oceanography** technology where its enrich the growth of economy with advancement in single strike.

Combining the geospatial applications to oceanography like, **India is a peninsular and consist of 3 sided seas/oceans,** India majority growth is on trading as well as local traditional growth is on aquatic hatching process especially in south India. Under considering the ground reality cases of local fisher mans through boats or small age boats sometimes its hard to find marine hatching process in seas as well as small boats doesn't contains any special navigation equipment, so our project will be a best solution to over come this problem like they can access this web application in their mobiles and they can get the clear cut information about the navigation and availability zone of **marine poultry** with good interface experience for the users through geo satellites information, And also this includes navigation in seas/oceans apart from general navigation on surface of earth.

USER INTERFACE {Voice enabled navigation system}

This web interface is used to allow the user to figure out and communicate with AI for navigation or various geospatial applications through specific commands mentioned for navigate communication. Initially web application allows user to get login into site which can able to generate user to connect with geospatial data and used to enable the voice prompts as input for navigation. In the background of web application it runs the various mentioned algorithms and APIS to perform the input tasks to figure out in graphical representation of maps. This voice enabled user interface features for geospatial navigation enrich the user compatibility and smooth dive over the general navigation system.

This Voice UI navigation site can be uplifts with additional addons like implementing multi language module where this UI can perform like as a bridge between user language and navigation system. By enabling this feature in general voice UI model can leverage the communication imbalance problems and its become solution for ground local users especially from south of the India {South costal India consist of different languages and many of the local user prefer to utilize their language rather than any other, In that case by using this Voice enabled UI navigation with multi-language model can help them to communicate with geospatial data in their own language and able to figure out solutions in easy path.

- Geospatial analyzed data with futuristic navigation

Focusing areas & Future Enrichments

- Implementation of Voice enabled navigation system as well as considering geospatial application
- Connecting Geospatial techniques to Oceanography for advancement for local to global
- Installing Multi – Language model for connecting different peoples or places with one click
- Introducing Visualization technology called Virtual reality for ultra user experience with Voice automation
- Implementing the voice enabled UI navigation on Lunar colonization (Moon) and Martian Bases (Mars)
- Customization of Voice response module in Space suits for better communication with AI integration

1. Speech Recognition Algorithm

Usage:

- Capture User Voice Input: The algorithm uses the Web Speech API (Speech Recognition or web kit Speech Recognition) to listen to and interpret voice commands from the user.
- Start Recognition: Initiated by clicking the "Start Voice Recognition" button, it begins continuous listening for voice input.
- Process Results: Converts spoken words into text and triggers event handlers to process the recognized commands.
- Error Handling: Captures errors in speech recognition and displays relevant messages in the debug area.

2. Command Parsing Algorithm

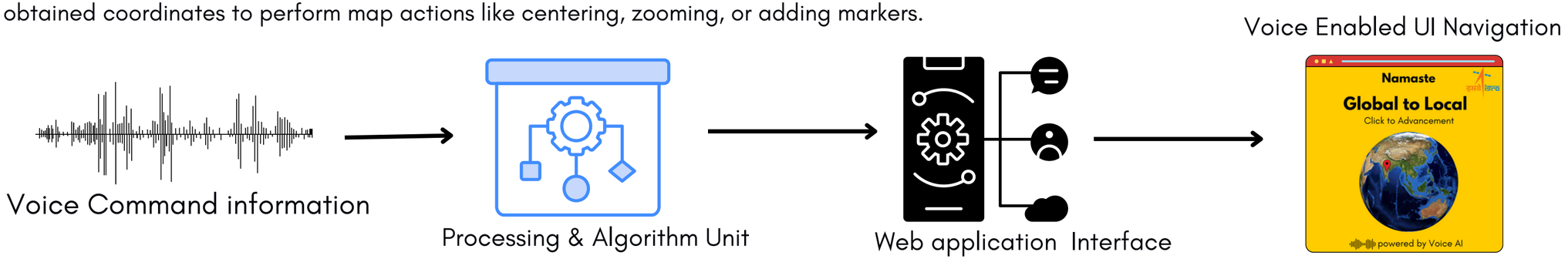
Usage:

- Interpret Voice Commands: After capturing voice input, this algorithm analyzes the text to determine the appropriate map action.
- Identify Keywords: Searches for specific keywords or phrases within the recognized text to understand the intended command (e.g., "zoom to", "add marker at").
- Trigger Actions: Matches the parsed command with predefined functions (e.g., zooming, adding markers, switching layers).

3. Geocoding Algorithm

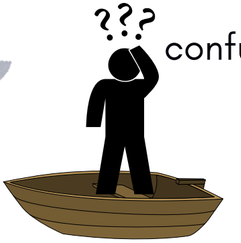
Usage:

- Convert Location Names to Coordinates: This algorithm uses an external geocoding service (OpenStreetMap Nominatim) to translate location names into latitude and longitude coordinates.
- API Request: Sends an HTTP request to the Nominated API with the location name provided in the voice command.
- Process Response: Parses the JSON response to extract coordinates for the specified location.
- Update Map: Uses the obtained coordinates to perform map actions like centering, zooming, or adding markers.



- **Advanced Oceanography meets traditional path of India**

Oceanography navigation



confused path

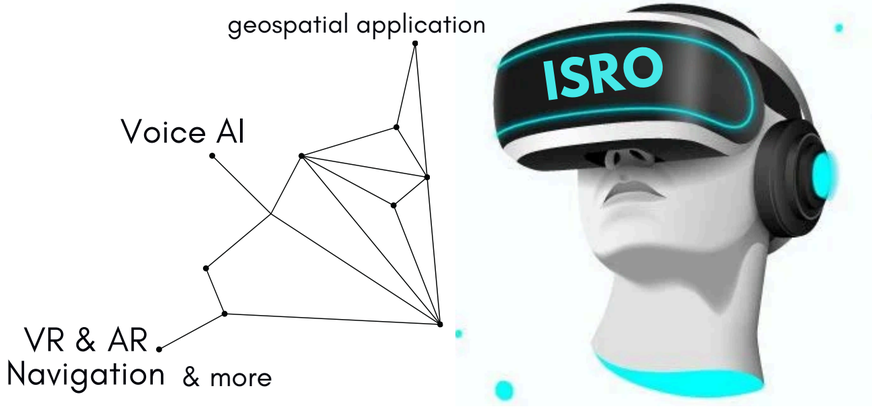
Enriching Indian economy & easy navigation with Technology

- **Multi Language Model Voice UI for better communication**

Connect by one click.

Global to Local

featuring advancement in navigation



“Augmented reality connecting with Voice UI geospatial navigation can introduce a new emerging technology called Augmented Positioning system”

Future Enrichments

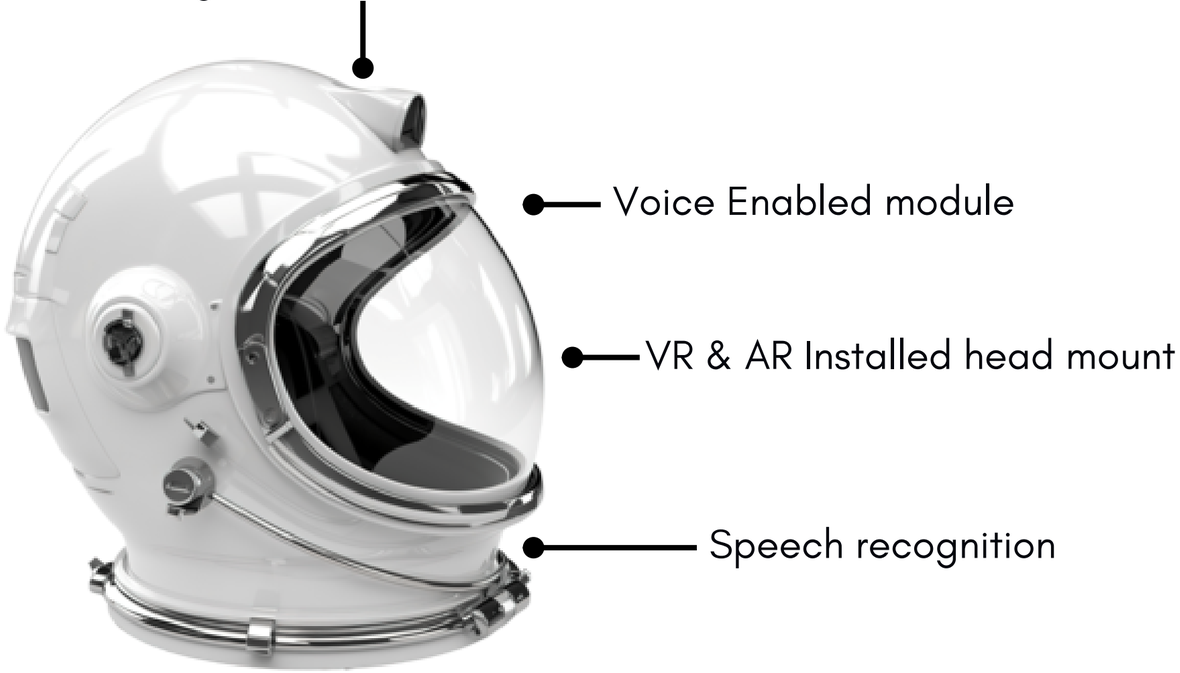
By involving Augmentation in real time navigation can enhance the advancement of real time global to local solution. This web based AR can generate various features like projecting near landmarks virtually and showcase the minute-to-minute directions for user free confusion in avigation. It also supports user to conveying every major landmarks in graphical & virtual representation. The major implementation is, the input of communication is on just voice command without any manual interaction. In soon this AR Voice enabled UI Navigation module can be install in Electronic goggles & more advancement. Its an unique

- Implementation of Virtual navigation system in addition for voice enabled navigation can be more enrichment for future user cases. For instant we are connected voice enabled UI with VR for experiencing the navigation/places just in one place without moving.

Special Innovative Approach

Advancement proposal for ISRO through Voice Enabled UI technology

- Implementing Voice enabled module navigation system in Space applications by installing in space suit helmet as VR & AR technology and providing real time planet navigation {Lunar or Mars surface}. This can enable the Vyomanauts easily access the navigation on planets through real time satellite information and they can easily communicate with navigation module through Voice command as input. In addition by involving AI techniques can leverage the innovation into extant level in the areas of advanced navigation through simple approach.



Vyomanauts
Indigenous mission by ISRO

COSMIC NAVIGATION

THANK YOU