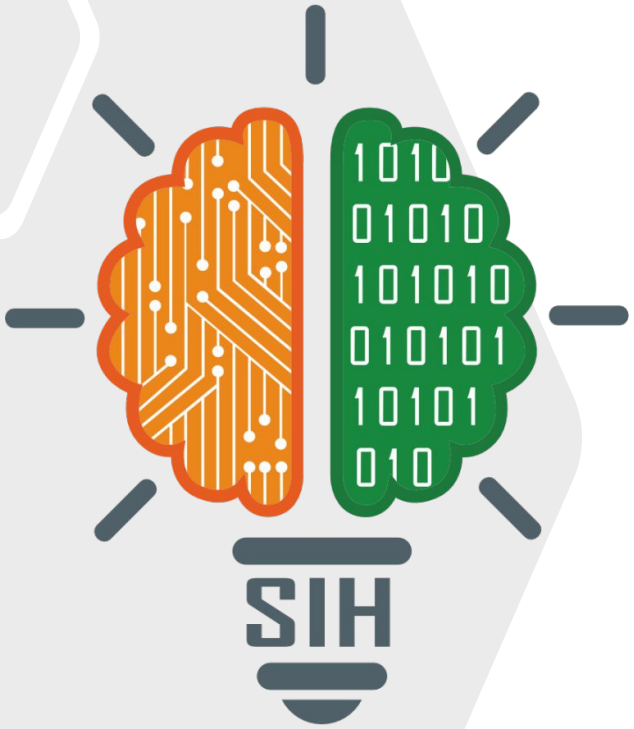
SMART INDIA HACKATHON 2025

TITLE PAGE



- **Problem Statement ID – 25040**
- **Problem Statement Title :- FloatChat – AI-Powered Conversational Interface for ARGO Ocean Data Discovery and Visualization**
- **Theme - Miscellaneous**
- **PS Category - Software**
- **Team ID -**
- **Team Name (Registered on portal) : DeepSeekers**

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IDEA TITLE

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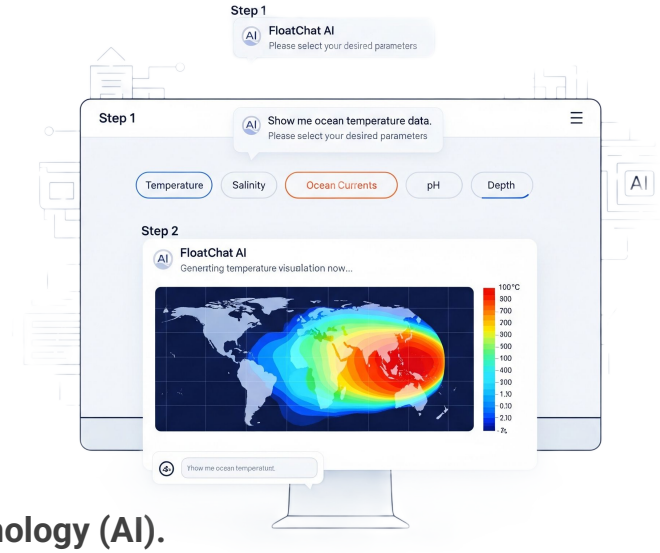
Proposed Solution (Describe your Idea/Solution/Prototype)

1. What It Is “FloatChat - AI-Powered Conversational Interface for ARGO Ocean Data Discovery and Visualization”?

A step-by-step web interface that replaces complex queries with simple button clicks. Users select a parameter (Temperature/Salinity), a region, and a timeframe to instantly generate a clear visualization.



2. How It Solves the Problem

- **Removes Technical Barriers: No need for coding or database knowledge. intuitive for anyone.**
- **Delivers Instant Insight: Transforms raw data into an understandable visual story in seconds.**
- **Guarantees Accuracy: Button-based choices ensure perfect understanding, unlike error-prone AI.**

3. Why It's Innovative

- **User-Centric Design: We innovated by focusing on the user's goal (guided discovery) rather than just the technology (AI).**
- **Conversational Without the Complexity: Provides a conversational, question-and-answer flow without the cost and hassle of building a complex AI model.**
- **Lean & Effective: Delivers 90% of the value of a full AI system with 10% of the effort and complexity—a smart, strategic first step.**

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TECHNICAL APPROACH

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Tech Stack – Smart Ocean Data Assistant

Frontend

- React.js + TailwindCSS
- Chart.js / Recharts (Data Visualization)

Backend

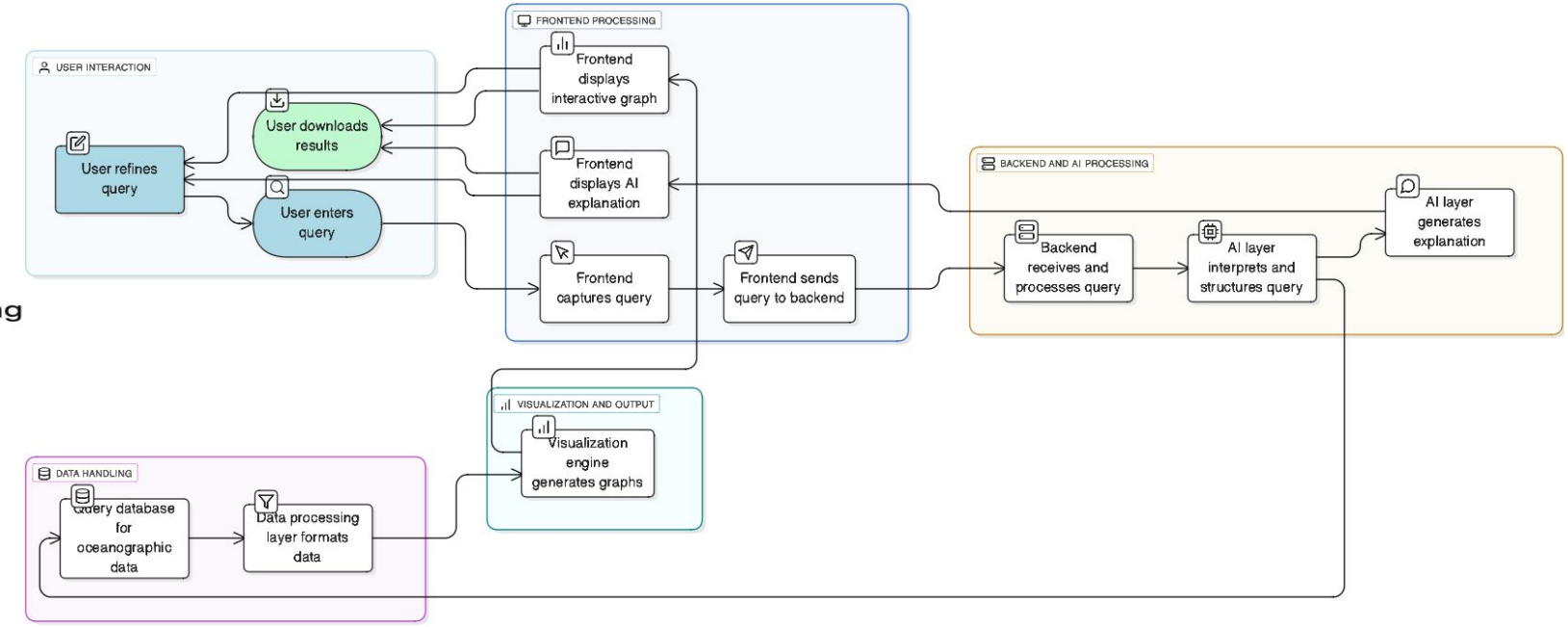
- Node.js + Express
- OpenAI API (Natural Language Q&A)
- Python (xarray, netCDF4) for `.nc` data processing

Database

- PostgreSQL / MySQL (structured data)
- OR MongoDB (flexible JSON storage)

Deployment

- Docker + GitHub
- Vercel (Frontend), Railway/AWS (Backend & DB)



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FEASIBILITY AND VIABILITY

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Feasibility & Risks

Feasibility: Highly Feasible

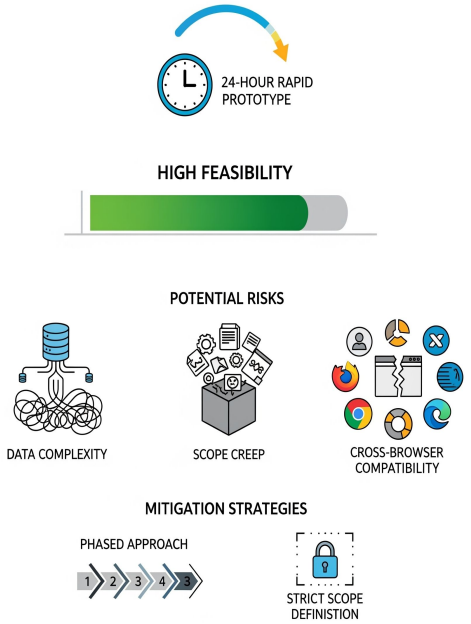
- **Proven Tech Stack**: JavaScript + Chart.js are lightweight, well-documented, and ideal for rapid visualization.
- **Stable Data Source**: Using preloaded ARGO sample data removes dependencies on unstable APIs.
- **Quick Development**: Suitable for hackathon timelines (fast setup, easy debugging).

Potential Challenges

- **Data Complexity**: Real ARGO datasets are huge, multi-variable, and harder to process in real time.
- **Scope Creep**: Temptation to expand into advanced AI, real-time integration, or extra modules may dilute focus.
- **Browser Compatibility**: Visualizations may behave differently on Chrome, Edge, and Firefox if not tested early.

Mitigation Strategies

- **Phased Approach**:
  - *Phase 1*: Controlled prototype with sample data for guaranteed reliability.
  - *Phase 2*: Integration with live ARGO API + advanced AI features.
- **Strict MVP Discipline**: Define and stick to the core features (charts + query handling) before enhancements.
- **Lean Development Practices**:
  - Use universally supported libraries (JS, Chart.js).
  - Perform cross-browser testing throughout to catch rendering issues early.



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IMPACT AND BENEFITS

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Target Audience & Impact

This tool is designed for students, educators, and early-career researchers in marine science. For them, it democratizes access to critical ocean data, removing a significant technical barrier to learning and discovery. It transforms a frustrating data retrieval process into an engaging, educational experience.

Key Benefits

- Educational (Social): Empowers the next generation of ocean scientists and informed citizens by making data exploration intuitive and accessible. Fosters data literacy and STEM engagement.
- Efficiency (Economic): Saves valuable time and resources. What used to take hours or days to manually download and plot now takes seconds, allowing researchers and students to focus on analysis and interpretation, not data wrangling.
- Awareness (Environmental): By making ocean data visually compelling and easy to understand, it can help raise public awareness about critical issues like climate change, ocean warming, and its societal impacts, potentially influencing policy and conservation efforts.

RESEARCH AND REFERENCES

Core Data Source:

- ARGO Program: The international effort that provides the foundational ocean data for this project.Link: https://argo.ucsd.edu/
- NASA sea level reports : https://climate.nasa.gov/vital-signs/sea-level/?intent=121
- Argo Global Data Repository: ftp.ifremer.fr/ifremer/argo
- Indian Argo Project: https://incois.gov.in/OON/index.jsp