SMART INDIA HACKATHON 2024

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TITLE PAGE

- **Problem Statement ID – SIH1658**
- **Problem Statement Title- Development of a versatile and fast algorithm for the optimal ship routing**
- **Theme- Transportation and Logistics**
- **PS Category- Software**
- **Team ID - 28349**
- **Team Name – Human Cyborgs**

PROPOSED SOLUTION

- We have developed a Deep Learning Model which has **less Time Complexity**
- This Model takes real time data through **API for weather**
- The Web-app consumes a very less **space complexity of only 2 GB.**
- It's a **fast running DL model** with ease access to people with zero knowledge of Machine Learning
- It shows the optimal route depending on the **type of cargo too**
- Depending on the type of cargo, vessel type and distance it **displays the fuel requirement**
- **It displays the coordinates of the route** to be followed in case of navigation compass failure

SRO(Ship Route Optimizer)

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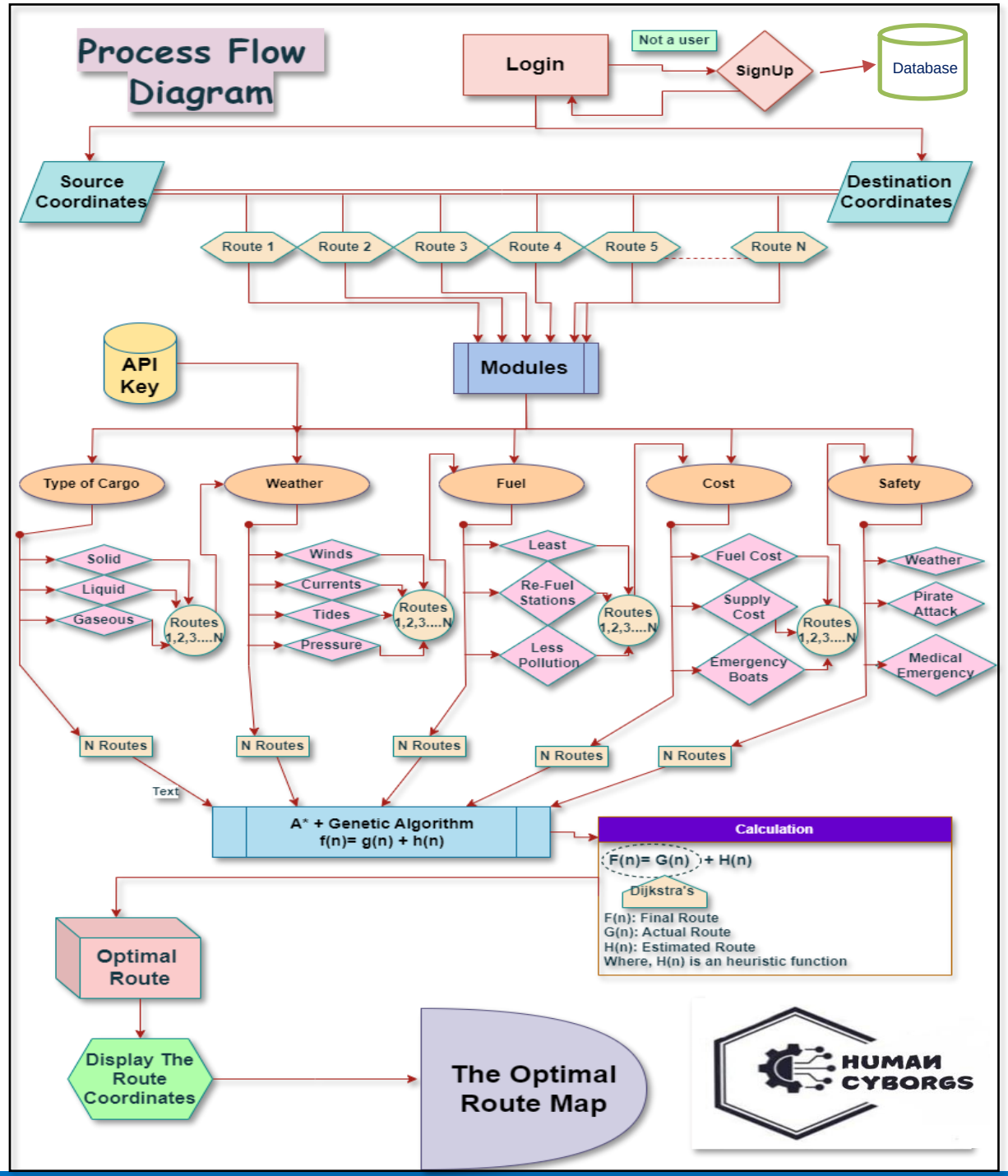

OBJECTIVES

- Developing a Model which provides a **Low fuel Consumption route**
- Follow a **Zero Carbon Emission Policy**
- Main Priority is to provide **Comfort & Safety** to passengers and crew members
- To provide a solution to the shipping industry which is **Sustainable & supports Green Technology**
- Access & Implement the **evolving weather changes**
- Making the **travel time least** by analyzing the factors like weather, fuel etc.
- Designing an algorithm which is accessible to the **public** with **less time complexity** and ease of access.
- Ensuring the route in such a way that it provides **No Vessel Damage** moto.

ADDITIONAL FEATURES

- An external feature is added in case of no network a simple **Map color reader** is embedded in the algorithm, which will give the result just by reading colors of them MAP
- As its difficult to check software internal calculations manually we have an embedded feature which **shows the Results of the Internal Algorithmic Calculation.**
- **AI Assistance,** we have added a ChatBot for navigating through the webapp
- Identifies **Ship Traffic** in nearby regions

TECHNICAL APPROACH

HUMAN CYBORGS

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Technology Stack

{json} pandas NumPy HTML CSS JS PyTorch Python GeoPy Matplotlib Java

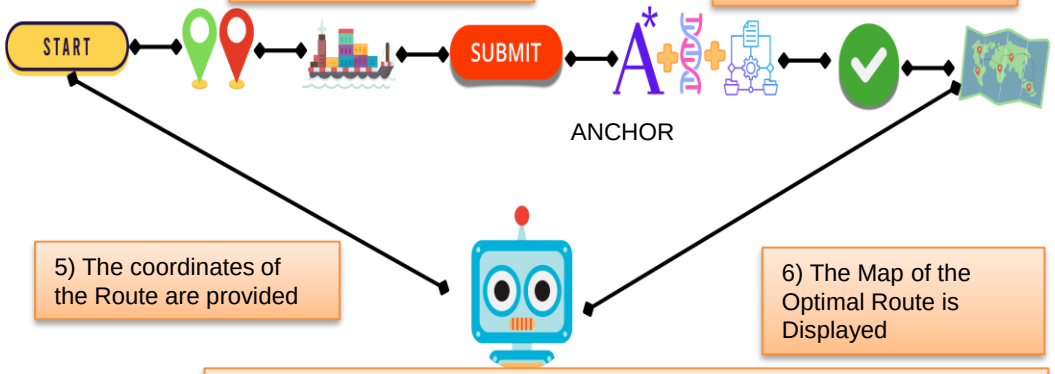
Simple Demonstration of working of the Model

1) Enter Source & Destination Coordinates

2) Enter the type of Cargo or select Passengers

3) Submit the details

4) Machine Learning algorithms A8, Genetic & Dijkstra's are implemented



5) The coordinates of the Route are provided

6) The Map of the Optimal Route is Displayed

For any assistance we have provided a ChatBot

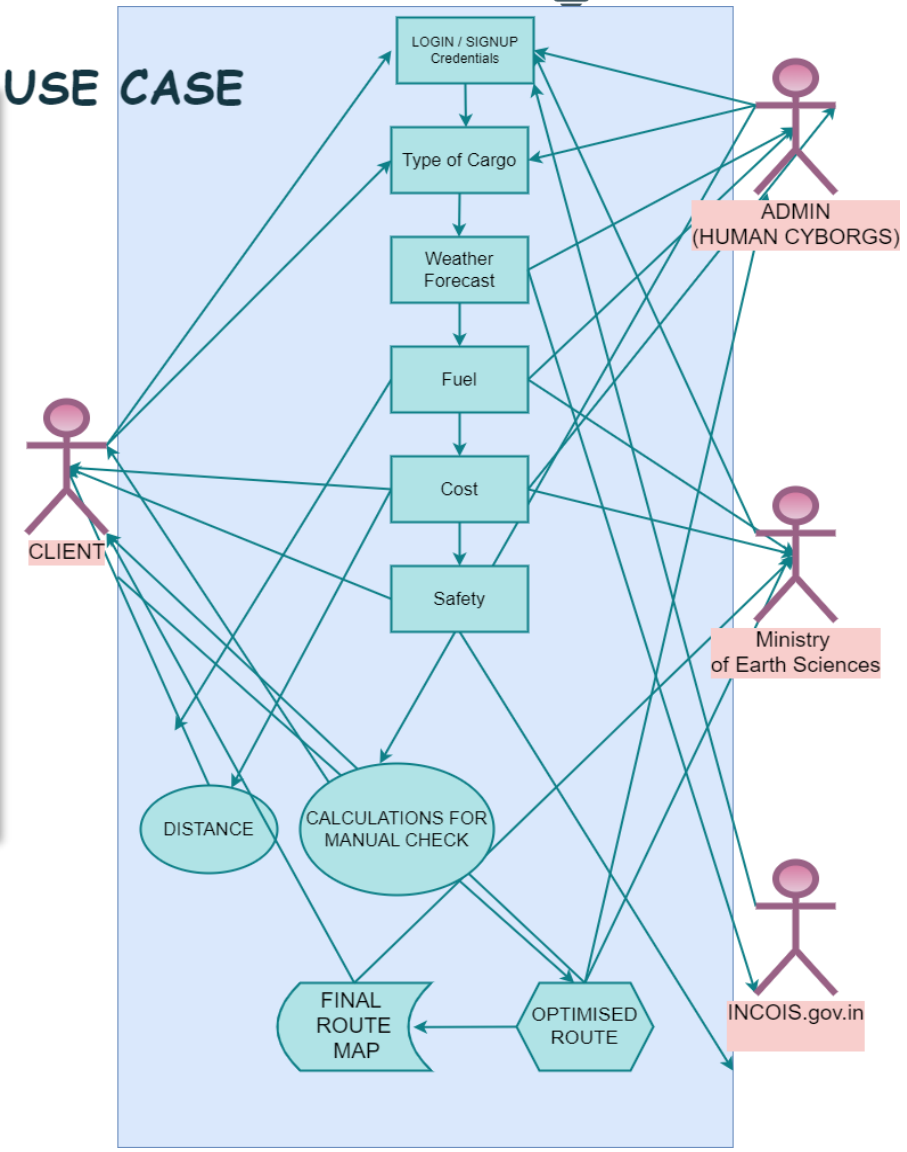
Stakeholders

INCOIS
ESSO- Indian National Centre for Ocean Information Services

पृथ्वी विज्ञान मंत्रालय
Ministry of Earth Sciences
सत्यमेव जयते

सत्यमेव जयते
पत्तन, पोत परिवहन एवं जलमार्ग मंत्रालय
MINISTRY OF PORTS, SHIPPING AND WATERWAYS

USE CASE



FEASIBILITY AND VIABILITY

Feasibility Analysis:

- Technical Feasibility: Takes up **low RAM** space
- Financial Feasibility: It's a simple Webapp using API thus, **no much costing**
- Market Value: The product being developed at low cost and the **requirement being more than 90%** has a huge market scale.
- The USP of our product makes **it stand & Sustain in the market for long**

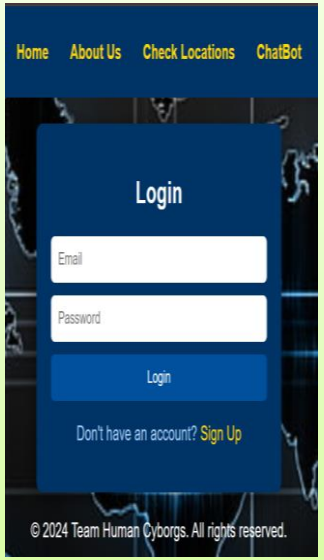
Potential Challenges and Risks:

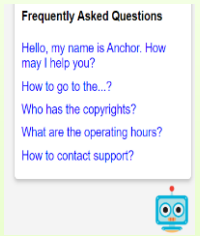
- **Data Availability:** The evolving weather data should be available easily for further proceedings
- **Network/ Internet:** If a problem occurs regarding the signal then a risk occurs
- **Google Earth API:** At present we don't have a system which tracks the location of the client but, if we get more support through the Ministry we can acquire the real time data through Google Cloud for developers
- **Increasing Database:** As the database will be increasing we'll require a good backend system for ensuring safe & prompt storage of client data

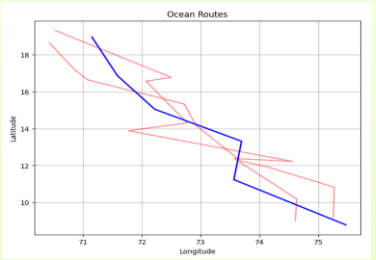
Strategies for Overcoming Challenges:

- To overcome the problem of data availability regarding weather we can add another **API of renowned weather forecasting institutions**
- The Network problem is already resolved with the help of **MAP Color Reader** and we plan to **add one more such feature** too.
- As soon as we get Google Earth API accessing the coordinates would be much easier, though we have **already added a link to find the current coordinates** of the user
- **Database is easily expandable**, old data is auto deleted after a certain time period creating more space.

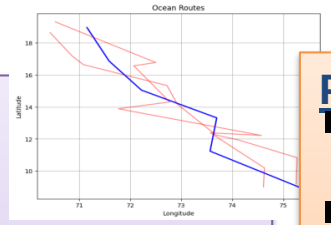
PROTOTYPE







IMPACT AND BENEFITS



Our USP:

- **Space complexity of only 2 GB**
- **Zero carbon emission policy**
- **Internal Algorithmic Calculation for manual checks which NAVTOR lacks**
- **Map Colour Reader which helps in emergencies or turbulence**
- **Ease of access to local public(e.g.- Fishermen)**
- **Low Cost software**
- **Graphical Representation of coordinates**
- **Ship Traffic in nearby Locations**

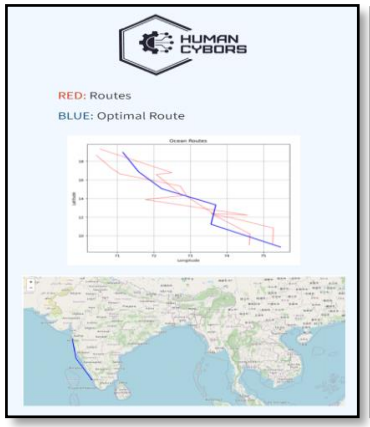
Potential Impact:

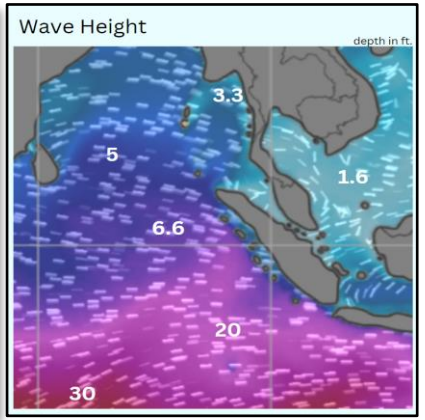
- **Shipping Industry:** The whole shipping industry relies on Navigation systems, thus this software will definitely create a huge impact for their traversals
- **Regulatory Functioning Bodies:** The Fishermen, Sailors will have a great solution for deciding their travel routes
- **Port In charges:** The Port authorities can use this for avoid ocean traffic
- **Client:** The client being our biggest buyer, will help them to easily navigate through the vast ocean & seas
- **Environmental:** The Environment preserving agencies will have a huge impact because of the zero carbon emission policy

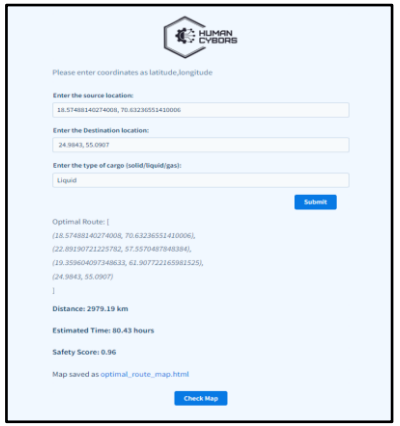
Our Project is built in such a way that in case of any challenges occur the Team Human Cyborgs can easily identify, resolve and provide a versatile solution to it, thus ensuring assurance and honesty towards the Client

Benefits of the Proposed Solution:

- **Less Reliability** on anyone for deciding navigational path
- Socially **made for good cause** for safety of human kind
- **Financially at low risk** as it stands in a never ending market
- Technically at ease due to **simple implementation** while performing a complex task
- **Environment friendly** approach makes our solution a big hit
- **Transparency** of the webapp ensures smooth usage for the sailor







RESEARCH AND REFERENCES

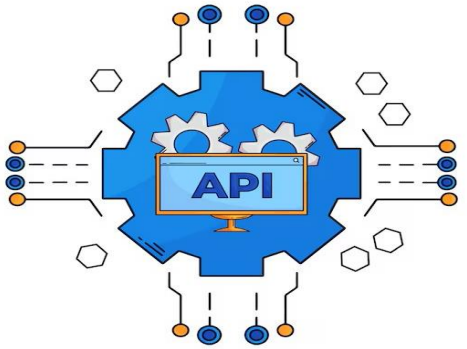
RESEARCH PAPER JOURNAL	NAME OF THE PAPER	NAME OF THE AUTHOR
IEEE Explore	**Ship weather routing based on grid system and modified genetic algorithm**	Peng Zhou; Hongbo Wang; Zhiying Guan
IEEE Explore	**Research on Ship Weather Routing Method Based on Dijkstra Algorithm and Neural Network**	Khanh Doan Huu
ELSEVIER	**A comprehensive ship weather routing system using CMEMS products and A* algorithm**	Manel Grifoll , Clara Bor´en, Marcella Castells-Sanabra
Research Gate	**The Ship-Routing Optimization Based on the Three-Dimensional Modified Isochrone Method**	Yu-Hsien Lin

References:

- Real Time App:

1) NAVTOR
2) Polaris

- Took real time problems faced data from Merchant Navy Captain



CONCLUSION: In conclusion, we propose that we meet the requirements of the client and always ready to provide extra features and services to serve the client fully.