FATHOMS OF FUTURE
FEB 20 - FEB 23 kurukshetra 2025™
The Battle of Brains
An International Techno - Management Fest

UNDERWATER ROBOTICS

"Dive Into Innovation,
Shape The Future Beneath The Waves!"

CEG Tech Forum
An ISO 9001:2015 certified organisation

TEAM NAME : AQUAVISION 14.1

AquaVision
TECHNOLOGIES

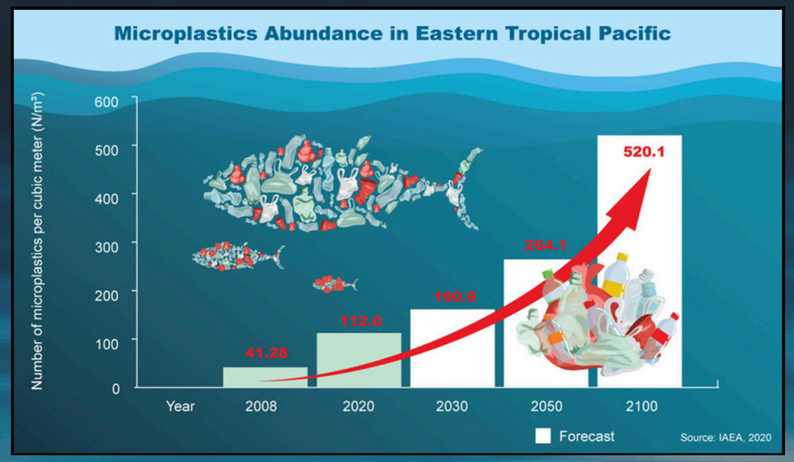
TITLE : AquaVision - Smart AUV for Microplastic Detection Using AI and 3D Simulations

TEAM DETAILS

S.NO	NAME	INSTITUTION	K-ID	PHONE NO.	ROLE
1.	UDAYA M R	SAIRAM	K2501686	99420 03192	Project Lead & Hardware Developer
2.	FREDDY SAMJACOB V	SAIRAM	K2501693	93601 26618	Simulation & Software System Engineer, Modelling
3.	PRIYANKA S	SAIRAM	K2501688	824 875 6885	Communication Engineer &Marketing Outreach
4.	RAGHUL D	SAIRAM	K2501712	72003 29651	Data Analyst & Validation Specialist

PROBLEM STATEMENT

- **Microplastics** - particles < 5mm , pose severe threats to marine biodiversity and human health.
- India generates **9.46 million tons of plastic waste** annually - reported by the Central Pollution Control Board **(CPCB)** in 2023.
- Existing technologies fail to provide scalable, real-time solutions.
- Urgent need for an autonomous, efficient and cost-effective system to detect and map microplastics accurately.



PROPOSED SOLUTION

Development of AquaVision 14.1 - an Autonomous Underwater Vehicle (AUV) equipped with:

- High-resolution cameras for microplastic detection.
- AI-driven algorithms for real-time analysis and segmentation.
- Laser-based underwater communication for data transfer.
- 3D modeling for optimized structural and functional design.
- The system aligns with UNESCO's SDG 14.1 to combat marine pollution.

14 LIFE BELOW WATER

TECH STACK

MODELLING

DESIGN

SIMULATION

PHYSICS

DASHBOARD

FRONTEND

UI

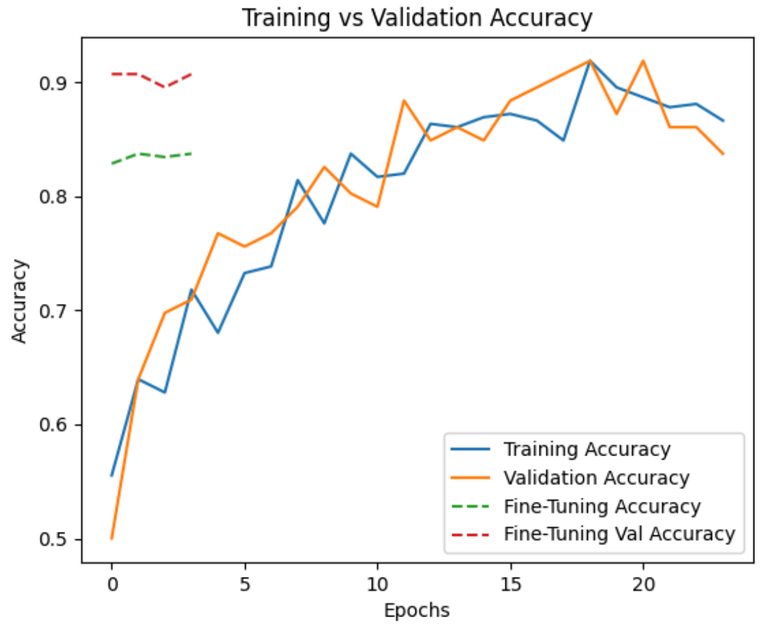
BACKEND

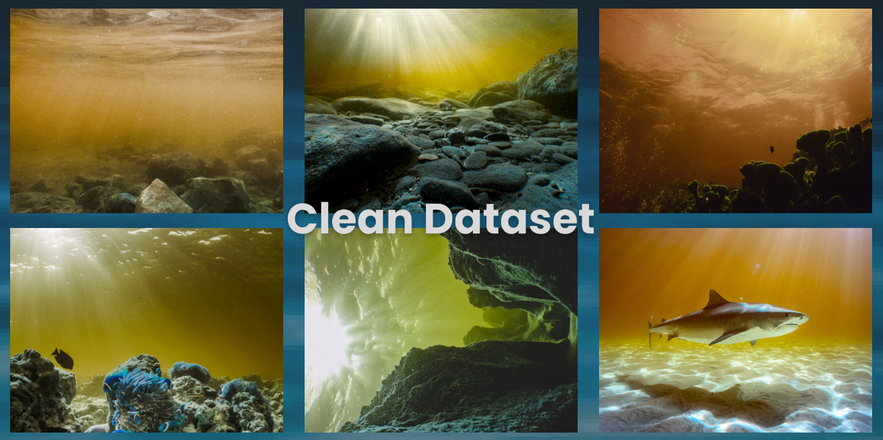
SERVER

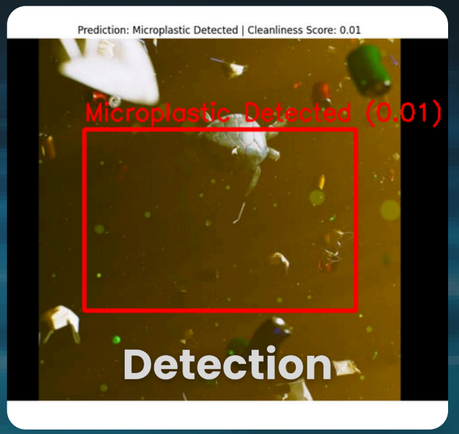
ML

MICROPLASTIC DETECTION

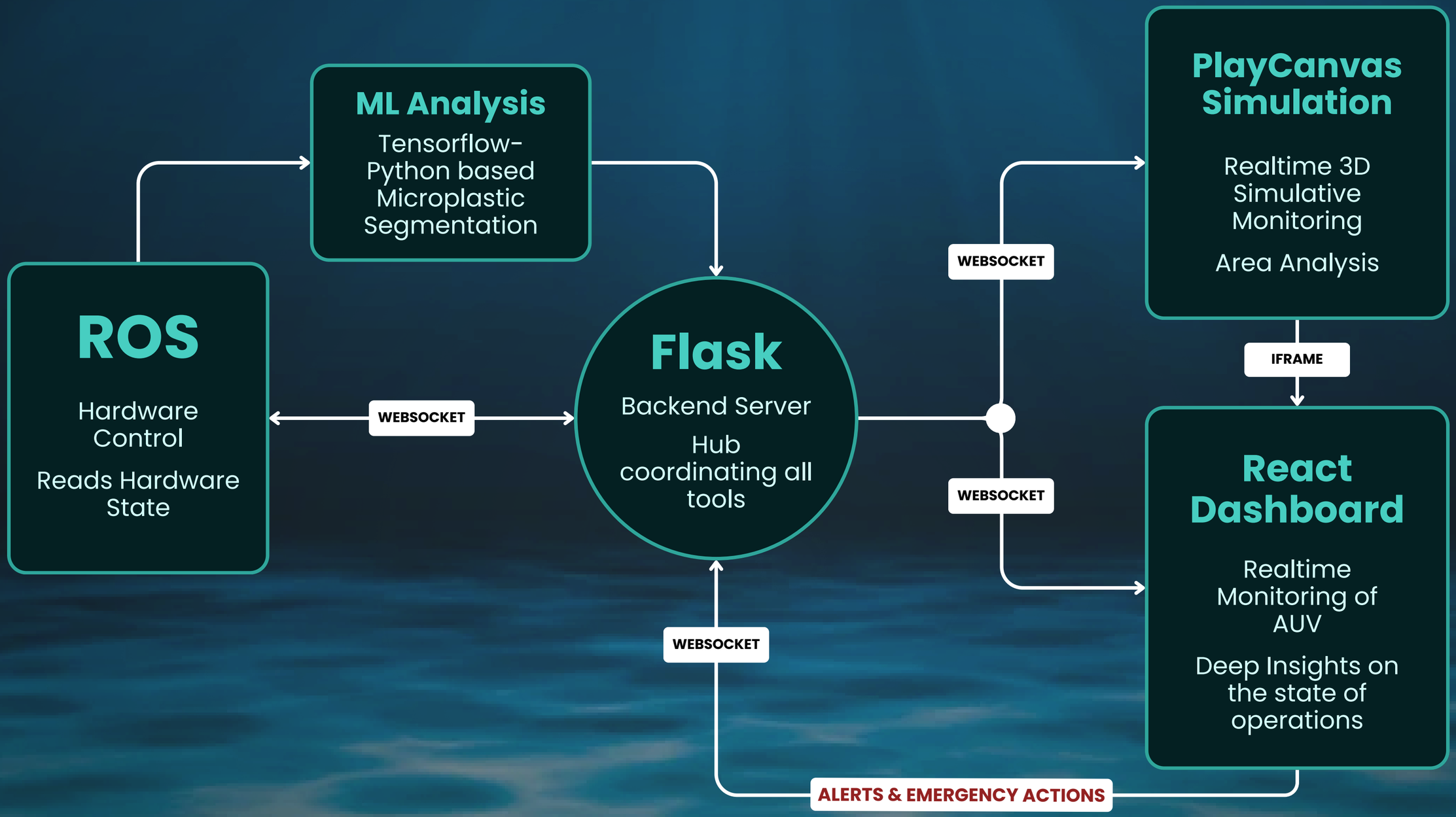
Training Behaviours



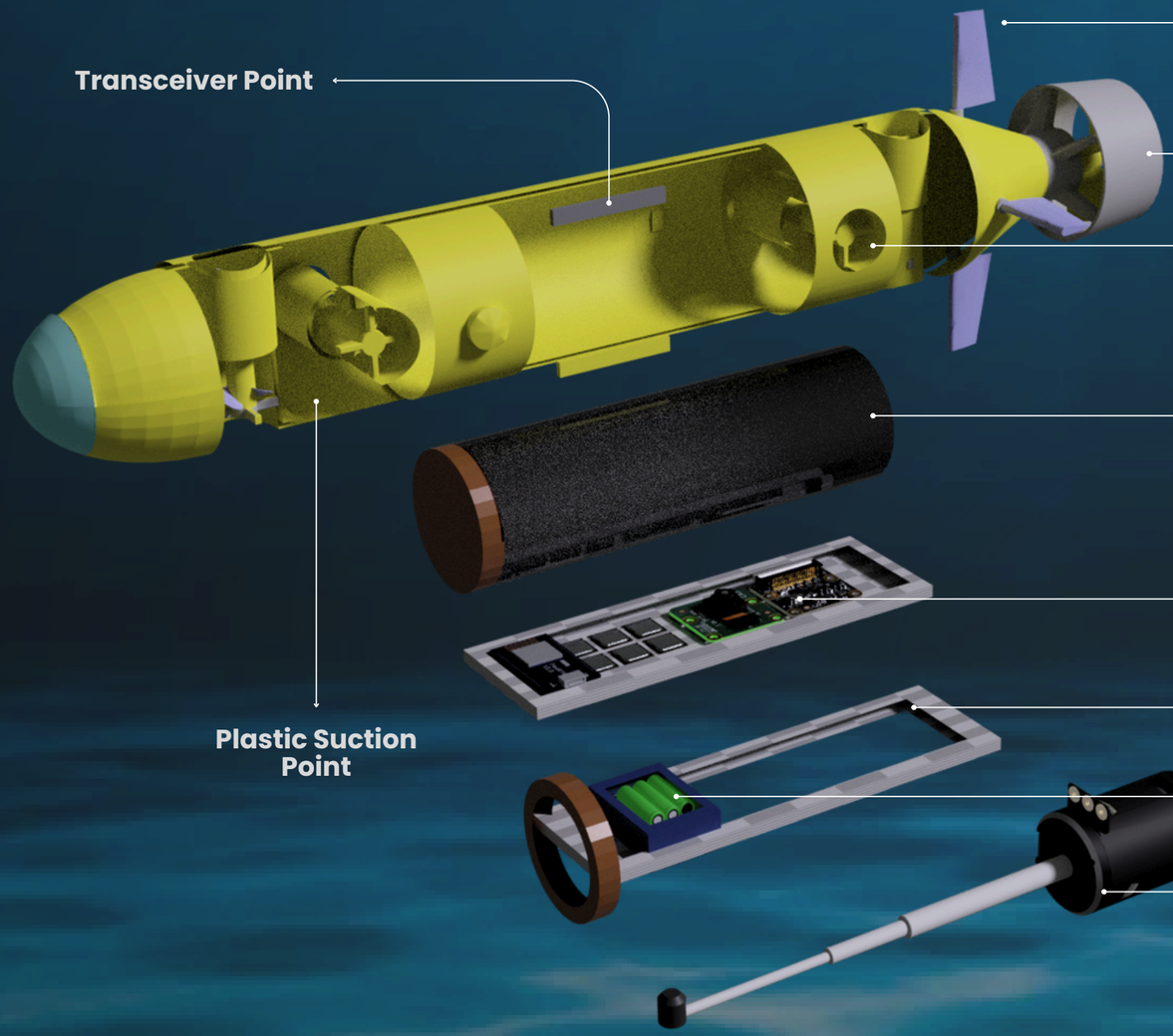


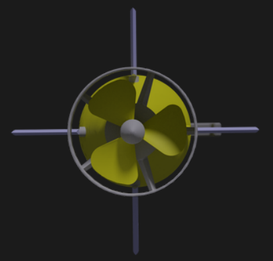


METHODOLOGY

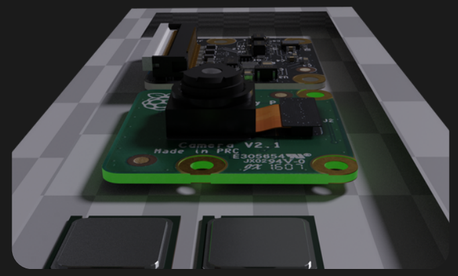


AUV STRUCTURE

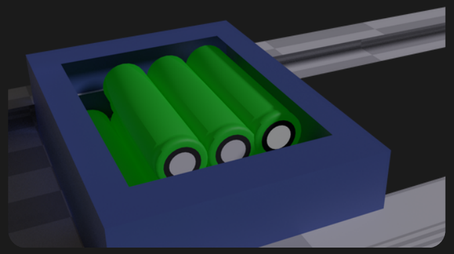




Smart Thrusters

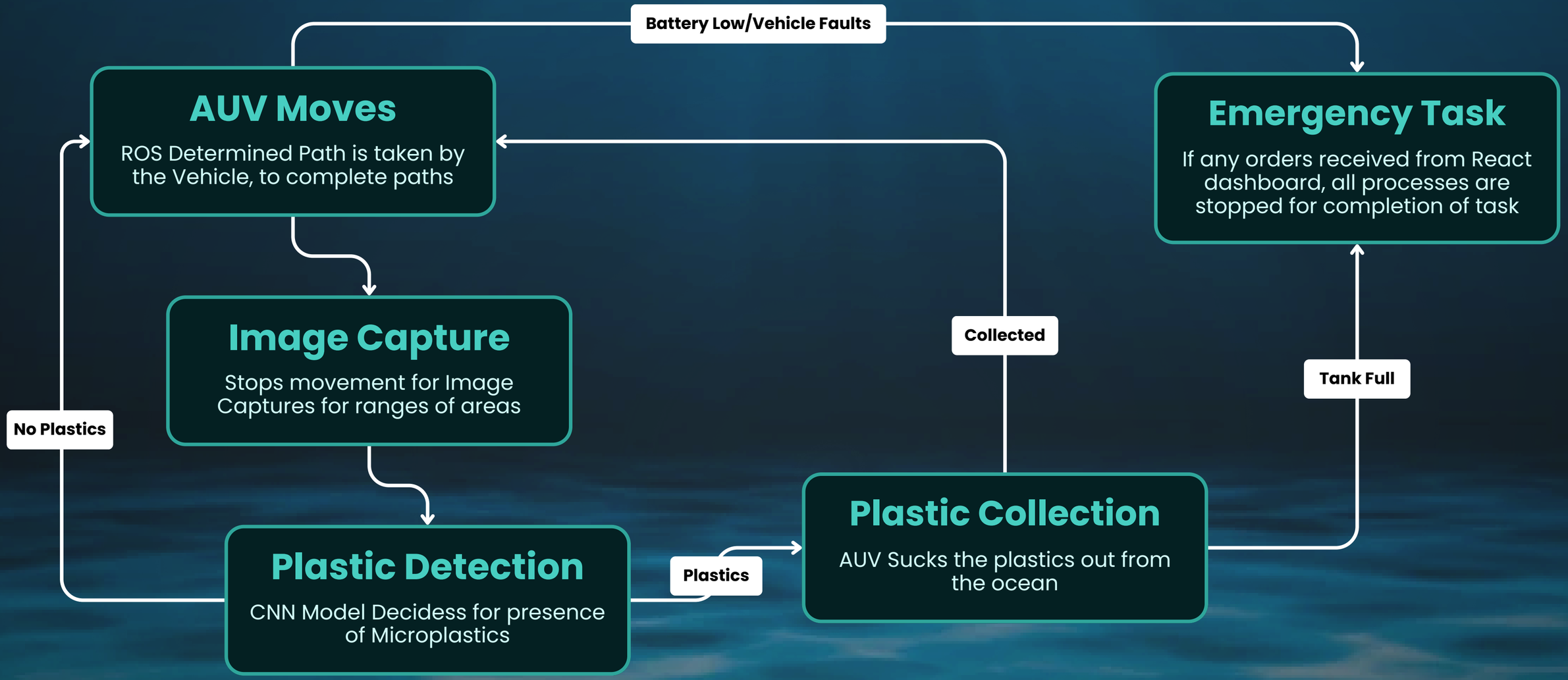


Edge Computing

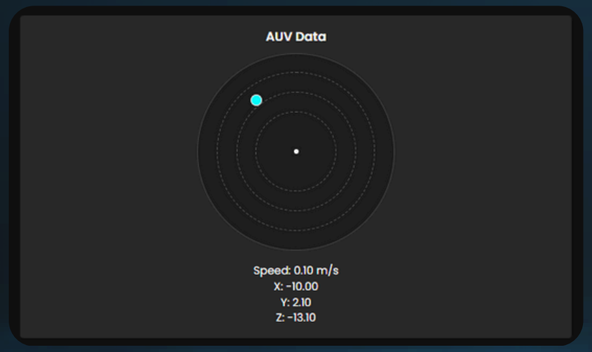


Modular Power

AUV METHODOLOGY

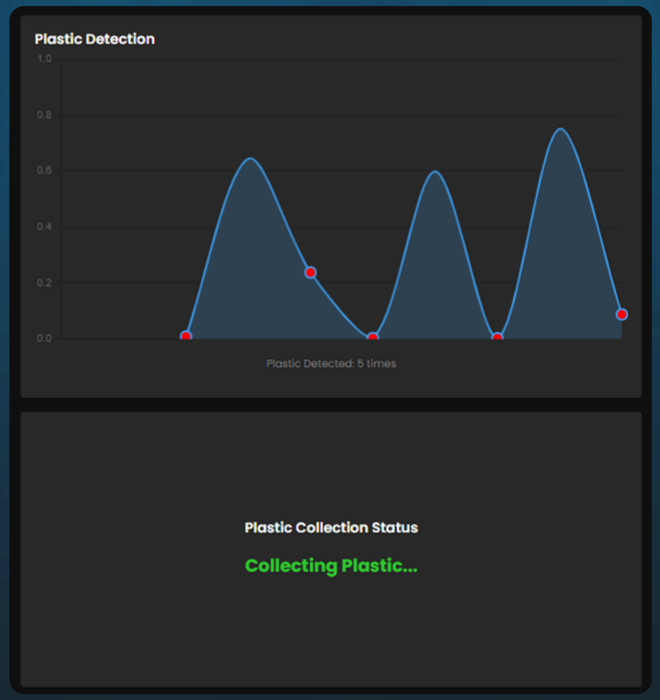


DASHBOARD

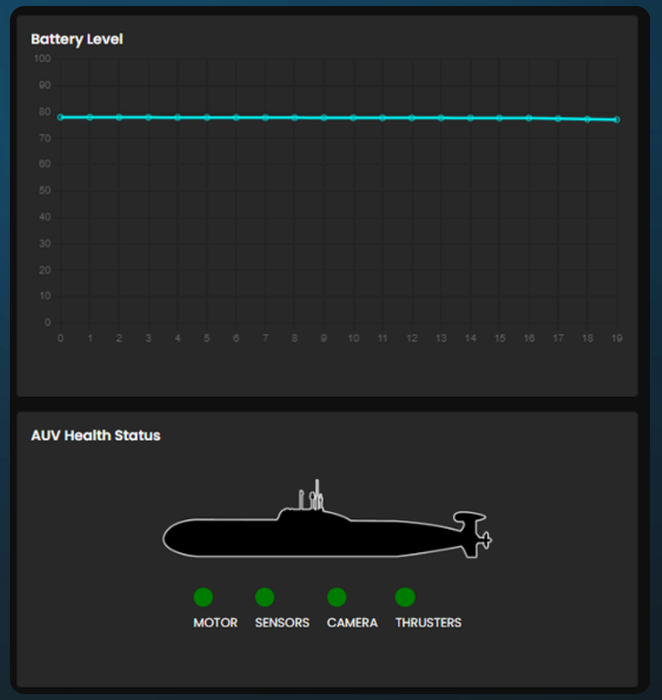


Positional Monitoring

Depth Observation



Plastic Detection & Collection



AUV Health & Battery Monitoring

CTA | Seek Shore | Emergency Alert | Tank Clearance | Battery Swap

Vite

LIMITATIONS

- The AUV's battery drains quickly, especially during plastic collection, limiting operational time before recharging.
- Sensors degrade faster due to continuous underwater exposure, reducing detection accuracy over time.
- Environmental factors like water turbidity and lighting affect plastic detection, leading to false positives or missed detections.

REFERENCES

[1] Sarker, M. A. B., Butt, U., Imtiaz, M. H., & Baki, A. B. (2023, March). Automatic Detection of Microplastics in the Aqueous Environment. In 2023 IEEE 13th Annual Computing and Communication Workshop and Conference(CCWC) (pp. 0768-0772). IEEE.

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DEMO VIDEO: (FOR HARDWARE & SOFTWARE TEAMS)

VIDEO LINK

https://drive.google.com/file/d/14ZD37QE_rZPI-jljAbuLHdM_Jqw3O8J3/view