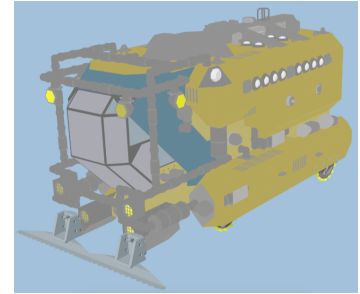


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Introducing the Sea Scrubber

Invest in the Future of Marine Maintenance

1. Executive Summary

We are seeking investment for a groundbreaking autonomous marine cleaning system that addresses the critical challenges of biofouling, corrosion, and escalating labor costs in the maritime industry. Our innovative solution integrates modular cleaning attachments, built-in water filtration, and advanced automated navigation, setting a new standard for efficiency, environmental responsibility, and cost-effectiveness. Drawing inspiration from patented technologies (US7971547B1 and US20240375290A1), our system offers a compelling competitive advantage in a rapidly expanding global market valued at \$35.72 billion in 2023, with significant segments in offshore inspection, repair, and maintenance (\$14.8 billion) and oil rig maintenance (\$3.74 billion). Unlike existing solutions, our fully autonomous, multi-tool, closed-loop filtration system provides a superior return on investment and a sustainable future for marine infrastructure.

2. Introduction: The \$35.72 Billion Problem

Marine maintenance is an indispensable part of sustaining operational efficiency and safety in maritime industries. However, current practices are fraught with challenges:

- **Biofouling Epidemic:** The relentless accumulation of marine organisms significantly increases drag, leading to a 20-30% rise in fuel consumption for ships. This translates to enormous operational costs and a larger carbon footprint.
- **Costly & Risky Manual Labor:** Traditional methods rely heavily on human divers and large, often clumsy, Remotely Operated Vehicles (ROVs). These approaches are expensive, hazardous, prone to human error, and severely limited by environmental conditions and dive times.
- **Environmental Degradation:** Most current robotic solutions lack integrated filtration, releasing pollutants and removing biofouling directly back into the marine environment, posing long-term ecological risks.
- **Limited Versatility:** Existing systems often employ a single cleaning tool, failing to address the diverse types of fouling found on various submerged surfaces.

During the early stages of our research, we identified these core issues through industry reports and analysis of current maintenance practices. This recognition led us to develop a concept that is manageable, adaptable, and sustainable: an autonomous, modular marine cleaning robot that operates on various submerged surfaces using suction-based locomotion, combining the versatility of existing modular tooling with an internal filtration mechanism.

3. Background and Patent Research: A Hybrid Advantage

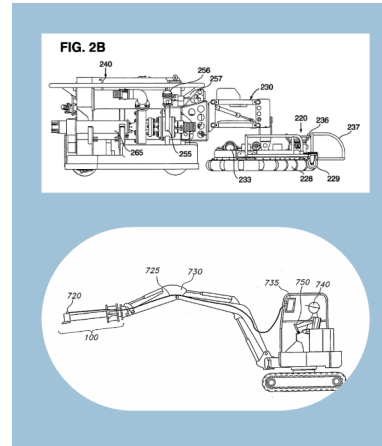
The growing demand for reliable and eco-friendly maintenance solutions in the maritime sector prompted us to investigate existing technologies and intellectual property. Through extensive research, we identified two pivotal patents that significantly influenced our design:

- **US7971547B1:** This patent outlines a marine cleaning system equipped with an integrated water filtration mechanism, effectively separating solid waste and contaminants from

cleaning discharge before reintroducing the water into the environment. This directly addresses a major environmental concern.

- US20240375290A1: This patent introduces a modular robotic cleaning system with interchangeable tool heads at the end of its lever arm, such as scrapers and brushes.

By strategically combining the core components of both patents, we have engineered a hybrid design that leverages the built-in, closed-loop filtration of US7971547B1 with the flexible tool attachment system of US20240375290A1. This synergistic approach directly responds to the needs of a rapidly growing market. Our design is strategically positioned to capitalize on these markets by offering a cleaner, safer, and more efficient alternative to current technologies.



4. Review of Existing Solutions: Why We Are Superior

While several companies offer robotics-based cleaning systems, they all have critical shortcomings that our solution addresses:

- Lack of True Autonomy: Most competitors, such as KeelCrab Pro, require constant human operation (ROVs), leading to additional labor costs and potential human error in cleaning quality. Even solutions like Greensea IQ, while autonomous, primarily offer a service model, not a transferable unit with our level of environmental commitment. Our fully autonomous operating system eliminates human labor, making it more efficient, cost-effective, and less prone to error.
- Environmental Neglect: Crucially, most competing devices, including services like Greensea IQ and units like KeelCrab Pro, do not utilize built-in filtration systems. This

means pollutants and waste material are discharged directly back into the water, posing long-term ecological risks, especially in sensitive marine environments. Our closed-loop filtration system is a game-changer for environmental responsibility.

- **Limited Versatility and Adaptability:** Most competing devices rely on a single cleaning tool (e.g., rotary brush or pressure washer), limiting their ability to tackle diverse fouling types effectively. For instance, while KeelCrab Pro offers some interchangeable brushes, they lack the specialized array we provide. In contrast, our proposed system employs a modular tool system with interchangeable attachments—a barnacle scraper, soft algae brush, and polishing pad—enabling comprehensive cleaning across a wide range of surfaces and fouling conditions.

Furthermore, direct human intervention via divers, a dominant force in the market, presents significant drawbacks: longer cleaning times, refusal to operate under dangerous conditions, and high employment costs. As

COMPETITORS



	Autonomous	Filtration	Multiple Tools
KeelCrab Pro	X	X	X
Hullbot	✓	X	X
NakAI	✓	X	X
GreenoalQ	✓	X	X
Fleet Robotics	X	✓	X
Tas Global	X	✓	✓
Sea Scrubber	✓	✓	✓

technology advances, the reliance on human divers for large-scale marine maintenance is poised to decline, creating a vast market opportunity for our robotic solution.

5. System Architecture and Workflow: Intelligent Cleaning in Action

The core of our proposed solution is an autonomous cleaning robot designed specifically for efficient and environmentally responsible underwater operation.

- **Intelligent Navigation:** Equipped with a sophisticated software-based mapping system, the device can autonomously navigate complex surfaces, including ship hulls, offshore platforms, industrial pipelines, and oil rigs. Our 3D mapping software generates a detailed model of the surface, ensuring streamlined and efficient cleaning paths. Users can also program specific cleaning paths for customized operations.
- **Multi-Layered Cleaning:** The system features a base cleaning layer, such as a durable cloth or brush, that performs general surface cleaning as the robot moves.
- **Modular Tool Interface:** Attached to the front of the robot is a modular tool interface, allowing for the quick and easy attachment of specialized cleaning tools tailored to the job:

- A Scraper for effectively removing hardened barnacles.
- A soft brush for algae and sediment.
- An optional high-pressure water jet for stubborn grime.
- A polishing pad for delicate surfaces and finishing touches.

- [Functional Demo Here.](#)

- **Closed-Loop Filtration:** All debris removed during cleaning is immediately suctioned into the unit and passed through our internal, multi-stage filtration system. This system captures solid waste and filters the water before it is discharged. This closed-loop process ensures that no pollutants are returned to the marine environment, setting a new industry standard for ecological responsibility.



- Lastly, the robot uses suction-based treads or pads to grip and climb surfaces, allowing it to clean both vertical and horizontal structures with ease.

Combined, these features deliver a self-sufficient, intelligent system optimized for both performance and environmental compliance, providing a truly comprehensive solution.

6. Commercialization Strategy: A Multi-Channel Approach to Market Domination

Bringing this system to market will involve a phased development approach, leading to a full-scale commercial rollout designed for rapid market penetration and sustained growth.

- **Phased Development:** We will begin with prototype design, followed by rigorous field tests in controlled environments such as marinas and shipyards. Based on extensive feedback and performance metrics, the product will be refined for scalable mass production.
- **Flexible Sales Models:** To ensure accessibility across various market segments and maximize revenue streams, we plan to offer the product through multiple sales and service models:
 - **Direct Equipment Sales:** To shipping companies, offshore operators, and other large marine infrastructure owners, enabling them to integrate the technology directly into their maintenance operations. Based on our competitors and early price estimates, a single Sea Scrubber unit would cost from 10-15k, without any additional tool packages. Compared to more traditional methods of cleaning, at an estimated 10k/month/ship, the Sea Scrubber would pay itself off relatively quickly.
 - **Service Contracts:** For organizations that prefer routine maintenance without the capital expenditure of purchasing hardware, we can offer the Sea Scrubber as a service rather than a singular product, providing a recurring revenue stream.

GreenSea IQ's EverClean robot service is estimated at 15k/ship/month. Based on our price estimates of a Sea Scrubber unit, we would be able to undercut the market significantly

- Modular Kits: For clients seeking customizable tool configurations, allowing them to tailor the system to their specific needs.
- Attachment Sales: The interchangeable cleaning attachments will be available both individually and as bundled sets, offering continuous revenue generation and customization options.
- Strategic Distribution: Our distribution will focus on established maritime suppliers, participation in key industry events, and direct business-to-business outreach campaigns.

This multi-channel approach ensures scalability while meeting a diverse range of customer demands, positioning us to become the leading provider of autonomous marine cleaning solutions.

7. Case Studies: Unlocking Value Across Industries

The adaptability and efficiency of our system lend themselves to a variety of high-impact real-world applications:

- Commercial Shipping: Our device can autonomously clean ship hulls while vessels are docked, significantly reducing drag, improving fuel efficiency, and minimizing dry-docking frequency, directly impacting operational costs.
- Offshore Energy: On oil rigs, where traditional cleaning involves significant safety risks and costs, our system can clean vertical legs, support structures, and underwater platforms without human intervention, enhancing worker safety and operational uptime.

- Tour Boats and Passenger Ferries: In high-traffic tourist areas, these vessels benefit from the aesthetic and environmental improvements provided by routine automated cleaning, enhancing passenger experience and brand image.
- Marine Research Stations: Our device can maintain transparent acrylic surfaces or data-gathering sensors in underwater observatories or deep-sea labs, ensuring uninterrupted operation and data integrity.
- Marine Wastewater Treatment Plants: This represents a significant and under-served market. These facilities rely on submerged infrastructure such as tanks, screens, and intake pipes that require regular cleaning to prevent clogs and maintain flow efficiency. Biofouling in these systems can compromise both treatment quality and system longevity. Our system can be deployed within treatment vessels and underwater piping to perform scheduled cleanings autonomously, reducing maintenance downtime and improving operational hygiene. This directly aligns with the growing focus on environmental sustainability in water treatment infrastructure.
- Other Potential Applications: Reservoirs, oil spill remediation, and food processing plants present further opportunities for market expansion.

8. Development Timeline: A Clear Path to Market

Our well-defined development roadmap ensures timely execution and market readiness:

- Q1 of Year 1 – Research and Conceptualization: Finalize problem definition, conduct patent analysis, and complete market research. (Completed)
- Q2–Q3 of Year 1 – Prototype Design: Develop CAD models, select materials, and build a functional prototype.

- Q4 of Year 1–Q1 Year 2 – Field Testing and Iteration: Conduct real-world tests in controlled environments; gather feedback for design refinements.
- Q2 Year 2 – Manufacturing Setup: Establish partnerships with vendors, begin manufacturing processes, and implement quality assurance protocols.
- Q3 Year 2– Commercial Launch: Introduce the product to pilot clients, gather testimonials, and begin marketing efforts.
- Q4 Year 2– Market Expansion: Launch global distribution, expand to new sectors such as wastewater treatment, and begin modular system upgrades.

9. Conclusion: Redefining Marine Maintenance for a Sustainable Future

This presentation has outlined a comprehensive solution to the longstanding challenges in marine maintenance by introducing an autonomous cleaning robot that is both environmentally responsible and operationally efficient. By combining modular tooling, integrated water filtration, and advanced autonomous mobility, the system represents a significant leap forward in sustainable marine infrastructure care.

From ship hulls to marine treatment plants, the potential applications are wide-ranging and impactful. Our vision is to redefine how marine maintenance is performed—making it safer, smarter, more cost-effective, and crucially, more sustainable for industries across the globe.

We are confident that the Sea Scrubber will not only disrupt the existing marine maintenance market but also drive significant returns for our investors by addressing critical industry needs with a truly innovative and responsible solution. Invest in the Sea Scrubber – where innovation meets impact.

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