

Wireless Oil Skimmer System Based on IOT

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ABSTRACT

Oil is extracted from an aqua-oil mixture using an oil skimmer. It contaminates coastal areas and puts aquatic life at jeopardy by generating an extremely acidic, alkaline, and salty environment. 706 million gallons of used oil find their way into rivers annually, polluting them. Seawater has been tainted by oil spills, harming marine life. Therefore, we propose creating a small boat that may be used as an oil skimmer to remove oil from water.

When a group of these little boats cooperate, spilled oil may be cleaned up and recovered. With two rudders and a DC motor-powered system, the boat is operated by the operator via a remote control. An oil skimmer device on the boat separates oil from water and gathers.

Keyword: Oil is extracted, 706 million gallons, DC motor-powered system, remote control,

1. INTRODUCTION

One major cause for concern in the modern world is pollution. The main global cause of water contamination is oil and oil spills. Therefore, in order to avoid contamination, our objective is to develop technology that separates oil from water. Therefore, it is essential to collect, dispose of, and store oil properly. Oil-containing wastewater, particularly from the petrochemical and process industries, is subject to stringent regulations in many countries. As a result, these businesses must construct oil skimmers or skimmers to extract the oils from the wastewater.

Specialized boats called oil skimmers or skimmers are used to collect oil that has spilled. The ultimate goal of every oil recovery endeavor is to extract the maximum amount of oil that is both economically and reasonably feasible.

A skimmer is a mechanical tool used to remove oil (or an oil/water mixture) from the water's surface while keeping the water's chemical and/or physical characteristics intact. Skimmers are operated by the fluidity properties of oil and oil/water mixtures, density differences between oil or oil/water mixtures and water, or variations in material adherence.

These technologies are applied in industrial settings, such as removing oil from machine tool coolants and aqueous parts washers, but they are mostly employed for cleaning up oil spills. In order to comply with environmental discharge standards, they are often required to remove oils, greases, and fats prior to further treatment.

By eliminating the top layer of oils, it is possible to reduce water stagnation, odor, and unsightly surface scum. If put in front of an oily water treatment system, it may boost the effectiveness of oil separation and improve wastewater quality. It is important to remember that all oil skimmers will collect some

water along with the oil; this water needs to be decanted in order to obtain concentrated oil. Two severe oil spills that occurred recently in Mumbai near the coast have had an impact on the majority of the local aquatic life. This leak also damaged tourism and fishing. These kinds of oil spills have significant negative environmental effects because they are currently a worldwide issue. Millions of US gallons of oil spill each year. This is the equivalent of 100 large-format gymnasiums. But because there are so many of these oil spills, the figures could not accurately reflect the damage they actually inflict to the ecosystem. Therefore, there must be a practical method for removing this oil from the surface without wasting it. Oil skimmers are now used in industry to separate oil from other materials like coolant and water. There are several ways to do this, the most popular being the disk type oil skimmer. This is a result of its extremely high efficiency roughly 90–95% and straightforward operation.



Fig.no.1–Structure of wireless oil skimmer.

2. METHODOLOGY-

Review of the Literature and Theoretical computations A thorough review of the literature will be done at this step. It entails gathering books from a variety of accessible sources. We will study the necessary theoretical foundation required to comprehend how the box shifting mechanism works and the technologies that will be used in it. It is also necessary to study motor power, torque, and tractive effort calculations.

System Design: Controller Design and Prototype Development It is necessary to design and create safety circuits in addition to the electric circuit from battery to motor. A prototype will be created and constructed in accordance with the specifications needed, taking into account the theoretical data and the resources at hand. And the necessary examinations will be completed.

Creation and Design of the Real Model

This task will be completed with the prototype development and working well. A CAD model of the product will be created. The dimensions will also make sense. The actual product, a material handling robot, will be built and constructed and prepared for use in educational institutions.

BLOCKDIAGRAM-WIRELESS OIL SKIMMER SYSTEM.

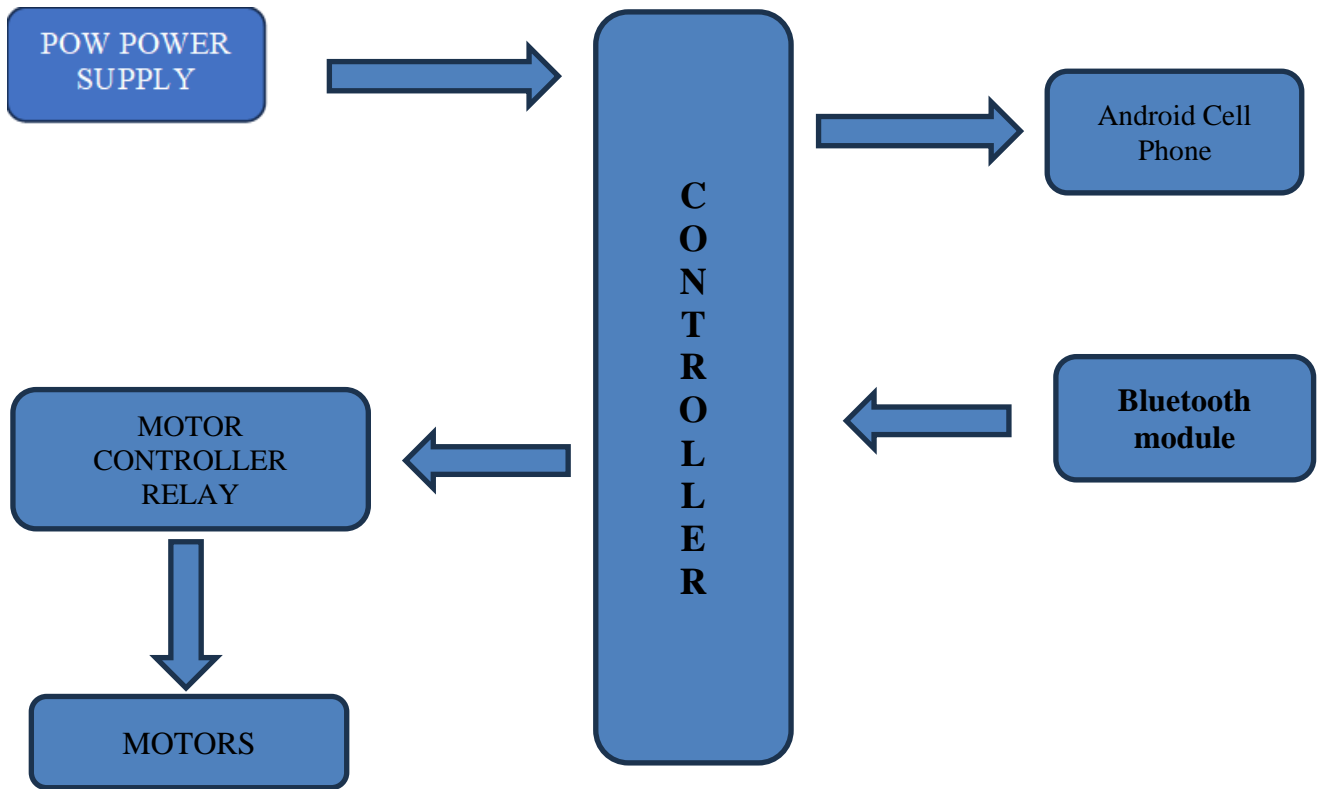


Fig.no.2–Block Diagram for wireless oil skimmer

3. WORKING

Oil is poured into a collecting tank and is drawn in by a belt and disc. The entire assembly rests on a belt and floating or fixed disk, with the skimmer partially submerged in water to increase contact. The battery is charged by solar panels, which also power the motor and provide a self-sustaining model. Rubber scraper that collects oil is fastened with a belt and disc. This system consists of one battery which is connected to the DC to DC converter. It converts DC into 12v DC. This DC to DC converter is connected to Arduino U. The goal of this project is to create a wireless oil skimmer robot powered by solar energy. The solar energy is connected to a battery and used for other purposes. The controller is an Atmega328p-pu. Here, we are utilizing a Bluetooth device for wireless connectivity. We don't need an external remote because we can operate every motor with our smartphone. Our car's movement can be controlled in both directions, and we can also turn the belt and disk on and off. The MS frame construction forms the basis of this entire setup, and PVC pipes are used to arrange the floating

4. ADVANTAGES

- 1. Real-time Monitoring:** Oil skimmer operations may be continuously monitored thanks to Internet of Things connectivity, which provides real-time data on oil levels, system status, and possible problems. This makes it possible to respond quickly and have more control over the skimming process.

2. **Remote operate:** Thanks to wireless connectivity, operators can modify and remotely operate the oil skimmer settings, which eliminates the need for staff to be present on site and promotes effective administration even in difficult or isolated areas.
3. **Data Analytics:** Internet of Things-enabled oil skimmers have the ability to gather and examine data, providing information on environmental conditions, efficiency trends, and consumption patterns. Performance is enhanced overall thanks to this data-driven approach's facilitation of predictive maintenance and optimization.
5. **Energy Efficiency:** Oil skimmers can work more efficiently by modifying their energy usage in response to environmental factors and real-time needs thanks to wireless Internet of Things (IoT) technology's intelligent power management capability.
6. **Integration with Other Systems:** Internet of Things (IoT)-enabled oil skimmers may easily interface with other industrial systems, offering a comprehensive method of environmental control. This integration lowers the possibility of problems involving oil and improves overall operating efficiency.
7. **Cost Reduction:** By better allocating resources, minimizing downtime, and optimizing maintenance schedules, remote monitoring and control combined with data-driven insights can result in cost savings.
8. **Environmental Compliance:** By offering precise data on oil cleanup, spill response times, and overall environmental impact, wireless IoT oil skimmers assist businesses in adhering to environmental requirements. This makes the operation more compliant and sustainable
9. **Early Warning Systems:** By using IoT sensors to identify anomalies or possible problems during the skimming process, early intervention and preventive maintenance can be carried out. This proactive strategy guarantees ongoing oil removal efficiency while minimizing downtime..

10. FUTURESOPES

1. **Improved Automation:** Oil skimming procedures will become much more automated as IoT technology develops further. Using real-time data, intelligent algorithms and machine learning could allow autonomous decision-making to maximize the efficiency of oil removal.
2. **Integration with AI:** Using Artificial Intelligence (AI) systems in conjunction with IoT-enabled oil skimmers can improve their predictive capabilities. Artificial intelligence (AI) algorithms are capable of analyzing past data to forecast oil spill trends, enhance response tactics, and further optimize skimming operations.
3. **Observation of the Environment:** Future wireless oil skimmers might have more sensors to keep an eye on a wider range of environmental factors, such temperature, ecological effect, and water quality. This extensive data can help mitigate the overall effects of oil spills and provide a better understanding of them.
4. **Cutting-Age Computing:** More processing power will be available at the device level as edge computing becomes more widely used in IoT devices. This can decrease latency and improve the overall responsiveness of the oil skimming system by accelerating data analysis and decision-making.
5. **Integration of Blockchain:** Oil skimming operations can benefit from increased traceability and transparency through integration with blockchain technology. This might be especially helpful for adhering to regulations and creating a safe, unchangeable record of oil cleanup operations.

6. **Energy gathering:** With the development of energy gathering technologies, wireless oil skimmers may require less external power sources. Examples of these technologies include solar and kinetic energy. They would become more off-grid and sustainable as a result, making them appropriate for use in isolated areas.
7. **Global Connectivity:** Utilizing satellite or long-range communication technologies, a more globally connected network of oil skimmers may be seen in the future. This connectivity could support cooperative efforts to address large-scale oil spills and enhance the overall efficacy of environmental response initiatives.
8. **Customization and Scalability:** Future IoT-based wireless oil skimmers may offer more customization options to accommodate particular environmental conditions and types of oil spills. Scalability will be essential to enable the deployment of fleets of interconnected skimmers for large-scale spill response.
9. **Regulatory Compliance Solutions:** The incorporation of IoT technologies can help businesses meet and surpass environmental regulations.

6. CONCLUSIONS

In conclusion, the wireless oil skimmer based on IoT represents a significant advancement in environmental management and response to oil spills. The integration of IoT technology has enabled real-time monitoring, remote control, and data-driven decision-making, enhancing the overall efficiency of oil removal processes. The system's ability to collect and analyze data provides valuable insights for optimizing operational parameters, reducing downtime, and improving resource allocation. Furthermore, the wireless connectivity of the skimmer allows for remote deployment and management, making it suitable for diverse and challenging environments. The predictive maintenance capabilities of IoT contribute to the skimmer's reliability, ensuring continuous and effective oil removal.

Going forward, there are a lot of exciting things that could happen to this technology. Things like AI, energy harvesting, and global connectivity could improve the skimmer's capabilities and make it even more sustainable, adaptive, and responsive to environmental challenges. In the end, the IoT-based wireless oil skimmer is a promising way to reduce the environmental damage caused by oil spills, help with regulatory compliance, and promote a more sustainable way of protecting aquatic ecosystems.

As long as technology keeps developing, this device will be a useful tool for protecting our waterways and maintaining the delicate balance of aquatic environments.

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