**Innovative Underwater Recovery: A Mini-Computer Powered Submersible Robot for Locating and Retrieving Lost Objects**

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1. Introduction

Recovering lost objects from underwater environments is challenging due to the complexities of aquatic conditions and limitations of traditional methods, such as large equipment or human divers. This study presents an innovative solution through a mini-computer powered submersible robot designed to improve underwater recovery. The robot utilizes advanced mini-computer technology for precise navigation and efficient retrieval, integrating sensors and autonomous capabilities. This approach aims to enhance safety, reduce costs, and overcome the limitations of existing recovery methods by offering a more compact and effective solution.

2.0 Background of the Study

Underwater recovery operations often involve large, expensive equipment or human divers, constrained by depth, visibility, and operational risks. Advances in robotics and miniaturization technology provide new opportunities for improving these operations. Mini-computers can enhance underwater robots with powerful processing, real-time data analysis, and autonomous functions. A mini-computer powered submersible robot can navigate challenging underwater environments and perform recovery tasks more efficiently and safely. This study explores the development and effectiveness of such a robot, aiming to revolutionize underwater recovery by integrating advanced computing with robust engineering.

3.0 Statement of the problem

Recovering lost or submerged objects from underwater environments is fraught with challenges, including the limitations of existing equipment and the risks associated with human divers. Traditional methods often involve large, expensive equipment that can be cumbersome and inefficient, or rely on divers who face hazards and limitations in visibility and depth. There is a need for a more effective, safe, and cost-efficient solution to improve underwater recovery operations. This study seeks to address this need by exploring the development of a mini-computer powered submersible robot designed to enhance the precision, safety, and efficiency of locating and retrieving lost objects underwater.

3.1 Main Problem

The main problem addressed in this study is the inefficiency and high risk associated with traditional underwater recovery methods. Existing equipment and human divers face significant limitations in terms of cost, safety, and effectiveness, which impacts the success of locating and retrieving lost objects from underwater environments. There is a need for a more advanced and accessible solution that can overcome these limitations and provide improved performance in underwater recovery tasks.

3.2 Specific Problem

Design and Functionality: How can a mini-computer powered submersible robot be designed to effectively navigate underwater environments, locate lost objects with high precision, and perform retrieval tasks efficiently?

Integration and Performance: What are the technical challenges in integrating mini-computer technology with underwater robotics to ensure reliable performance and functionality in various underwater conditions?

Safety and Cost Efficiency: How does the mini-computer powered submersible robot compare to traditional methods in terms of safety for operators and cost-effectiveness for recovery operations?

4.0 Objective of the Study

The objective of this study is to design, develop, and evaluate a mini-computer powered submersible robot that enhances the efficiency and safety of underwater recovery operations. The robot aims to locate and retrieve lost objects more effectively than traditional methods by utilizing advanced mini-computer technology for precise navigation, autonomous operation, and real-time data processing. The study will assess the performance of the robot in various underwater conditions and compare its effectiveness with existing recovery methods.

4.1 General Objective

The general objective of this study is to improve underwater recovery operations by developing a mini-computer powered submersible robot that can efficiently locate and retrieve lost objects. This robot aims to address the limitations of current recovery methods by providing a more precise, safe, and cost-effective solution for underwater object recovery.

4.2 Specific Objective

Design and Development: To design and develop a mini-computer powered submersible robot with capabilities for precise navigation, autonomous operation, and effective object retrieval in underwater environments.

Performance Evaluation: To evaluate the performance of the mini-computer powered submersible robot in various underwater scenarios, assessing its effectiveness in locating and retrieving lost objects compared to traditional methods.

Safety and Cost Analysis: To analyze the safety and cost efficiency of the mini-computer powered submersible robot in comparison to conventional underwater recovery techniques, identifying potential advantages and improvements.

5.0 Scope and Limitation

Scope:

This study focuses on the design, development, and evaluation of a mini-computer powered submersible robot intended for underwater recovery operations. It encompasses the integration of mini-computer technology with underwater robotics to enhance navigation, object detection, and retrieval capabilities. The scope includes testing the robot's performance in various underwater environments and comparing its effectiveness with traditional recovery methods. The research will primarily address the technical aspects of the robot’s design, its operational efficiency, and its overall impact on underwater recovery tasks.

Limitation:

Environmental Conditions: The robot's performance may be evaluated in controlled or specific underwater environments, which may not fully represent all possible real-world conditions such as extreme depths or varying water qualities.

Hardware Constraints: The study will be limited by the capabilities of the mini-computer and other hardware components used in the robot, which may affect its performance and functionalities.

User Testing Scope: The assessment of user experience and operational safety will be conducted with a limited number of test operators, potentially limiting the generalizability of findings related to ease of use and safety.

6.0 Significance of the study

This study is significant as it introduces a novel approach to underwater recovery operations through the development of a mini-computer powered submersible robot. By enhancing the precision, safety, and cost-effectiveness of locating and retrieving lost objects, the robot has the potential to revolutionize current recovery practices. The study addresses critical gaps in existing methods, offering a more efficient solution that minimizes risks associated with traditional equipment and human divers. Additionally, the integration of mini-computer technology provides advanced functionalities that improve operational effectiveness in challenging underwater environments. The findings of this study could benefit various sectors, including salvage operations, environmental monitoring, and search and rescue missions, by providing a more reliable and accessible tool for underwater recovery.