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Design and Development of a Low-Cost IoT-Based Underwater ROV for Environmental Monitoring

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Abstract: The development of low-cost underwater exploration systems has gained increasing interest due to the high expense and complexity of commercial ROVs. In this work, a cost-effective, IoT-enabled Remotely Operated Vehicle (ROV) is designed and developed for underwater monitoring and research applications. The system employs a Raspberry Pi as the main controller to operate waterproof thrusters and collect real-time data from temperature, pressure, and depth sensors. The acquired data and live video feed are transmitted wirelessly to an IoT dashboard for visualization and analysis. The ROV frame, designed using 3D modeling and fabricated through 3D printing, ensures low manufacturing cost, modularity, and waterproof integrity. The proposed system offers reliable performance, scalability, and ease of customization, making it suitable for academic, environmental, and small-scale underwater exploration applications.

Keywords: Remote Operated Vehicle(ROV),Real time monitoring, sensor integration, Underwater exploration

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