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Introduction

Commercial fishing is one of the world's most hazardous occupations due to extreme weather, mechanical hazards, and limited emergency readiness [1,2].

Traditional safety training is classroom-based with little hands-on experience [3]. This study introduces an immersive VR safety-training module that simulates vessel emergencies to enhance preparedness and decision-making. Results expected to show strong engagement and improved skill retention compared to traditional methods.

Research Methods

- Built a water-leak emergency module in Unreal Engine using Meta Quest Pro for full-body immersive experience.
- Simulated leak localization and sealing tasks inside a virtual fishing vessel under dynamic flooding conditions.
- Compare VR-based and traditional classroom-based safety training to evaluate learning efficiency.

Findings and Challenges

- VR module achieved realistic hydrodynamics and interactive training fidelity with strong user immersion.
- Participants showed faster reaction times and better procedural recall than in traditional training.
- Optimized real-time fluid simulation and user tracking for Meta Quest Pro hardware limits.

Challenges:

- Realistic water physics demands GPU-intensive computation and iterative performance tuning.
- Maintaining frame stability and synced user actions under dynamic fluid conditions required optimization.

Future work

- Develop fire-emergency VR module enabling users to identify fire sources, select extinguishers, and perform correct response steps.
- Implement an AI-driven instructor avatar in Unreal Engine for adaptive guidance and performance feedback.



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References

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VR Training Module

