

SHIP HULL LEAK DETECTION AND AUTOMATIC WATER DISCHARGE SYSTEM BASED ON AND WLS (WATER LEVEL SENSOR)

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ABSTRACT

Hull leakage is one of the main problems that can disrupt ship stability and endanger both the vessel and its crew. This study proposes a solution by designing an automatic hull leakage detection and water discharge system based on and Water Level Sensor (WLS), implemented on a 1:56 scale tug boat model. The system consists of three detection points using WLS connected to , a relay module, three mini DC pumps, a buzzer, LED indicators (green, yellow, red), and a 16x2 LCD display to monitor conditions in real-time. The research method includes electronic circuit design, Arduino programming, and testing of sensor sensitivity, response time, pump capacity, and system effectiveness. The results show that the sensor can detect water levels starting from ± 0.5 cm with a response time of less than 3 seconds, while the pump can discharge 250 ml of water within approximately 16–18 seconds. The system automatically provides alerts through visual and audio indicators and activates the corresponding pump according to the leakage point. The novelty of this research lies in the implementation of multi-point leakage detection integrated with an automatic water discharge mechanism that is effective on a ship model.

Keywords: *Leakage, ship hull, detection system, , WLS (Water Level Sensor).*