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# Acceptability Level of the Modified Automatic Water Level Controller with Digital Display

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**Abstract**

**Introduction**: This research delves into water conservation, focusing on the impact of negligent practices on Earth's drinkable water supply, echoing the adage "Water is life, so save it."

**Objectives**: The primary objective of this study was to evaluate the acceptability and effectiveness of a newly developed Modified Automatic Water Level Controller with Digital Display, focusing on its potential to address water wastage from tank overflows.

**Methods**: Employing an experimental design, structured surveys were distributed to 19 Electrical Technology participants to gather insights into water level control systems.

**Results**: The findings on the Modified Automatic Water Level Controller with Digital Display reveal its favorable reception and effectiveness in various technical aspects. The device excels in functionality, power efficiency, convenience, and safety considerations. However, there are opportunities for refinement in power usage, adaptability, and user interface design.

**Conclusions**: The study concludes by highlighting the device's potential for further development, contributing valuable insights to the field of water level control technology.

**Keywords**: water level controller, acceptability level, experimental design

## 1. Introduction

Rooted in the principle that "Water is life, so save it," this study delves into the crucial realm of water conservation, highlighting the wide-ranging consequences of careless practices on Earth's drinkable water supply. Existing research, including works by Gleick (2000)[1] and findings from the World Water Assessment Programme (2019)[2], strongly emphasizes the looming depletion of this vital resource—a result of both the reckless destruction of water sources and uncontrolled use. An often-overlooked aggravating factor in this complex issue is the common practice of storing water in tanks, as discussed in studies by Sharma et al. (2015)[3] and Li et al. (2018)[4], especially during times of inefficient water distribution. Despite being seen as essential for many homes and businesses, this precautionary measure paradoxically leads to water wastage, particularly during unnoticed overflows, often occurring at night. The study explores the market response with available controllers designed to address this issue, shedding light on the resistance among water tank owners to invest in these solutions, as evidenced in studies by Smith (2017)[5] and Patel et al. (2020)[6], presenting a significant obstacle. This research underscores the urgent need for swift, sustainable solutions to protect our valuable water resources, contributing essential insights to the existing body of literature on water conservation and management.

## 2. Objectives

The primary objective of this study was to evaluate the acceptability and effectiveness of a newly developed Modified Automatic Water Level Controller with Digital Display, focusing on its potential to address water wastage from tank overflows. The researchers aimed to assess the device's performance across four key dimensions: functionality, power consumption, convenience for use, and safety considerations. In addition, the Modified Water Level Controller with Digital Display was developed to have an effective and user-friendly solution for water conservation, and promoting responsible water management practices.

## 3. Methods

In conducting this study, an experimental design methodology was implemented. The researcher distributed structured questionnaires to a cohort

comprising nineteen (19) Electrical Technology students and instructors. The questionnaire aimed to gather comprehensive insights into various aspects related to the subject matter. After the data collection phase, a meticulous analysis ensued, employing statistical tools to discern patterns and derive meaningful insights. The researcher, adopting a systematic approach, interpreted the findings, drawing conclusions that contribute to the understanding of key factors within the realm of Electrical Technology. This methodological rigor is pivotal in enhancing the reliability of the study's outcomes and enriching the existing body of knowledge in the field.

## 4. Results

Acceptability Level of the Modified Automatic Water Level
Controller with Digital Display
**N** = 19

| In terms of: | WM | Descr | Rank |
|---|---|---|---|
| **1. Device Functionality** | | | |
| a. produce sound when a predetermined top level of water is reached. | 2.74 | H | 1 |
| b. Shut off the pump motor instantly when the predetermined top level is reached. | 2.58 | H | |
| c. The sensing device uses any size of duplex wire instead of a float switch. | 2.37 | H | |
| d. Run the pump motor when the predetermined lower level is reached. | 2.63 | H | |
| e. Gives lights when predetermined lower and the higher level is reached. | 2.47 | H | |
| **Average:** | **2.56** | **H** | |
| **2. Power Consumption** | | | |
| a. Uses 6V-DC at 50mA or less during the whole operation | 2.47 | H | 4 |
| b. Consumed approximately 150mW of power per hour | 2.68 | H | |
| c. Uses 6V-DC current to operate the sensor which is located at the side of the water tank | 2.31 | A | |
| d. Consumed approximately .09kW x 6 pesos/kW or pesos for the operation | 2.37 | H | |
| **Average:** | **2.46** | **H** | |
| **3. Convenience for use** | | | |
| a. No part of the components is breakable | 2.47 | H | 2 |
| b. The whole unit is provided with holes at its corners for an easy screwing installation | 2.53 | H | |
| c. Sensor wires can be installed in any manner (by PEC provision) since only 6Volts is present across wires | 2.59 | H | |
| **Average:** | **2.53** | **H** | |
| **4. Safeness** | | | |
| a. Uses ordinary duplex wire #18 or smaller | 2.57 | H | 3 |
| b. No more than 6Volts is used to operate the device | 2.42 | H | |
| c. The entire unit is housed in a unique design plastic casing of 4”x8”x3” | 2.42 | H | |
| d. The controlling unit is installed within 5m from the water pump unit | 2.47 | H | |
| e. Equipment with grounding system for protection | 2.58 | H | |
| f. Wires used are insulated | 2.40 | H | |
| **Average:** | **2.48** | **H** | |

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## 5. Discussion

The research findings on the Modified Automatic Water Level Controller with Digital Display, involving a sample of 19 participants, underscore its

commendable acceptability and effectiveness across diverse dimensions. In assessing functionality, the device demonstrated notable strengths, particularly in generating auditory alerts upon reaching a predetermined water level, achieving the highest average rating of 2.74 and securing the top rank. This aligns with existing literature emphasizing the crucial role of audible alarms in water level control systems for signaling critical thresholds (Smith et al. 2018)[7]. The controller's efficiency in promptly halting the pump motor (average rating: 2.58) and its adaptability to any size of duplex wire instead of a conventional float switch (average rating: 2.37) further indicate competitive performance, suggesting potential areas for improvement and future development.

Regarding power consumption, the controller exhibited satisfactory performance, utilizing 6V-DC at 50mA or less (average rating: 2.47). This aligns with contemporary literature emphasizing the significance of energy-efficient operation in enhancing the sustainability of water control systems (Li & Zhang 2017)[8]. Moreover, the device consumes approximately 150mW of power per hour, earning a competitive average rating of 2.68. While slightly lower ratings are observed for the use of 6V-DC current for the sensor located at the water tank's side (average rating: 2.31) and power consumption calculation (average rating: 2.37), these findings still maintain a satisfactory standing, indicating areas where refinements could be considered for optimization.

Assessing convenience for use reveals positive attributes, including non-breakable components (average rating: 2.47) and strategically provided installation holes (average rating: 2.53), aligning with principles of user-friendly design within automated systems (Chen et al. 2020)[9].Furthermore, the flexibility in installing sensor wires due to the low voltage present across wires receives a commendable rating of 2.59, signifying the user-friendly features of the device.

In terms of safety considerations, the controller adheres to safety standards by employing ordinary duplex wire #18 or smaller (average rating: 2.57). Notably, no more than 6 Volts are used to operate the device (average rating: 2.42), reflecting a commitment to safety measures. The unique design plastic casing, close proximity of the controlling unit to the water pump unit (average rating: 2.47), grounding system for protection (average rating: 2.58), and use of insulated wires (average rating: 2.40) collectively contribute to a comprehensive approach to safety, as recommended by Mishra and Kumar (2016)[10] .

In summary, the research findings indicate a generally positive acceptability of the Modified Automatic Water Level Controller with Digital Display. While functionality, power consumption, convenience for use, and safety considerations all exhibit positive aspects, further research and development could focus on addressing specific areas with slightly lower average ratings to enhance overall performance, contributing to the refinement of this innovative water level control technology. In conclusion, the research findings underscore the commendable acceptability and effectiveness of the Modified Automatic Water Level Controller with Digital Display across various dimensions. The device demonstrates notable strengths in functionality, particularly in generating auditory alerts and efficiently halting the pump motor, aligning with existing literature on the importance of audible alarms and energy-efficient operation in water control systems. Despite slightly lower ratings in certain aspects of power consumption and sensor-related considerations, the overall positive attributes, including user-friendly design and safety measures, contribute to the device's overall positive reception.

The study suggests that while the controller exhibits competitive performance, there are opportunities for refinement and future development, especially in optimizing power consumption calculations and sensor-related features. These findings provide valuable insights for researchers and developers to enhance the device's performance and further establish its credibility in water level control technology. Overall, the Modified Automatic Water Level Controller with Digital Display holds promise as a reliable and user-friendly solution, emphasizing the need for ongoing research and improvements to meet evolving standards and user expectations in water management systems.

## 6. Recommendation

To optimize the performance of the Modified Automatic Water Level Controller with Digital

Display, key recommendations include refining power efficiency, especially in the calculation of 6V-DC current for side sensors, and exploring alternative alert mechanisms to enhance the signaling of critical water levels. Additionally, improvements in sensor adaptability and user interface features are essential for maximizing the device's compatibility and ensuring straightforward user interaction.

Continuous safety measures, such as regular assessments of plastic casing, controlling unit proximity, grounding systems, and insulated wires, should be prioritized to uphold safety standards. Stakeholder engagement, particularly with end-users and water management professionals, is crucial for soliciting feedback on user experiences and incorporating real-world perspectives. This collaborative approach will guide iterative enhancements, ensuring the Modified Automatic Water Level Controller with Digital Display remains at the forefront of efficient, user-friendly, and safe water level control technology.

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