

Review OJS_Development of an IoT-Based PLC Trainer Bridging the Practical Divide in Industrial Automation Education

Round 1

Round 1 Status
Submission accepted.

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[IJEM] Editor Decision	2024-01-11 03:01 AM
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plasma comprehension and effective implementation process as a manager for local business and professionals. The surge of the Internet of Things (IoT) in recent years offers newfound opportunities to deepen the comprehension and utilization of PLCs by harnessing device connectivity and integration. In this realm, [7] emphasizes that "the pursuit of innovative and IoT-based practical training empowers students and professionals to attain a profound understanding of PLC utilization across diverse environments, including fire monitoring and control." Echoing this sentiment, [10] underscores the urgency of developing interactive practical training tools, stating that "the adoption of IoT-based practical training sparks students' interest and motivation in mastering PLCs."

Numerous recent studies advocate for the incorporation of IoT technology in teaching and learning PLCs. For instance, [11] seamlessly integrates PLCs using Virtual Reality with wireless sensor technology, facilitating practical exercises and skill development. This study showcases a significant enhancement in students' understanding and practical skills.

Furthermore, studies exploring the integration of PLCs with IoT platforms, such as cloud and mobile platforms, exemplify this trend [12], for instance, pioneers a cloud-based platform facilitating the remote monitoring and control of PLCs over the internet, ensuring flexible access and efficient utilization.

2 Methodology

The research methodology involves a series of steps in designing, developing, and testing the IoT-based PLC Trainer. Here is a brief description of each methodological step:

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Page 1 of 1 English (Indonesia)

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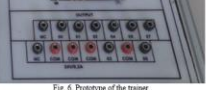


Fig. 4. Prototype of the trainer

5. Testing:

In the testing phase, the IoT-based PLC Trainer underwent a meticulous evaluation to validate its performance and usability. The testing process involved comprehensive trials on various components, affirming that the trainer is ready for effective deployment. The testing protocol included the following key components:

Component Test	Procedure	Result
PLC Functionality Test	Executing sample programs to assess the PLC's responsiveness and logic execution.	Very Good
Pneumatic System Trials	Activating the pneumatic double-acting cylinder, solenoid double coil, and regulating air pressure using the air flow regulator.	Very Good
Sensor and Actuator Verification	Testing the inductive proximity sensor in various scenarios and evaluating the lamp's response to programmed conditions.	Very Good
Material Durability Examination	Subjecting the casings to simulated conditions and ensuring they meet safety and durability standards.	Very Good
Control Interface Validation	Actuating push buttons and switches to observe corresponding responses in the PLC program.	Very Good

4 Conclusion

In conclusion, the development of the IoT-based PLC Trainer represents a significant achievement, demonstrating a well-functioning tool through rigorous testing. The trainer has proven its capabilities in executing precise PLC logic, operating pneumatic and sensor components seamlessly, and showcasing optimal performance across all functions. The thoughtful selection of materials, such as the durable acrylic casing and robust metal container, ensures longevity and compliance with safety standards crucial for industrial applications. The inclusion of an intuitive user interface, featuring well-designed push buttons and switches, adds to the trainer's user-friendly nature, enhancing its utility in educational and industrial contexts. Looking forward, the successful completion of this project opens avenues for impactful contributions, especially in the realm of industrial automation. The IoT-based PLC Trainer, with its capabilities, is poised to become an

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additional results from the researcher's thoughts, then combined with the results of previous research.

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language of contemporary industrial automation. In essence, the IoT-based PLC Trainer signifies not only the culmination of technical expertise but also a significant step towards bridging the gap between theoretical knowledge and practical application in the dynamic domain of IoT-driven programmable logic controllers. The journey from conceptualization to realization has laid the foundation for a tool that promises to empower the workforce of the future.

5 Acknowledgment

The successful completion of this research project was made possible through the generous support and funding provided by the Lembaga Penelitian dan Pengabdian kepada Masyarakat (LPPM) of Universitas Islam Dallas (UAD). We express our heartfelt gratitude for their financial assistance, which played a crucial role in the realization of this study. The commitment of LPPM UAD to fostering research initiatives has significantly contributed to the development of knowledge and innovation within the academic community. This acknowledgment extends to the dedicated efforts of all those involved in administering and facilitating the research funding program. Thank you, LPPM UAD, for your invaluable support.

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